

**Defining Activity Areas in the Early Neolithic Site at Foeni-Salaş
(Southwest Romania): A Spatial Analytic Approach with Geographical
Information Systems in Archaeology**

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Abstract

Through the years, there has been a great deal of archaeological research focused on the earliest farming cultures of Europe (i.e. Early Neolithic). However, little effort has been expended to uncover the type and nature of daily activities performed within Early Neolithic dwellings, particularly in the Balkans.

This thesis conducts a spatial analysis of the Early Neolithic pit house levels of the Foeni-Salaş site in southeast Romania, in the northern half of the Balkans, to determine the kinds and locations of activities that occurred in these pit houses. Characteristic Early Neolithic dwellings in the northern Balkans are pit houses. The data are analyzed using Geographic Information Systems (GIS) technology in an attempt to identify non-random patterns that will indicate how the pit house inhabitants used their space. Both visual and statistical (Nearest Neighbor) techniques are used to identify spatial patterns. Spreadsheet data are incorporated into the map database in order to compare and contrast the results from the two techniques of analysis. Map data provides precise artefact locations, while spreadsheet data yield more generalized quad centroid information. Unlike the mapped data, the spreadsheet data also included artefacts recovered in sieves. Utilizing both data types gave a more complex and fuller understanding of how space was used at Foeni-Salaş.

The results show that different types of activity areas are present within each of the pit houses. Comparison of interior to exterior artifact distributions demonstrates that most activities take place within pit house. Some of the activities present include weaving, food preparation, butchering, hide processing, pottery making, ritual, and other activities related to the running of households. It was found that these activities are placed in specific locations relative to features within the pit house and the physical structure of the pit house itself. This research adds to the growing body of archaeological research that implements GIS to answer questions and solve problems related to the spatial dimension of human behaviour.

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Most importantly, I would like to thank my advisor, Dr. Haskel Greenfield, for his patience and continuous encouragement. He took time away from his family and to work with me on all of the theoretical, methodological, technical and data issues discussed in this thesis. Without his constant advice and guidance this thesis could not have been completed and that is greatly appreciated. I am glad and grateful to have had the opportunity to work with him on this thesis and to become part of the Foeni project.

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Thanks must be also extended to the excavation team that dug Foeni-Salaş during the 1992, 1993 and 1994 field seasons. The detailed maps created during this dig made this thesis possible. It is very unusual to have such an extensive spatial database from an Early Neolithic settlement.

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To my family. Old, new, close by and far away.

Foreword

Masters candidates are often asked what subject they are specializing in. When people hear “archaeology”, the majority immediately launch into the tirade about CSI, Indiana Jones and Lara Croft and how cool I must be. I usually answer this by insisting that learning the proper use of whip and correct fedora wearing is mandatory in first year studies. A darling minority is rather more clever and ask about my specific work. They soon regret their line of inquiry as I drone on about animal bones, pit houses and spatial clustering.

Archaeology has always held my interest. Such a field of study is attractive and challenging for some one like me who wants to see it all. The Foeni project was a way of combining many of the interesting aspects of archaeology in to a cohesive spatial analysis. What other way could I look at bones, lithics and dwellings.

My involvement in the Foeni project began back in my early university days as an undergraduate student in Anthropology at the University of Manitoba. In the usual undergrad strategy of trying to get work/ experience/ good grades, I began looking for projects that graduate students and professors needed an extra hand at. Dr. Greenfield needed help digitizing the piles of hand-drawn maps from his excavations at Foeni-Salaş. One of his former graduate students, Adam Allentuck, patiently taught me how to use the now archaic digitizing board and ArcView software to create computerized versions of the maps. Eventually that volunteer work turned into a real job. My interest in the project grew as I also organized and scanned photo slides, other maps and worked on the data.

In my early days as a graduate student I needed a site. I needed something in a part of the world I was interested in and one that I could run a spatial analysis on it. I looked at several sites. There were sites from Peru, the United States and Canada. However, none of these contained the quality of data that were necessary for the type of inquiry that I planned. I ended up choosing Foeni since it was the best data that I had access to. In addition, I already had a good idea of what could be done on the data and I was semi-familiar with it from working on it from various angles.

In order to use the data properly in GIS I ended up taking on-line courses in ESRI's flagship GIS software. I also had to learn to change my writing style from terrible

to merely poor. I feel that I never learned so much so fast in my entire life during those first two years. It has been at times a pleasure and at times a hell. A typical grad student sentiment I believe. Even if one person finds the information provided here of any use or interesting it will have been worth it.

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Chapter 1: Introduction to the problem

I. Introduction

The Early Neolithic is an important transitional stage in Balkan prehistory. Early Neolithic studies of the organization of people that lived in the Balkans have concentrated on macro-scale issues, such as chronology, culture history, spatial distribution of settlements, settlement type, structure construction, subsistence, technology, and economies. Micro-scale research, such as activities within particular structures, or even in entire sites has been neglected. Micro-scale refers specifically to the distribution of artefacts and features within a single site. Macro-scale refers to gross-features, such as site location or inter-site comparisons, regional settlement pattern, etc. Variables that can be studied include identifying artefacts associated with each other and with certain features; the locations where faunal remains are found, and what taphonomic processes may be responsible for false patterns. Even spaces that are void of artefacts and features may be of importance. As a result, there is incomplete understanding of the smaller scale behavioural patterns within Early Neolithic settlements, and within dwellings. In the past, little effort has been expended to uncover the type and nature of activities performed within dwellings during the early stages of the Neolithic.

There is virtually no literature on the spatial arrangements between artefacts and features within individual pit houses in order to uncover activity areas. Individual artefacts are given less attention and are rarely discussed in terms of relation to major features and other artefacts. Archaeological features are often unclear and ambiguous in their function necessitating close study.

By ignoring associations among artefacts and features, it is more difficult to unravel the function of the feature or activity areas and define them. Clearly, there is a need for activity area investigations based on artefacts and features using a method specifically for the representation and interpretation of place. This may be one of the underlying problems in recognizing and understanding Early Neolithic behaviour and cultural characteristics. It is necessary to identify organizational areas and patterns that inform us of how people organized their spatial activities in the past (Oswald 1987: 295).

This thesis conducts a spatial analysis of the Early Neolithic levels at the archaeological site of Foeni-Salaş, in southwest Romania. This thesis examines the

artefact and feature patterns of pit houses in order to identify where and how activities were organized within pit houses. As a result, small-scale activity areas can be recognized. In this manner, a more complete view of the nature and spatial distributions of the daily activities of residents of an Early Neolithic village can be obtained.

Foeni-Salaş contains Early Neolithic levels with a relatively undisturbed Starčevo-Criş component that contains pit houses (Greenfield and Drasovean 1994; Greenfield and Jongsma in press). This site was excavated and mapped in a manner that enabled this study to use Geographical Information Systems (GIS) for analysis. The data were collected in a form specifically designed to conduct spatial studies, such that an analysis that identifies and examines specific activity areas can proceed.

II. Previous research on Foeni-Salaş

In the central Balkans, the living structures of the Early Neolithic Starčevo-Criş culture are in the form of pit houses. Jongsma's (1997) analysis moved towards establishing community patterns such as settlement patterns, household clusters and activity areas. She was able to determine the nature and location of houses in Early Neolithic sites in the Balkans (Jongsma 1997: 201; Jongsma and Greenfield 2001). She was able to identify the pit houses of Foeni-Salaş from middens by recognizing the presence of architectural wattle and daub, ovens and hearths. It was determined that artefact concentrations are in pit houses and storage pits yet, there is no investigation to how these various objects are concentrated and if they are in a spatial relationship with other objects or features.

Jezik's (1998) botanical study inferred that agriculture was only part of the subsistence strategies utilized at Foeni-Salaş during the Starčevo period. Gathered plants were supplemental to the main part of the diet. A variety of wild and domestic meat and milk sources are present including wild and domestic pig, cattle and sheep/ goats (Greenfield and Jongsma in press). Senior's (2004) study of the modes of production at Foeni-Salaş states that communal activities may have taken place at the site and that some areas share activities. Zita (2006) examined the data and investigated social organization using a relational database. This is an improvement on the spreadsheet form as errors are more easily caught and corrected. However, the relational database is not intuitive. It is difficult to make corrections and changes that will be made across all the

parts of the database. Zita used multivariate statistics, namely Chi-squared and Cramer's V to determine if group activities between house structures were more similar or less similar (2006: 68). Gross artefact categories were used to classify material remains: daub, ceramic, figurine and bone. Zita's data and analysis could not conclusively define activity areas but speculated on the purpose of different loci.

III. Goal

As shown above, previous comparisons of the data from the Early Neolithic pit houses at Foeni-Salaş have compared artefact and feature (such as hearths, ovens and pits) distributions between pit houses. What activities and where they took place within the context of pit houses will be investigated. Why did specific activities occur where they did? This study discusses what activities were being conducted and how and why they were placed in specific locations. This thesis uses data that have not been previously analyzed – the maps of piece-point plotted artefacts and their distributions in relation to large and small features at the site. As a result, the organization of space and activity areas within early Neolithic pit houses of Foeni-Salaş in Romania can be further investigated.

IV. Nature of activity areas

. An activity area is “a place... at which one or more specific activities [such as stone tool production or pottery manufacture] took place” (Thomas 1998: 406). If an area was used for weaving, there should be high concentrations of loom weights. Other weight types such as spindle wholes or bolas that may have also functioned in the weaving process should be present.

In places where food production occurred tools associated with this activity should be there (e.g. certain bone tools, ceramics and grinding stones). More specific food production activities such as grain processing should have higher numbers of grinding stones present. Storage places would have concentration of larger ceramics and perhaps a mix of different faunal remains and tools depending on whether there were different storage places for different types of material. If material is used for both cooking and eating, it may be stored at a cooking area or eating area. The cooking and eating areas may also be the same. It is possible that areas were used for socializing or gathering. If this is the case then they may be around heat sources (ovens, hearths or fire pits), or in

large central areas where many people can be at once. Socializing also takes place synchronously with work so activity areas and socializing areas may be the same. If there are specific dedicated areas for religious purposes there may be a lack of domestic, utilitarian artefacts. There would be higher concentrations of figurines, altars, ornaments, or other special artefacts pertaining to cult activity.

Discard areas such as middens will have concentrations of every artefact and remain type. Bones, tools beyond repair, ashes, charcoal and ceramics may be concentrated in random array. If this is the case, then specific places were used for discard. If there is no discard area, it may be further from the site and therefore not part of immediate excavations. If the site was short term, as Foeni-Salaş appears to be, the discarded waste may have not amassed in specific places, but simply left in place when the user(s) were finished with it.

A. Structure of activity areas

Artefacts found indicates what activity they were being used for. If lithic production took place then there should be concentrations of cores and lithic debitage.

There has been a question as to whether different weight types are associated or not. Loom weights may be used for weaving. More ambiguous artefacts, such as bolas, may be used for weaving or for hunting. If bolas are associated with weaving implements, such as loom weights, then they are most likely being used for textile manufacture. Bolas associated with hunting may not be on site if hunters leave them external to the site. On-site, they may be associated with faunal remains or in storage places. Loaf weights are another ambiguous object. They may be weights to hold down covering such as the pit house roof (Barber 1991: 97). If loaf weights are associated just outside pit house loci near postholes they are probably used as weights. If loafs are in other loci without any association than they may be decoration. Net weights could also be used for various purposes, including fishing and weaving.

Artefacts associated with food production may occur in concentrations. Bone tools, spatulas, grinding stones, ceramics and faunal remains may be clustered in a food production area. Lithic tools may be associated in these places. Carbon, ash and carbonized and burnt remains are indicative of burning. These artefacts may indicate hearths, ovens or fire pits.

V. Hypothesis

“Activity systems are inevitably organized in space and time” (Rapoport 1990: 12). This being true, and given the nature of the Foeni-Salaş data, it should be possible to identify spaces where specific activities took place. Artefacts represent particular behaviour and activity patterns. Activity areas should be recognizable by the number and type(s) of artefacts present. In other words, if the space within pit houses was organized according to human activity, patterns reflecting that organization should be reflected in distribution of material remains within that space. If activity areas are reflected in artefact distributions, then there should be clusters of materials at the activity locations and the cluster contents should reflect the activities performed (Simek 1981: 59). In order to test for, and find, activity patterns and formation processes within pit houses, the theories behind spatial behaviour and organization, activity patterns, and their material manifestations within pit houses must be defined and explored.

If activity areas exist, then a non-random pattern of artefact distribution will be identifiable. The expectation is that the kinds of activities that should occur in pit houses are those related to the domestic realm: for example, food preparation, consumption, disposal, and storage; general storage; socializing; heating; tool production and repair; and sleeping. As a result, whether these activities are taking place in the same places within these pit houses or are segregated elsewhere, can be found.

The null hypothesis is if activity areas are not present, then artefact patterns will be random with no overarching or specific patterns. They will be randomly scattered.

VI. Method

Spatial analysis has long been an important part of archaeology. Context and provenience of artefacts have been recorded in archaeological excavations since the discipline began. It has provided insights into behavior, social organization and structure of past cultures. The use of spatial analysis is varied in archaeology. There are numerous methods and theoretical approaches (e.g. statistics, GIS, GPS, grid systems, artifact associations, stratigraphic association). Common ground is found in that spatial analyses in archaeology attempt to explain the relationships between the patterns of artefacts and architecture and the way that past societies operated as systems. This thesis employs the method of spatial analysis to define activity areas and the processes that formed them. To

this end, Geographical Information Systems are employed in order to display and identify patterns and spatial relationships of artefacts.

VII. Technique

Patterns are identified visually and with statistical means (e.g. Chi-squared and Kernel Density). Visual patterns are observed through the GIS projections. Different artefacts and combinations of artefacts and loci can be examined for relationships and patterns. Artefact clustering and associations are sought. Even empty places are of importance. Artefact patterns within specific loci or locations are identified. GIS was useful in that certain artefacts in certain areas could be isolated and studied on their own or with others in the same place or in other places. Visually identified patterns were verified using a statistical technique.

Visually identified patterns were verified using Average Nearest Neighbor, a spatial index expressed as the ratio of the observed to expected distance (Spiegle 1992). A statistical tool appropriate to verify visual patterns called Average Nearest Neighbor. The nearest neighbor index is expressed as the ratio of the observed distance divided by the expected distance. The expected distance is the average distance between neighbors in a hypothetical random distribution. If the index is less than 1, the pattern exhibits clustering; if the index is greater than 1, the trend is toward dispersion or competition. It is expected that there are artefact patterns. If this is the case than the index or Z-score will be less than 1.

Statistically speaking, using the Average Nearest Neighbor method, the Z-score for the null hypothesis will be greater than 1. It may be that activities are scattered at random but as artefacts appear to be concentrated according to feature in other early Neolithic sites it will indicate that this is not likely to be the case and that the Z score will be less than 1.

VIII. Conclusion

This thesis adds to the growing body of literature that is using GIS as a tool to conduct archaeological spatial analysis. It enhances our understanding of how and where people conducted the activities necessary to survival during the Early Neolithic, with the spread of early farming communities in SE Europe. Information is gathered on nature and location of activities, especially in a type of dwelling that is not adequately discussed in

Early Neolithic settlement literature. Comparisons between activity area research conducted on other Early Neolithic sites in the Balkans and in central Europe will become possible for the first time, for this crucial intervening region. Pit house comparisons are possible with the new information from this analysis. An additional benefit is the creation of a dynamic information system that can be changed as new information (such as a ceramic analysis) becomes available. The data can also be combined with other data to produce a very large databank that can be subject to many different kinds of analysis.

In studies of Balkan prehistory, there is a general lack of awareness of the structural relationships between people, objects, places, and the material dimensions of these relations in social practices. The Balkan Early Neolithic lacks written accounts and its distance in the past ensures that ethnographic studies are of little relevance for archaeological. Archaeologists are limited to studying the material remains that are left from the daily activities of human behaviour to infer socio-cultural dynamics, relations that produced spatial patterning (Chapman 2000: 4). This is why it is necessary to place this study in larger theoretical terms. These are discussed in the next chapter.

Chapter 2: Theory

I. Introduction

This chapter summarizes the theoretical literature on spatial organization of behavior. This will provide a theoretical basis for investigating the distribution of remains within pit houses at Foeni-Salaş. It shows how it is possible to identify activity areas based on the nature of the spatial data from the Early Neolithic levels at Foeni-Salaş.

The first section of the chapter summarizes the anthropological and geographical theoretical literature that is relevant for inferring behaviour from archaeological sites. Next, the cultural and social behaviour that shape and organize space and the activities carried out within that space is explored. Then, the general activity area theoretical literature is summarized. Next, the relationships between behaviour and formation processes are examined. The distribution of archaeological remains can be generated or affected by different activities and formation processes. Finally, this chapter discusses several examples of pit houses from different parts of the world and how they are studied and interpreted.

The goal of archaeologists is to try to understand the relationship between cultural and social behaviour and its material manifestation in the archaeological record. Behaviour, organization, structure are concepts that must therefore be explored in order to link the archaeological record to behaviour.

II. General relationship between spatial behaviour and organization

Patterns that are resultant from human behaviour imply an organizational process. Humans organize themselves and organize their space in the space in which they find themselves. Societies are recognized upon differences in patterns of culture, behaviour, and organization. Humans organize themselves according to a multitude of criteria and influences that influence the decision making process. Cultural material, behaviour, culture and the interrelationships among cultural material, behaviour and culture is patterned (Kent 1987: 3). Spatial behaviour and organization, as observed in cultural material (artefacts), is patterned and interrelated with many other variables such as, function, raw material, microenvironments, behaviour, object use, abstract meaning, specialization, division of labour and many other factors (Kent 1987: 3, 531).

A. Factors dictating spatial behaviour and spatial organization

Spatial organization and behaviour are dictated by social and cultural organization. The way people organize space is shaped not only by space itself, but also by the individuals within and without the group; by the culture that is impacted by political and socioeconomic institutions and practices and by what is happening inside the space (Knox et al. 2004: 228).

Behavioural considerations stem from the objectives and constraints affecting individual decision makers. These are accounted for in the organization of space. The need to be with other humans for reproduction, economic activities and social interaction affects people's personal space and proximity to other individuals in the same group. The same factors influence a group's proximity to neighboring populations. For example, in the pre-Columbian Andes, residential settlement organization changed with population organization and social structure as people moved away from rural areas and moved closer to city storage facilities (Bawden 1982: 166-169).

Socioeconomic behaviour also partially dictates how people organize space within settlements and residences (Oswald 1987: 296). Decision-making based on socioeconomic organization that determines the composition of the group performing activities and decisions based on the mechanical attributes of the activity affects the way space is used (Binford 1983, Oswald 1987: 297).

Limited space, for example, a shortage of land or housing, can constrain the residents' ability to respond to their socio-economic organization (Oswald 1987: 32). Cultural behaviour is affected if there is no space available for necessary work or social phenomena or resource exploitation. Conflicts may arise when space is constrained. Conflict can be on a small scale, between two people vying for the same place, or large scale, for example, between two countries for resources. An increase or decrease in resources may change socio-economic organization. This happens through population and resource fluctuations.

B. Spatial hierarchies

Humans organize themselves into units of any size. At one end of the spectrum, a lone human can live as a hermit; at the other, more than a billion people can constitute the population of a country or region. As groups and as individuals, people can be members

of many different spatial entities in different geographic areas. Artefacts are the products of human behaviour, including behaviour within these spatial entities (for example, a house, village, country, etc). As products of human behaviour, artefacts can be used to track the behaviour(s) people exhibit within their spatial sphere (Wobst 2006: 56).

1. Regional behaviour

The amount of space available to a population within a region will directly affect settlement patterns. People will organize themselves differently if the space they take up is large or small. A change from a spacious region to a cramped region will alter the way people organize themselves (Knox et al. 2004). Fissioning into new groups can be more difficult if there is no place to go. Groups may therefore have to travel very far to find new spaces in which to live.

Interactions between groups and individuals complicate regional behaviour patterns. Territoriality exists when people, individually or collectively, are attached to a particular space. Conflict between different groups in the same region may arise when there is a need for something that their own space lacks. This is especially true when resources or places necessary for survival reside within a specific geographical region or ecosystem.

Population fluctuations influence the degree to which space is optimized. A large population needs a larger geographical area in order to reside comfortably. Problems occur when a region is overpopulated. Resources may become scarce and conflict arises.

Resource availability, along with political and economic forces, affects how a region may be utilized. Specific locations are often claimed to fulfill people's need for identity, defense, or resources (Knox et al. 2004: 226).

2. Site/ community behaviour

The spatial organization of dwellings and settlements is influenced by environment, physical factors (such as human body size), and socio-cultural behaviours. Fundamental clues to the character of activities, the labour organization employed in their execution, and the anticipated use of a location in terms of the overall subsistence-settlement system, are coded into the organization of site structure (Binford 1983:145- 146).

Within a site, space is divided among various structures and activities according to the culture and the predominant socio-economic organization (Binford 1983: 144, 146). Thus, similarities and differences between the spatial organizations of various culture complexes are informative about how their people behaved, functioned, and operated.

A community of interest can occur among people conducting related activities. This facilitates communication and enables better flows of information and cooperative behaviour. It may also encourage rivalries. All of these cases may result in the generation of innovation (Kolb and Snead 1997: 613).

3. Household behaviour

Larger features, termed 'structures', have an important place in the archaeological record. They are central to daily life. The remnants of behaviour in and around dwellings are found in the structure and the material evidence of residence (Wobst 2006: 57). There are strong correlations between residents, organization and the constructed environment. Built environments are created to support desired behaviour. This may be activities necessary to survival such as cooking food, or casual activities such as recreation. Pit house architecture must support the activities and lifestyles of the people using it. This is because the activities that take place within dwellings shape the architecture of those dwellings (Rapoport 1990: 11). An inappropriate structure will not facilitate activities that are taking place inside.

C. Household cluster

The theories of household organization and archaeology of agrarian societies (specifically that in the Early Neolithic) are drawn upon to aid this research. Household archaeological theory is important to this research. Households affect all of pre-history and history on a large and complex scale (Flannery 1976). It is important to note that the terms household and household cluster are not synonymous. The former refers to the living residents, while the latter is comprised of the archeological data, the artefacts, and features (Flannery 1976; Winter 1976: 25).

Household clusters consist of the house itself along with any associated features that are resultant of the activities of the inhabitants (Flannery 1976; Winter 1976; Bogucki and Grygiel 1981: 61). This assumes that features within and immediately

around the household cluster were the result of activities performed by the residents of the house (Bogucki and Grygiel 1981: 61). The household cluster is a spatial unit in which features and artefacts can be understood as manifestations of a single part of a larger society (Bogucki and Grygiel 1981: 62).

In small communities, social ties and economics affect the layout of houses, house components, and dwelling groups (Fagan 1999: 206). By mapping and analyzing artefact patterns and house inventories, it is possible to find traces of different household clusters within a single community. Household clusters are never static. Individuals die, move, erect new houses, and destroy old ones. Features and artefacts move around as they are repaired or adapted for different use.

D. Intra-structure

The use of space in a dwelling is dictated by economics and social organization of a group (Oswald 1987: 296). A residence must be able to fulfill the special needs of the residents by means of an appropriate shape, size, and style. The majority of residences are a place to conduct domestic activities, shelter, sleep, and eat. Architectural design reflects what is going on inside it. Pit house architecture creates boundaries in and around unbounded space, while the use of space may be seen as a means of organizing unbounded space (Kent 1990: 2). The extent of the pit house may restrict the area where activities may be carried out. The same task conducted within or without a dwelling may utilize different amounts of space. Inappropriate dwelling architecture may distort activities and render them either difficult or impossible. Different activities may overlap in space. Utilitarian artefacts may vary in their organization from one home to another.

E. Behaviour behind activity area creation

Artefacts and features are the products of human behaviour (Wobst 2006: 57). They are evidence of the activity areas where the behaviours that produced them occurred. Activities are in part, explained by their association with artefacts (Wobst 2006: 57). Ancillary activities, such as the repair and maintenance of tools and dwellings can develop around major activity areas that require or depend upon those tools and dwellings in order to be successful. Economic, social, cultural, and environment settings are reflected in spatial behaviours that affect the material organization of space.

F. Spatial behaviour within structures

Human organization and behaviour within a structure is subject to many behavioural and material factors (Knox et al. 2004: 302). The organization and management of structural space are shaped by human behaviours such as cultural beliefs, practices, morals, values, traditions, power relationships, and overarching institutions (Knox et al. 2004: 222). Cultural and social behaviours channel certain activities away from some spaces or structures and toward others. This is reflected in residential plans and residual artefacts. For example, in some cultures in North America, Africa, Melanesia and other places, menstruating women cannot be with the rest of the group but must temporarily reside in a women-only dwelling (Bock 1967: 213).

If a social behaviour was present, it may have generated products. A top-down approach, suggests that if a house floor is present then a household was once present. A bottom-up approach infers social entities when there is a contrast. For example, artefact clusters versus empty spaces. This approach treats artefacts as the product of real social behaviour (Wobst 2006: 58). Artefacts are aides in changing or preserving aspects of the social world (Wobst 2006: 59). To understand why artefacts are present where they are, archaeologists must think about what their purpose was.

G. The social importance of artefacts

Certain behaviours are impossible without the help of certain artefacts. To use a large example, house building behaviour needs the artefacts and material to build a house. Lithic production needs the appropriate stone types. Archaeologists usually refer to human behaviour in terms of spatial units, ranging for example, from the artefact level through the feature, house, household, community, and up to the world level. Artefacts are the smallest unit that archaeologists can examine. It is the smallest of these units, the artefact, feature, and structure that are closely analyzed in this thesis.

III. Activity areas theory

Theory must instruct spatial method to maintain theoretical control over the data (Wobst 2006: 55). In recent years, a profitable direction for reconstruction of spatial and social organization in archaeological contexts has been through the concept of activity areas. Spatial organization influences how archaeological sites are structured in terms of artefacts, refuse, buildings and other facilities. The way humans organize activity areas is

the result of complex combinations of class, gender, personal relationships, and history. Behaviour and activity area use is a result of the interrelationships between culture, behaviour, and cultural material (Kent 1987: 531). Binford (1987) studied the relationship between contemporary activity functions and cognitive categories of material culture. Past cultural and social behaviour are examined through material and nonmaterial elements that are reflected in space.

An assemblage can be organized into artefact groups that convey a representation, or residue, of activities (Newell 1987: 110). Patterns in the archaeological record result from a repetitive activities in specific areas. When activities are repeatedly undertaken in the same place, discrete zones of certain cultural materials that are associated with that activity develop over time (see Table 2). Identified material clusters represent activities and cognitive categories of culture (Newell 1987: 110). These spaces are called activity areas. Binford describes activity areas as integrated sets of tasks performed in an uninterrupted sequence (1986: 147). Activity areas are created in different ways. An activity can be started, completed, and repeated at a different time, in the same or a different place.

Activity systems and their spatial organization must be flexible enough to allow traditional and innovative behaviour while maintaining functionality. Constrained spaces influence activity areas. A constrained space may hold multiple activities. Many things are trying happening at once in the same place at the same time (Anderson 1982; Binford 1983; Oswald 1987: 332). If the space is small enough, it is likely that only one activity could occur at any one time. This would call for organization of when different activities will take place in shared space. Overcrowding may cause conflict between mono-functional activity areas and the inability to provide new space: most of us have experienced this when told to get our newspaper or homework off the kitchen table!

Larger spaces will be more likely than smaller spaces to have activities spread out, decreasing friction and conflict, and resulting in activity areas that are no longer embedded spatially or temporally (Oswald 1987: 32). These relationships can be seen in modern ethnographic studies.

An economic phenomenon called the agglomeration effect describes the clustering of functionally related activities. Functional interdependence webs include the

relationships among different kinds of work and the materials involved. Agglomeration effects influence the location patterns of economic activities (Knox et al 2004: 303). For example, a food preparation area will be near a hearth or oven area for cooking. Settlements will be near water, arable land or other vital resources.

Clustering economically related areas near one another increases the efficiency of the activities performed there. These clusters can be found in several ways: they can be visually observed in the field and on maps; conversely, they can be identified by statistical tests that determine spatial proximity between artefacts. Clusters of different artefact types can yield insight into related activities. For example, grinding stones found in proximity to ceramic bowls. Both artefact types are related to food related activities. Clusters of like artefacts represent a certain activity. In the previous example, food preparation and consumption are together.

Activity systems exhibit much variability. When examining activity systems all of the following must be taken into account: activity order, order sequence, their nature and their links and separation, the participants, where and when they occur are among the varied and complex factors.

IV. Studies of activity areas in pit houses in other places

This section will focus on three examples of pit house activity area research in very different parts of the world. There is a great deal of literature on pit house form, construction, role in religion and economy, and their transition to surface houses (Diehl 1997; Larson 1997; Stone 2005; Rocek 1995; Wills 2001). There is great variation in building styles and purpose.

Pit houses are one of the oldest Native American building types. They are found from the sub-Arctic to Mexico. Different forms of pit house occur worldwide in various culture complexes and ecosystems. Pit houses were used, by the Anasazi and Fremont cultures in North America; by the Grubenhäuser of northern Europe; and during the Mumun Pottery Period of the Korean Peninsula to name just a few.

Early pit houses use earth berming, for passive heating or cooling. This will result in houses cooler in summer and warmer in winter. These pit houses have a framework of wood poles that support walls and a sod roof. Along the lower Columbia River, the typical pit house had a deep large rectangular pit, lined with planks, capped with a gabled

roof. Only roof and gable ends showed above ground. Large pit houses were built by the Hohokam along the Mississippi. Pit houses are also found in desert regions in the southwestern states.

The Anasazi culture complex existed about 1,200 years ago in the four corners region of the United States. Their first dwellings were pit houses. Larger pit house structures apparently served not as a home, but as a community gathering place and ceremonial chamber.

The floors were dug slightly more than a metre into the ground to form a round or oblong pit (Roberts, 1996). The shallow pit houses were mostly lined with rocks and had roofs held up by vertical timbers and thatched with mud and branches. Storage pits lined with stones were constructed in order to protect surplus food items (Adler 1993: 302). Anasazi pit houses also had a central fire pit indicated in the archaeological record by an ash concentration. East facing ventilator shafts, sub floor storage pits are also present (Adler 1993: 302). Fragments of pottery vessels, human remains, stone tools, and evidence left from the construction of dwellings are typically found within the pits. This type of pit house had a clearly domestic function. Larger pit houses called 'kivas' apparently had a religious function (Adler 1993: 321).

The lithic pattern at an Anasazi pit house partially excavated in 1999 shows clear evidence of what activities occurred. The lithic assemblage suggests a large midden where refuse representing daily domestic activities was disposed of (Totah Archaeological Project 1999). The lithic assemblage suggests possible tool production and core reduction activities. Nearly all of the lithic artefacts are made from locally available stone, and represent expedient tools for processing animal and plant resources. A paucity of large milling implements suggests different discard patterns for these items: a typical Anasazi pattern was to recycle milling implements into raw materials for masonry. Functionally the site is ordinary and includes several activities such as core reduction, tool production, and tool maintenance. Hunting, floral and faunal resource processing is not well represented (Totah Archaeological Project 2001).

Around 500 A.D., the first permanent villages were established with deeper pit houses and some aboveground rooms (Roberts, 1996). Deep pit houses began to disappear as this culture began to use a pueblo style of architecture.

Pit houses have been used throughout South Korea. Some of the earliest examples come from Amsa-dong, a Neolithic site dating to about 3000 B.C. situated in a Seoul suburb. The Amsa-dong settlement was discovered when erosion from the Han River exposed hearths. Since then the site has been extensively excavated and is now an interpretive centre. Circular, semi-subterranean pit houses are present. These were thatched-roofed dwellings containing a central hearth, burned posts, a single large saddle quern, chipped stone axes, net weights and pottery. The artefacts suggest an economy based on plants and fishing from the Han River.

Pit houses continued to be used throughout Korean prehistory. In south-central South Korea during the Early Mumun period (1500-850 B.C.) continuing to the Middle Mumun period (600-800 A.D.), pit houses were a basic unit of settlement (Bale and Ko 2006: 160, 166). Early Mumun pit houses were small and circular with interior hearths reminiscent of that at Foeni-Salaş. The Middle Mumun pit houses had a rectangular shape, timber frames and wattle and daub construction. There were storage pits, courtyard areas and occasional raised floor constructions. The Middle Mumun pit houses have evidence of activity areas based on the location of features and artefacts. Hearths were now placed outside, suggesting that cooking and food production took place communally outside pit houses (Bale and Ko 2006: 167). Often several pit houses were connected together with multiple hearths suggesting habitation by multigenerational family groups (Bale and Ko 2006: 166). A central oval pit characterizes the interior of Middle Mumun pit houses (Bale and Ko 2006: 167). Many of these pits have evidence of lithic production: flakes, debitage, tool blanks and broken and unfinished tools (Bale and Ko 2006: 166). It has been theorized that pit houses with greenstone artefacts were used only for greenstone production activities (Crawford and Lee 2003: 87). However, pottery and subsistence artefacts were also found, suggesting that these areas were also domestic in nature. As greenstone production is not found in every pit house it may be that production was concentrated in market areas (Costin 1991: 25; Bale and Ko 2006: 177). Greenstone pit houses were also discovered near agricultural fields and river-banks. This suggests that these agricultural peoples may have had some individuals who specialized in greenstone production (Bale and Ko 2006: 177). Greenstone pit houses are typically larger than pit houses that have no evidence of greenstone production. Shoda (2004: 102-

103) theorizes that this is because greenstone producers were wealthier because of their specialized ability. Greenstone processing may be an activity needing additional space in order to accomplish the work.

Iceland provides an example of how complicated pit house identification and activity analysis can be. A pit and a long house were excavated at Hofstaðir, Iceland. It was originally interpreted as a pre-Christian pagan site with a long house for ceremonial purposes and a pit for rubbish (Brunn and Jónsson 1911). More recent research has called this conclusion into question. Olsen (1996 in Simpson, Milek and Guðmonsson 1999: 513) suggests that the regular stratigraphy of the pit indicated that it was a cook site for the chief's longhouse and temple-farm. Others (Friðriksson and Vésteinsson 1997) interpreted the pit as being filled with domestic rubbish typical of a farm. A close investigation (Friðriksson and Vésteinsson, 1997) found that the lower stratigraphy is a hard dark layer that underlies a layer of disturbed soil. It has been suggested (ibid.) that this represents roof and wall collapse. If this interpretation is correct then this would indicate that the pit was once an inhabited pit house that later was used for rubbish some time after abandonment. This would contradict the original conclusion that the pit was created for rubbish disposal after ceremonies at the long house. An analysis of the microstructure of the stratigraphy shows a similar structure to that of occupation surfaces (Simpson, Milek and Guðmonsson 1999: 520).

An identified "active zone" shows evidence of trampling and occupational debris (Simpson, Milek and Guðmonsson 1999: 520). The accumulation of charcoal and fine mineral material is suggestive of occupation floors, and there is *in situ* evidence of accumulated hearth debris. In addition, a felsic accumulation is attributed to the effect of trampling. The functionality of the pit has been complicated by later occupations, but microanalyses shows evidence of an interior hearth for cooking. Birch charcoal and fragments indicate that this wood was burned for fuel and was perhaps used as structural support (Simpson, Milek and Guðmonsson 1999: 524). Disturbed sod was seen in the microanalysis and is theorized to have been wall and roof support (Simpson, Milek and Guðmonsson 1999: 523). Through thin-sectioning pit stratigraphy, Simpson, Milek and Guðmonsson (1999) were able to propose answers to questions regarding the original functionality of the pit, and to suggest the sorts of activities that may have occurred

within the dwelling despite its complex history and use. Their results support the hypothesis that the earliest use of the Hofstaðir pit was as a semi-subterranean dwelling (Simpson, Milek and Guðmonsson 1999: 522). They also found (ibid.) that after abandonment it stood unused for a period before later occupations used it for rubbish.

V. Conclusion

This chapter has shown how it is artefact type, distribution, size, and association that provides insight to what activities took place at Foeni-Salaş. It is important to recognize that the aspects of artefact distribution may not be fall within the visual scale of the artefact maker, user, or discarder. Social space varies. The spatial location of artefacts helps to identify socio-spatial areas, especially in the form of activity areas. In theory, this method should track human actions in the form of activity areas and it will be possible to make observations from it.

This chapter presented examples of how other scholars analyzed the ways different societies divide space and organize it according to its use. A theoretical framework provides a description of how activity areas are found and interpreted. It has explored the theoretical background of activity area studies and the relationship between behaviour and material remains. Pit house architecture and how it may influence artefact patterns has also been discussed. Examples of pit house studies conducted in other parts of the world were provided. The next chapter discusses the Early Neolithic Balkans and the Starčevo culture.

Chapter 3: Early Neolithic culture history

I. Introduction

This chapter discusses the culture history of the Balkans. It begins by examining various theories for understanding the origins of the early farming cultures of southeastern Europe. Second, the Starčevo culture complex is briefly described in terms of its spatial and temporal distribution and material cultural characteristics. The place, time and characteristics of the culture complex under analysis are also established.

Third, Starčevo culture characteristics are further discussed in terms of the nature of pit houses, surface houses and spatial organization of settlements. Particular attention is given to the distribution of artefacts and features within pit-houses excavated at various Early Neolithic Starčevo sites, including Achilleion, Blagotin, Divostin and Lepenski Vir.

Fourth, the data for spatial organization from both pit houses and surface houses from the time period and region presented in other studies are examined to determine if similar patterns are present in both.

Finally, comparative data on the spatial distribution within pit houses from a number of Early Neolithic sites excavated in the surrounding regions are discussed in order to determine if the Starčevo-Criş pattern extends beyond the generally accepted range of the Starčevo-Criş culture.

II. Origins of agricultural societies in the Balkans

About 6500 BC (cal.), a new more sedentary way of life began to appear in the Balkans. This had come from the Early Neolithic farming communities in the southern and central Balkans that relied upon a Near Eastern array of domesticated plants and animals, including wheat, lentils, barley, cattle, sheep and goat (Childe 1957: 85; Dumitrescu, Bolomey and Mogoşanu 1982: 14; Whittle 1996: 40, 43; Price 2000:7, 8; Tringham 2000: 23; Perlès 2001: 40-41). This pattern remains during the Early Neolithic expansion into the northern Balkans (McPherron and Srejović 1988: 3). As Early Neolithic cultures expanded into Central Europe and the Baltic region, cattle and pigs became an important part of the agricultural economy as they were well suited to the climate (Dumitrescu, Bolomey and Mogoşanu 1982: 13; Bogucki 1988: 243; Greenfield and Jongsma in press).

Other changes became manifest. Permanent and semi-permanent structures are built. Clay firing became a common way of making containers. At the same time, there was an increase in the range and number of objects within built environments (Bailey 2000: 39). These included stone, bone and antler objects that were similar to previous Mesolithic manifestations. Discs and models of fired clay appeared. New plants and animals were exploited (Tringham 2000: 22, 23).

III. Origins of agricultural societies in the Balkans

By 6500 BC (cal.), domesticated plant and animal dependent food production had spread from its place of origin in the Near East, into the Aegean and southern Balkan Peninsula (Tringham 1971: 68; Dumitrescu, Bolomey and Mogoşanu 1982: 14; Dumitrescu 1983: 17, 21; Whittle 1996: 40; Tringham 2000: 21, 25, 27; Perlès 2001: 38, 52). Two Early Neolithic farming cultures spread from the southern Balkans into the rest of Europe: the Cardial Culture complex along the Mediterranean, and the Karanovo I-Kremikovci-Anza-Starčevo-Körös- Criş complex that spread northwards through the Balkans into central Europe (Tringham 1971: 73; Perlès 2001: 61) (Fig. 1).

In the southern Balkans bordering the Mediterranean, the first cultures of the Early Neolithic period are the Proto-Sesklo culture groups. The Sesklo site in Thessaly, Greece typifies this culture (Perlès 2001: 88, Table 6.1). For the southern Balkans, the literature is almost unanimous in its acceptance of migration of agricultural societies from the Near East (i.e. the area of western modern Turkey).

Agriculture spread from the southern Balkans into the northern Balkans (which includes the central Balkans- Serbia, West Bulgaria, East Bosnia and Southwest Romania) (Tringham 1971, 2000; Zvelebil 1998: 10, 11). Was the spread of agriculture into the northern Balkans the result of migration of people from the south or the adoption by indigenous peoples? For many years it was argued that agriculture came into the northern Balkans through the physical movement of people (Childe 1957:85; Piggott 1965: 49; Dumitrescu, Bolomey and Mogoşanu 1982; Renfrew 1987; Diamond 1997; Chikhi et al. 1998). There are still two competing schools of thought for this region – migration from the south (e.g. Childe 1957; Piggott 1965; Renfrew 1987; Diamond 1997) and expansion of ideas, techniques and tools related to agriculture and stockbreeding and their adoption by indigenous peoples (e.g. Greenfield 1993; Tringham 1971: 70; 2000:

30; Zvelebil 1998: 10; Greenfield and Jongsma in press). New genetic data on humans (Richards et al. 2000: 1251) supports the suggestion that early domesticates were brought into Europe from the Near East. However, this does not answer the question about human population continuity in the region. Both models have their adherents. There appears to be movement towards the theory that indigenous people gradually adopted ideas that originated in the Near East.

IV. Early Neolithic Starčevo Culture

The Starčevo-Criș-Körös culture represents the macro-regional archaeological culture for the earliest Neolithic in the northern Balkans and north of the Danube. The designations Starčevo, Körös and Criș are regional names for the same culture, and reflect modern political affiliations of local archaeological schools (Tringham 1971: 73, 78; Gimbutas 1982: 27; Tringham 2000: 23). The combined name represents the local archaeological variants identified throughout Serbia, in west Croatia, north and east Bosnia, Romania and southeast Hungary. This culture was originally given separate names in different countries before local archaeologists realized that it was a single macro-cultural group (Manson 1995: 65; Tringham 2000). Starčevo is the name for this culture in Serbia; Körös in Hungary; and Criș in Romania (Tringham 2000: 23; Greenfield and Jongsma in press). These cultures have extremely similar material culture, settlement patterns, architecture, subsistence, mortuary styles, and subsistence methods (Tringham 2000: 23).

There are regional differences, especially in pottery styles, with respect to the north and south ends of the distribution. Regional differences are less than the differences between the Starčevo-Criș-Körös cultures in the southern Balkans (Tringham 1971: 2000).

All Early Neolithic cultures in the central Balkans, including Starčevo and its regional manifestations (Criș-Körös), are geographically restricted to south of the 41st parallel (Alexander 1971: 34). In Croatia, the culture extends at least as far as Vučedol (near Vukovar) and Sarvaș (near Osijek), both in eastern Slavonia. In Romania, where Foeni-Salaș is located, Starčevo-Criș remains have been located in the counties of Glăvăneștii-Vechi, Perieni, Valea Lupului in Moldavia; Leț, Bedehaza-Sf. Gheorghe, Cipău in Transylvania; Oltenia in the Iron Gates region and the Banat (Roșu and Peck

n.d.: 27) (Fig. 2). The peripheral edges of the culture extend into southern Slovakia, parts of the western Ukraine, and west and north Bulgaria (Roşu and Peck n.d.: 27; Tringham 1971).

The type-site of the culture is located in the modern village of Starčevo, on the left bank of the Danube, in current Serbia (province of the Vojvodina), about 20 km east of Belgrade (*Beograd*). Grbić conducted initial excavations at the type-site in 1928, followed by excavations by Robert Ehrich and Draga Garašanin in the 1960s (Ehrich 1977). Starčevo sites are commonly found on river terraces on gentle slopes near springs and streams (Dumitrescu 1983: 23; Whittle 1996: 49). The sites of Divostin and Grivac are typical of this pattern as they are located at a natural spring and brook respectively (McPherron and Srejović 1988: 4, 29). Starčevo pottery was found on a gentle slope at a site called Zironica (McPherron and Srejović 1988: 31). Early Neolithic cave sites (e.g. Nemea, Kitsos' Cave and the Cave of Pan) have been found in Greece, (Nandris 1970: 194-195; Perlès 2001: 113, 274), although most are located in open spaces (Dumitrescu, Bolomey and Mogoşanu 1982: 23, Dumitrescu 1983: 23) (Fig. 3).

This thesis is concerned with the site of Foeni-Salaş that is located near the border between Romania and Serbia (Fig. 4). The term Starčevo-Criş will be used here to describe the archaeological material pertaining to this culture.

A. Time

The North Balkan Early Neolithic began between 6500 and 5200 BC (cal.) (Tringham 2000: 27; Biagi and Spataro 2005: 38). It is within this range that the Starčevo complex appears (See Table 1).

A chronological sequence based on seriation of pottery types was created by Milošević (1950: 108-118) and is still widely used. Milošević's (1950) chronology suggested a four-phase sequence (I through IV) for Starčevo. Advanced techniques are providing new dates.

Another chronology, suggested by Draga and Milutin Garašanin, is based on pottery typologies recovered from a pit at the type site. The Garašanin's chronology has been subject to criticism, as the pit has poor stratigraphy and the number of sherds is small (Manson 1995: 67). Since the excavations from the site were never published, they

also lacked site plans and drawings that would have aided analyses or validated their results in the eyes of other scholars (Ehrich 1977: 61).

A third chronological system was proposed by Stojan Dimitrijević (1971, cited in Manson 1995: 151). It refined the Garašanin chronology using a larger ceramic sample. Although it has been corrected using radiocarbon date controls, this model appears to only work in the northern and western regions of Starčevo distribution (Dimitrijević 1971, cited in Manson 1995: 69).

Dragan Srejšević (1988: 483) used ceramic seriation and the stratigraphy at Lepenski Vir to produce a four-phase sequence (Proto- Starčevo I, II, III and Starčevo). This sequence is very seldom used. Manson has provided a redefined chronology and an improved framework within which behaviour patterns are reflected in remains (1995: 70). According to Manson, the Starčevo culture dates to about 6100 - 5100 B.C (cal.) (Manson 1995: 69). Her sequence is based on the Garašanin chronology and the problems regarding its sample set and stratigraphy cause its improved sequence to be questioned. Furthermore, Manson's sequence is based on southern Starčevo distributions rather than more central sites.

A calibrated chronology, suggested by Marija Gimbutas, is based on ceramic typology and radiocarbon dates (1982: 22). Her chronology consisted of three phases. She used the site of Obre, the only carbon-dated site in Bosnia (Gimbutas 1974a; Biagi and Spataro 2005: 35), and Anza in Macedonia. These two sites are situated at the edges of Starčevo distribution. This sequence is also questioned, because it is based on peripheral distributions (Garašanin 1982).

Robert Ehrich and H. Arthur Bankoff (1990) used absolute dating and stratigraphic sequencing from the Vinča and Anzabegovo sites to establish two major phases of Starčevo culture. This calibrated sequence is based on samples from clear, well-sampled stratigraphy at the two sites. It is probably one of the more accurate dates thus far. Ehrich and Bankoff date Starčevo manifestations spanning 5970/5490- 5525/5350 B.C. (cal.) (1990: 377- 380). Their chronology begins with Starčevo I, the earliest culture, at about 5970 BC (cal.) and ends with Starčevo III about 5350 BC (cal.) (Ehrich and Bankoff 1990: 377- 380; Manson 1995: 69- 70).

Recent attempts at absolute dating of Early Neolithic sites in the central Balkans differ from Ehrich and Bankoff's (1990) dates for the beginning of the Starčevo culture. Biagi, Shennan and Spataro date the advent of Starčevo manifestations at Foeni-Salaş to 7510 BC (uncal.)/6300-6500 BC (cal.) (2005: 49). Greenfield has referenced radiocarbon dates from Blagotin that are in the 6100 BC dating range, as well. Clearly the advent of the Early Neolithic in the central Balkans precedes that of Ehrich and Bankoff by several hundred years. These new dates are older and are pushing back the date for the earliest Starčevo manifestations in the central Balkans.

Clearly there are problems plaguing a final absolute chronology for Starčevo dating. Most investigational analyses (Milojčić 1950; Draga and Milutin Garašanin cited in Manson 1995; Dimitrijević cited in Manson 1995; Manson 1995) rely on ceramic seriation and the laws of stratigraphy to date deposits and site assemblages (Jongsma 1997: 66). Many data schemes do not have clearly defined elements that are required for cultural and chronological differentiation of different phases (Perić 2004: 33). An accurate chronology is lacking because Starčevo sites are often not stratified and there is no continuity or stratified tells (Chapman 1989: 35). Starčevo sites are mostly single layered sites so sample sizes are often small (Minichreiter 2001: 200; Biagi and Spataro 2005: 37). Many sites are undated with absolute methods. Often only one phase from a multi-period site is radiocarbon dated. In fact, the Donja Branjevina site on the Serbian/Croatian border is the only site with all three of its Starčevo-Criş layers dated with absolute methods and the only Croatian site that has been radiocarbon dated (Biagi and Spataro 2005: 36).

Another major issue is that local sequences must correlate with widespread regional ones. An additional problem is that chronologies and typologies are not uniform across the Balkans. This has resulted in four different relative chronologies that are commonly used (Milojčić, Garašanin, Dimitrijević and Srejović). There are also absolute chronologies proposed by Spataro (2005) and Ehrich and Bankoff (1990). There is no single absolute Starčevo chronology to which local sequences can be tied (Manson 1995: 66; Jongsma 1997: 67; Spataro 2005; Greenfield and Jongsma in press). The number of radiocarbon dates is insufficient and new dates are necessary in order to improve understanding of early Starčevo chronology (Biagi and Spataro 2005: 37).

The site under analysis, Foeni-Salaş has been subjected to radiocarbon analysis. There are possible issues of contamination from the samples taken. Foeni-Salaş has been dated to ca. 5500-5200 BC (calibrated Greenfield and Jongsma in press), the middle phase of the Starčevo-Criş culture using Ehrich and Bankoff's (1990) sequence (Tringham 2000: 27-28). Another samples from Foeni-Salaş indicate that Greenfield and Jongsma may have underestimated its age since a second date at 6300-6500BC (cal.) has been recently derived. (Biagi, Shennan, and Spataro 2005: 49; Greenfield and Jongsma in press). The oldest date is 6900 BC (cal) (Greenfield and Jongsma in press). The Early Neolithic strata at Foeni-Salaş, is clearly a short-term single occupation. This raises questions of the validity of the tests and/or whether contamination occurred.

B. Characteristics of Starčevo-Criş culture

Starčevo structures and artefacts tend to be modest and simple, characteristic of short-term occupations. The structures from Divostin I are exemplary of this. They are simple, but well made. Artefacts are widely spread out within and outside of architectural remains.

1. Ceramics

All Starčevo sites in the Balkan area are known for Neolithic (mainly monochrome) pottery (Tringham 2000: 23). Starčevo ceramics are stratigraphically and typographically the oldest in the region (Grbić 1957: 141; Tringham 1971, 2000; Schubert 1999). Early pottery in this culture was simple but well made and up to a half inch thick (Perić 2004: 32). It was finger-pinched or impressed. Globular vessels had flat bases and sometimes had small stand rings. Pottery in the western Balkans has fingernail impressions, which may be an autochthonous invention (Schubert 1999). Pottery makers used an organic (chaff) temper, mica, sand and pebbles. It was fired in an oxidized environment at low temperatures (500° - 600°C) (Schubert 1999).

The earlier Starčevo pottery is plain and unpainted or monochrome with a thick finger-applied slip called "barbotine", leaving a rough surface (Grbić 1957: 141; Manson 1995: 67; Schubert 1999). Later Starčevo pottery shows increasing frequency of fine and painted pottery (Grbić 1957: 141; Manson 1995: 67). It is found sporadically over a broad area throughout the northern part of the Balkans (Tringham 2000). The pottery is occasionally painted with iron pigments after burnishing and before firing. Designs

include dots, spirals, and curvilinear designs. White dots may be the earliest motifs (Grbić 1957: 141). White, dark/black, and red, including white on red polychrome painting exists (Grbić 1957: 141, Dumitrescu, Bolomey and Mogoşanu 1982: 17). Some vessels appear late in the Starčevo chronology and have human like shapes in simple relief (Banner 1937 cited in Bailey 2000: 101; Kalicz 1970).

2. *Economy*

Along with the pottery, Starčevo-Criş sites represent the earliest agricultural and cattle-breeding practices in the central Balkans (Grbić 1957: 141; Chapman 1989: 34-35; Manson 1995: 66; Tringham 2000: 27; Greenfield and Jongsma in press). Domestic dogs, cattle, pigs and sheep have been recovered. River fishing also occurred. Tortoise, catfish, pike, carp, other fish and shellfish have been found. Food was also obtained by hunting and plant agriculture (Dumitrescu, Bolomey and Mogoşanu 1982: 13; Tringham 2000: 25; Greenfield and Jongsma in press). Wheat, barley and millet have been identified. Red and roe deer, aurochs, wild pigs and donkeys, brown bear, beaver, wolf, hare and fox remains have been recovered (Fewkes 1937: 343; Dumitrescu, Bolomey and Mogoşanu 1982: 14, 16; Greenfield and Draşovean 1994:73; Manson 1995: 70; Greenfield and Jongsma in press).

3. *Tools*

Implements of this culture were made of flint, obsidian, polished stone, bone and horn. Blades, worked flakes, polished adzes, axes, chisels and milling and hand stones are characteristic (McPherron and Srejović 1988: 74; Manson 1995: 71). There is little evidence for retouching or modification of tools (Bailey 2000: 129). Bone tools consist of needles, awls, fishhooks and points (McPherron and Srejović 1988: 88; Manson 1995: 71). Bone and antler tools were often incised with decorative patterns (McPherron and Srejović 1988: 87). Starčevo sites are often characterized by spatulas (Fewkes 1937: 373, 379; Childe 1957: 85; Gimbutas 1974a: 52).

Lithic artefacts consist of flake and ground stone objects gathered from local sources (Tringham et al 1988: 205; McPherron and Srejović 1988: 75). Flaked stone tools from Divostin I were made on site from material collected from local rivers and streams (McPherron and Srejović 1988: 75). A similar pattern exists at Lepenski Vir (Srejović

1972). This pattern seems to represent expedient tool production from local sources that are often of poor quality.

V. Examining Early Neolithic activity areas of temperate southeast Europe

In this section, the nature of research on activity areas in the Early Neolithic of the Balkans is reviewed. Since activities examined at Foeni-Salaş are within Starčevo pit houses, the nature and characteristics of houses in Early Neolithic settlements in the Balkans is described. A structure is not to be confused with a house. A structure is an architectural entity. For theoretical purposes, a house is defined as a structure with a specific function, (Tringham 1971: 85-86, Whittle 1996: 52, 57). A house is a place where sleep, shelter, and other activities (often domestic in nature) are performed. Large permanent house architecture features such as ovens may be built out of similar material to houses. Ovens and other features are not considered architectural. They are not lived in, hence the need for differentiation between house architecture and architectural features. House architecture is the floors, walls and roof. Architectural features refer to the minor features within dwellings: ovens, hearths, beds and other non-dwelling architecture.

A. The nature of houses

A 'household' is defined as the human occupants of the house and their relationships (e.g. a nuclear or extended family). Household archaeology provides a link between environment, social organization and behaviour (Flannery 1976: 13).

It was long ago recognized and accepted that Early Neolithic houses in southeast Europe were usually one-room structures (Tringham 1971: 161; Whittle 1996; Tringham 2000: 46). The basic architectural unit is a single room, above ground four-walled building. However, in many sites, particularly in the northern Balkans, the structures are pit dwellings (Whittle 1985: 54; Greenfield and Draşovean 1994: 72; Whittle 1996: 48; Jongasma 1997; Tringham 2000: 46; Jongasma and Greenfield 2001). These are usually one roomed but exceptions exist. A large pit dwelling at Zadubravlje in Croatia was divided into four rooms (Minichreiter 2001: 205). In the northern Balkans, pit houses are found in the Starčevo, Criş and Körös culture sites. Pit dwellings have recently been recognized in the southern Balkans (Halstead 1999; Tringham 2000: 46). This suggests a more widespread use of pit house architecture than previously recognized.

Early Neolithic houses often have mixed remains from other, later periods, owing to a number of taphonomic issues. At the site in question, intrusive features such as Iron Age storage pits, burials, and rodent activity, can complicate the interpretation of pits.

Early Neolithic pit houses are archaeologically identified as small oval depressions with hearth remains and stake or post holes around them indicating a cover (Bogdanović 1988; Whittle 1996: 54; Jongsma 1997; Minichreiter 2001). Subsequent houses are often built directly on top of previous dwellings, such as at Achilleion (Gimbutas 1989). This continuity in the location of houses has been interpreted to reflect continuous site use (Bogucki 1988: 8-9).

The interpretation of pits as human housing is disputed. Some researchers maintain that it is unclear whether the original Early Neolithic pits were houses or for refuse (Tringham 1971: 86; Lichter 1993). It is possible that later occupations used old pit houses for refuse that may account for mixed remains. In contrast, others argued that pits represent the remains of pit houses (Bogdanović 1988; Minichreiter 2001). Jongsma (1997) and Jongsma and Greenfield (2001) demonstrated that all Early Neolithic architectural features found at Foeni-Salaş are found only within the pits. Pit houses are identified when a hearth is present (McPherron and Srejović 1988: 38; Jongsma 1997). Clearly, some pits have a dwelling function. This conclusion is beginning to have widespread acceptance (Whittle 1996: 48; Tringham 2000: 25, 46). Spatial analysis of pit house interiors will build upon the question of functionality of these pit deposits.

Bogdanović's (1988), Greenfield and Drasovean's (1994), Jongsma's (1997) and Minichreiter's (2001) identification and discussion of pit houses meant that two forms of houses existed in Early Neolithic settlements from southeast Europe – surface and pit houses. These are now reviewed.

B. Surface houses

1. Surface house size

Foundations of surface houses show that they were on average 8 m by 4 m (Tringham 1971: 86).

2. Surface house shape

Sites in the early Karanovo I culture in Bulgaria and the Sesklo culture of Greece show that most early surface dwellings were small single roomed mud and wattle huts.

Models of Early Neolithic houses show peaked roofs (Gimbutas 1989; Whittle 1996: 58). Later structures of the Starčevo culture are rectangular or trapezoidal (Bogdanović 1988). The Divostin I, surface structures were rectangular or square (McPherron and Srejović 1988: 36). At Nea Nikomedeia, six structures were identified as having a rectangular shape and roofs was supported by posts. The six smaller dwellings at Nea Nikomedeia are one or two roomed and there is evidence of porches (Rodden 1965). Smaller roomed houses would be easier to keep warm in cooler climates.

3. Surface house construction

There are two general patterns of construction. The first is a framework of thin wooden posts covered with thick clay walls (Tringham 1971: 86; McPherron and Srejović 1988: 70). Another method is a framework of a few large posts with braided branches, wattle and clay (Tringham 1971: 86). Postholes are evidence for structural support both around the perimeter of houses for roofs and inside as centre supports (Divostin I - McPherron and Srejović 1988: 47). At the Slatina site in Sofia, Bulgaria there is a dwelling with a pitched roof upon posts and walls covered with wattle and daub (Whittle 1996: 58; Sirakova 2004: 7). This structure had a central roof post with a platform on one side (Sirakova 2004: 7).

4. Surface house walls

Wood and wattle and daub is the most common technique of wall construction. Nea Nikomedeia architecture consists of mud walls supported by wooden poles (Rodden 1965). There is occupational debris, but the site consists mostly of collapsed mud walls. The Divostin I walls are also of wooden construction or wickerwork which are packed with daub (McPherron and Srejović 1988: 70).

5. Surface house floors

Clay and daub floors are common in the Early Neolithic in Central and Southeast Europe. At Slatina, a clay wooden floor overlies planks and clay. The floors of the Lepenski Vir houses are of a poured baked mixture that includes limestone (Srejović 1966). Floors at Slatina and Lepenski Vir evidence repair and renewal. Floor repair may have been an annual event. The Divostin I dwellings contain laid timber sub-floors with heavily applied daub (McPherron and Srejović 1988: 70). Earth floors are often beaten

hard (Tringham 1971: 87). Some dwellings had flat living surfaces and others, concave surfaces (Bogdanović 1988).

6. *Spatial organization of settlements*

There is some general patterning in the spatial arrangement of surface houses and it is possible that patterns are related to the ecosystems in which they were built (Tringham 2000: 25). Settlements tend to be near a riverine ecosystem (Dumitrescu 1983: 23). At riverside sites, such as Lepenski Vir, houses seem to have entrances facing the water (Srejović 1966: 14). At Foeni-Salaş, Starčevo pit houses also appear oriented towards the nearby river. At Varoš in Yugoslavia, a semi-circle of houses was situated on a mound in a swamp (Tringham 1971: 87). Starčevo settlements usually appear in three different types of geographies. They appear along the banks of rivers (Lepenski Vir), on low hills that descend into river valleys (Nea Nikomedeia) and on slight raised, well-drained land on a plain near former water courses (Foeni-Salaş) (Minichreiter 2001: 202).

The surface dwellings at Divostin I had a fixed orientation and were arranged in groups. Groups of houses were aligned parallel to each other indicating some planning (McPherron and Srejović 1988: 85). At Karanovo, houses were arranged close to each other in rows (Georgiv in Tringham 1971: 227). At Nea Nikomedeia, a large building was surrounded by smaller ones. By all indications, the distribution of surface houses in settlements implies that they were carefully planned. The only general pattern is that houses seem to be placed close together with open communication lines between them.

7. *Spatial organization of surface houses*

General activity areas can be reconstructed, and is based upon the spatial distribution of major architectural features. There is a lack of comprehensive discussion of where artefacts are found in relationship to the house or architectural features within. For example, architectural features generally appear associated with ovens, hearths and food preparation areas. One consistent pattern is that hearths and often ovens often appear opposite from entrances (Tringham 1971: 87; McPherron and Srejović 1988; Whittle 1996; Minichreiter 2001, Sirakova 2004). It is not clear what artefacts are found in these areas.

a. *Heat*

Hearths tend to occur far from doorways For example, in a structure at the site of Slatina (Bulgaria), there is a hearth opposite a doorway (Whittle 1996; Sirakova 2004). Two wooden structures that may have been beds are close by. Ovens occur regularly and are situated at the back or side of each house well away from the entranceway. This would increase heating efficiency. The trend at Karanovo is to have the hearth to one side instead of the wall opposite the entrance. This would free floor space for other activities within this non-architectural space (McPherron and Srejović 1988: 82). Hearths and ovens are plentiful at a Starčevo-Körös-Criş site near Zadubravlje-Dužine, Croatia (Minichreiter 2001).

b. *Storage*

Storage areas do not appear uniform (McPherron and Srejović 1988: 82). In some houses, storage vessels are located far from hearths and ovens (McPherron and Srejović 1988: 82). Larger storage vessels tend to appear further away from heat sources (Whittle 1996: 114). A common trend at Divostin is to have pots that may have held food stuffs placed towards the back and sides of houses (McPherron and Srejovic 1988: 80).

c. *Cooking and baking*

Food processing and cooking activities surround hearths and ovens (McPherron and Srejović 1988: 82). Pottery vessels on floors are assumed to be in connection to food preparation activities. At Slatina, a domed clay oven occupied the centre of the back wall, and this pattern is repeated at other sites. A grinder and a pit were found next to the Slatina oven, and this feature is interpreted as a food preparation area possibly to grind the grain for baking (Whittle 1996: 58). At Divostin I, vessels in association with food preparation, cooking and serving are usually within the vicinity of hearths (McPherron and Srejović 1988: 82; Whittle 1996: 114).

Kitchen activities often spread beyond the immediate vicinity of a hearth or oven. At Divostin I a vessel resembling a trough for kneading bread was found away from a food preparation area (McPherron and Srejović 1988: 82). Grinding stones and mill structures are also somewhat removed from the immediate hearth area. At Zadubravlje, many querns were in an exterior courtyard area (Minichreiter 2001).

d. *Sleeping*

Depending on the weather, household members may have slept close to or away from heat sources. In the Slatina structure, there are two wooden structures, which may be beds that are situated close to a hearth but far from the door. Benches of earth were excavated at Divostin I that may have served as sleeping pads (McPherron and Srejović 1988: 82).

e. *Tool making*

McPherron and Srejović (1988: 82) suggest that the presence of whetstones near a hearth at Divostin I indicate that bone or antler tools were created in this area. It is very reasonable that many tool creation activities and other non-economic activities such as socializing took place around the hearth. At the Slatina site, stone and bone tools and a box were found in a separate area of the house (Whittle 1996). A pit dwelling at Zadubravlje seemed to be specifically for lithic tool production (Minichreiter 2001). This segregates lithic production from all other activities. This may be because of the messy debitage involved that can get stepped on or find its way into food.

f. *Religion*

The previously mentioned box at Slatina was interpreted (Whittle 1996: 58) to be a repository for a household spirit. Religious items such as figurines appear in many other sites including Divostin I (figurine frequency increases in Divostin II phases) (McPherron and Srejović 1988), Achilleion (in all phases) (Gimbutas 1989) and Nea Nikomedeia (Rodden 1965). Anthropomorphic and zoomorphic figurines occur. Among the Nea Nikomedia artefacts are two exceptionally large axes, hundreds of unutilized flint blades, clay discs and female figurines (Rodden 1965; Whittle 1996: 58). The lack of strictly utilized tools and domestic equipment suggest that the central building where they were found may have had special religious purpose as a shrine.

C. Pit houses

Starčevo sites generally have less vertical debris accumulation (and hence, thinner depositional layers) than surface dwelling sites (Bogucki 1996: 146). Furthermore, the nature of the houses is different in early Starčevo sites. Instead of surface houses, early Starčevo houses are in the form of semi-subterranean features or pit houses. Pit house complexes are the earliest major form of habitation at Divostin (McPherron and Srejović

1988) and contain concentrations of pottery, animal bones, and other material. They may have a secondary purpose after habitation as rubbish pits (Bogucki 1996: 246).

Minichreiter (2001: 202-207) has identified four basic types of pit house structures. These are small structures which are working pits, medium structures which are working pits or dwellings with kilns with at least one room, large pit dwellings for habitation or rituals and burials and deep pits or wells that may have a storage function. The Starčevo pits at Foeni-Salaş are medium structures.

1. Pit house size and shape

There is a wide range of pit dwelling size. Pit houses are generally ovoid in shape, and have dimensions of 3.5 by 4.5 m (Roşu and Peck n.d.: 27). Smaller pits, 2-3 m in diameter may be working pits or pit dwellings (Minichreiter 2001: 202). Foeni-Salaş and the early Divostin I phases are of this type of settlement.). One pit dwelling at Slavonski Brod was 15x5 m (Minichreiter 2001: 210). Pit houses are about 50-70 cm deep (Minichreiter 2001: 202). One dwelling at Divostin I appears to be beehive shaped according to the pattern of postholes (McPherron and Srejović 1988: 36). A ramp at the side served as the entrance (McPherron and Srejović 1988: 35).

2. Pit house construction

Construction of subterranean or semi-subterranean pit houses appears uniform. Starčevo pit houses were dug into glacial löess deposits and daub walls were constructed (Bogdanović 1988). At Divostin I, the pit was dug in a circular shape and a light wooden structure was erected on top (McPherron and Srejović 1988: 70). Wood, crushed stone, daub and sometimes a lime or clay coating were used in their construction (McPherron and Srejović 1988: 70). No Early Neolithic pit houses cut into each other suggesting contemporary construction. At Zadubravlje, a Croatian site, Blagotin and Obre I in Bosnia-Herzegovina, animal remains were underneath the floor of a possible house shrine. At Lepenski Vir and Blagotin animal bones were also from floors and the area below them (Dimitrijević 2000: 102; Vuković 2004: 84). It has been conjectured (Benac 1973: 16 Minichreiter 2001: 205; (Nikolić and Zečević 2001: 12; Vuković 2004: 84) that animal sacrifices were part of the construction process.

3. *Spatial organization of settlements*

At Divostin I, there are early pit structures spread over an area of at least 80 by 60 m (Whittle 1996: 54). The early Divostin I pit houses do not appear to have a particular orientation or fixed plan (McPherron and Srejović 1988: 85). Foeni-Salaş is similar to the surface house pattern at Blagotin: pit house structures form a semi-circle surrounding a larger structure (Nikolić and Zečević 2001: 12). Spaces between pit houses are generally empty presumably keeping lines of communication and sight open (McPherron and Srejović 1988: 85). This also implies that work areas that create debris are elsewhere, often in dwellings. The Zdubravljje site had clearly delineated activity areas for storing and preparing food, producing lithic tools, dwelling and religious areas, courtyards for textile production and food processing, pottery workshops and kilns (Minichreiter 2001: 208). Working pits and workshops tend to cluster in the center of this settlement (Minichreiter: 208).

4. *Pit house walls*

Walls are often poorly defined in pit houses as they are dug into the soil. Walls would also collapse as dwellings fall into disuse. Walls slope towards the base and only the centre floor is level (McPherron and Srejović 1988: 38-39, 71). The pit structure at Achilleion had very sloping walls (Gimbutas 1989: 34). In a subterranean dwelling at Divostin I, a rectangular niche was cut into the east wall from the floor to the original soil level (McPherron and Srejović 1988: 38). Postholes indicate wall support in several pit houses at Divostin (McPherron and Srejović 1988) and at Foeni-Salaş (Greenfield and Draşovean 1994).

5. *Pit house floors*

There are a few different types of floors within pit houses. There are highly finished floors such as found in Phase 1a at Achilleion that contained a pit house with a smooth white plaster and daub floor (Gimbutas 1989). A large daub floor was associated with a pit house at the Blagotin site, Serbia (Greenfield 2000:193). These may be maintained over long periods of time through various phases of reconstruction, repair and maintenance (Gimbutas 1989: 34). There are also unfinished hard earth floors such as in the pit dwellings at Divostin I (McPherron and Srejović 1988: 36). Tringham (1971: 86) notes that if the pit houses were not fired then clay comprising the walls and floors would

not be preserved which may account for unfinished floors. However, part of the floor in Hut 2 at Divostin I exhibits signs of burning, but no daub or clay is preserved indicating that some floors were simply left as hardened earth (McPherron and Srejović 1988: 36, 37). It could be that Divostin I floors were generally not finished and that most were dug into sterile pre-Neolithic substrate.

6. *Spatial organization of activities within pit houses*

Spatial organization of activities within pit houses is seen in several sites including Lepenski Vir, Blagotin, Divostin and Achilleion and Zadubravlje. These sites all have complexes that date to the Early Neolithic. At these sites, hearth, fire pit, oven, threshold and altar design change through time but all have their own place within a structure (Radovanović 2000: 339). Domestic activities take place in relation to these major architectural features. Unfortunately, there is little literature discussing where artefacts are found in terms of the larger organization of household domestic items.

a. *Achilleion*

At Achilleion in later phases (Achilleion Ib and so on), figurines are found at an altar, in courtyards or in garbage pits. Beads and ornaments were also clustered in areas where figurines were found (Gimbutas 1989: 251, 254). Figurines are generally associated with architectural features throughout the sequence at Achilleion (Gimbutas 1989: 213). They were present in human activity areas both inside and outside of houses. Gimbutas (1989: 214, 254) noticed that the type of figurine was different depending on whether it was found inside or outside the house. In communal courtyards they are associated with objects related to domestic activities but always near an oven or hearth (Gimbutas 1989: 213). These patterns continued to exist in later phases. This pattern is not so clear and common in the earliest phase but its beginnings are present. This emerging pattern is first seen in early phase (Achilleion Ia). A cult object was discovered in a pit surrounded by stones. This pit was next to a floor surface and near a food preparation area (Gimbutas 1989: 213). It has been interpreted as a pit house or storage pit (Gimbutas 1989: figure 2.1; Perlès: 2001: 184). In another part of the site, figurines were associated with bowls and plate fragments (Gimbutas 1989: 213). The general pattern across all phases at Achilleion is that religious objects including figures, beads, clay discs and clay blocks are associated with houses, ovens and heat sources.

Clay discs appear in house-shrines at Achilleion (Gimbutas 1989: 254). They appear in all phases in the same area type. They are associated with loom weights and this suggests that they were also used in weaving. At Karanovo, looms stood next to altars (Gimbutas 1989: 256).

Stone tools used for grinding, pounding and hammering were found at Achilleion. Most of these were located near ovens, hearths, cooking areas and querns (Gimbutas 1989: 271). Tool manufacturing took place at the site during the Early Neolithic phases (Gimbutas 1989: 300). However, there is no spatial clustering of remains among the chipped stone, which are very sparse.

b. *Divostin*

At Divostin I, the majority of figurines were associated with habitation features. Only two were in pits (McPherron and Srejović 1988: 173). In the earliest phase, Divostin Ia no figures were found in pit dwellings. In later phases, Divostin Ib and Ic, they began to appear with architecture (McPherron and Srejović 1988: 173).

There were few pendants, beads and bone rings found in Divostin I phases. Most of these were in or nearby dwellings (McPherron and Srejović 1988: 330-331 Table 11.9, 11.10, 11.11).

Spatial distribution studies of lithics were not conducted. Three-dimensional provenance was not recorded on most artefacts rendering spatial analysis virtually impossible (McPherron and Srejović 1988: 224-225). Gunn (in McPherron and Srejović 1988: 227) notes that blue flint tended to be associated with Divostin I dwellings. Blue flint is found and was probably gathered locally.

Lobates, possibly a form of body decoration, are found within houses (McPherron and Srejović 1988: 326-327, Table 11.1). Many ambiguous grain shaped 'reel-shapes' are found with Divostin I house contexts (McPherron and Srejović 1988: 325, 327-328, Table 11.2).

Pierced stone discs are found in pits (McPherron and Srejović 1988: 329 Table 11.6). Divostin I pottery sherds are concentrated at high density in pits (McPherron and Srejović 1988: 361). The same pattern is found in animal bone distributions (McPherron and Srejović 1988: 365).

Cattle may have been domesticated on site. The evidence is in the presence of smaller (freshly domesticated individuals), hybrids (medium) and larger (wild) individuals (McPherron and Srejović 1988: 421).

In Divostin I pit houses, heat sources tend to be in the southern part of the structure (McPherron and Srejović 1988: 36).

Evidence of spatial patterning at Divostin I is difficult to perceive because of heavy disturbance from Divostin II and the lack of provenience information (McPherron and Srejović 1988: 360).

c. Lepenski Vir

The pit houses at Lepenski Vir could not be clearly differentiated from their surroundings (Srejović 1972: 46). However, hearth placement is clear. Hearths are carefully made and proportioned. Hearths are placed every 8-12 m apart and at a certain distance from the nearby Danube River (Srejović 1972: 47). Household goods and animal bones were concentrated along the western, narrow side of hearths and never found on the opposite side (Srejović 1972: 47). Hearths were not placed in the center of the living area but to one side.

Animal bones covered the floor in some dwellings (Srejović 1972: 47). However, certain animals seem to be treated as more than just food. Along with human internment in house floors red deer skulls and/ or antlers in some houses were brought in around house abandonment. Dogs and boar were deposited in the same way (Srejović 1972: 47). In houses where there were no human bones, large red deer antlers are present (Radovanović 2000: 341).

The first cultures at Lepenski Vir, called Proto-Lepenski Vir and Lepenski Vir Ia, had no figures or sculpture (Srejović 1972: 81). The culture complex following this, Lepenski Vir Ib, had sculptures which were spatially linked with altars (Srejović 1972: 81). In the Proto-Lepenski Vir pit dwellings, only flint weapons and some bone and stone objects were excavated (Srejović 1972: 131). Objects used in domestic, daily tasks were only found in houses, a pattern which continued through all time periods at the site (Srejović 1972: 131).

d. Comparison of Achilleion, Divostin and Lepenski Vir patterns

At Achilleion, Divostin and Lepenski Vir, there are reoccurring patterns in the Early Neolithic complexes. These patterns often recur throughout all periods of habitation. Objects related to daily household activities are always found within a dwelling context. This is what we may expect as it is convenient to have these things close by. There are finer patterns within this overarching pattern.

Fine, subtle patterns indicate where specific activities were located. Loom weights indicate a weaving area within houses at Divostin and Achilleion. Figurines at Achilleion and Divostin are within a household context and especially associated with cooking and food preparation areas. The early complex of Proto-Lepenski Vir had no figurines, but this pattern is evident in later periods. Other religious paraphernalia and ornaments are found within households near cooking areas. Ritual objects are commonly found near hearths and heat sources including ovens at Achilleion (Gimbutas 1989: 213) and Divostin (McPherron and Srejović 1988: 173). This could be evidence of shared activity areas. For example, the fire could not only be used for cooking, baking, heat or making pottery but also as a spiritual focus.

In all sites discussed, hearths are not central to the dwelling. They are erected to one side of the living floor. This could be to free space for other activities relating to the domestic realm.

Food preparation areas are often close to ovens or hearths. Sometimes all three appear very close together such as at Achilleion (Gimbutas 1989: 271).

Garbage pits are used in all the sites. They contain a wide variety of objects including ceramics, bone, and the odd ornament or figurine. These garbage pits are located near house structures but never immediately adjacent.

7. *Spatial organization of specific activities, functions and objects*

a. *Heat*

At Divostin I, hearths were often set along the southern or eastern walls (McPherron and Srejović 1988: 71). A poorly preserved hut in phase Ic at Divostin exhibits a stone construction in the middle of the floor surrounded by ash which may have been a hearth or roof support (McPherron and Srejović 1988: 39). The pit house at Achilleion does not exhibit a hearth. Hearths in the pit dwellings at Lepenski Vir were

oriented near the eastern side of the dwelling and oriented to the nearby river (Srejović 1972: 46-47).

b. *Storage*

Household goods appear to be stored opposite hearths at Lepenski Vir (Srejović 1972: 47). A stone formed niche at the back of a dwelling may have been for storage (Srejović 1972: 47). Exterior storage pits are common in Early Neolithic sites in the Balkans and are seen at many sites including Divostin, Lepenski Vir, Blagotin and Foeni-Salaş.

c. *Cooking and baking*

Artefacts associated with food preparation such as spatulas, bowls and grinding stones are nearly always found close to hearths and ovens. Where meat was processed and cooked is more ambiguous. Most site reports give bone counts by period or level. There is seldom indication of where faunal remains were located in relation to where they were being processed or cooked. This renders spatial analysis difficult. At Lepenski Vir animal bones were only found in a narrow place on the west side of hearths (Srejović 1972: 47). In some dwellings, the animal bones were scattered over a large area (up to 3 m) away from the hearth and right up to the foundation on the other side of the structure (Srejović 1972: 47).

d. *Tool making*

Lithic tools were only found in the living areas of the Mesolithic Lepenski Vir pit houses (Srejović 1972: 131). They are found in multiple activity contexts within pit houses. This is because lithic tools are used for many activities including pottery making, cooking, baking and clothing production. A pit at the Early Neolithic site of Zadubravlje in Northern Croatia contained many types of lithic artefacts including microliths, cores, flakes, whetstones, and unfinished tools (Minichreiter 2001: 202). This may have been a workshop for the production of stone tools.

e. *Religion*

At the Blagotin site, two idols were found on a daub platform (Greenfield 2000: 196). It has been observed that the particular pit house in which they were found may have functioned as a place with religious meaning. Other artefacts such as ceramics or

lithics were notably absent from this space (Greenfield 2000: 196). In other sites, namely Divostin, Achilleion, and Karanovo, religious objects are found in houses and in relation to hearths and other heat sources (McPherron and Srejović 1988: 173; Gimbutas 1989: 213). The Zdubravljje site had a large pit dwelling, containing four rooms that were capable of holding a large number of people. Many pottery sherds, bone pieces and cult objects are were within this space (Minichreiter 2001: 205). A specialized ritual/burial area was discovered at the Starčevo-Criş site of Slavonski Brod. A fence had enclosed this pit dwelling. There was pottery within overlaying a cattle horn that had been ritually buried (Minichreiter 2001: 209). Two human burials were near two kilns within the dwelling. Altars are usually in the shape of small pedestals not unlike a stool and it is assumed that they are associated with religion (Nikolić and Zečević 2001: 14).

8. *Nature of activity patterns within pit houses*

Dwellings and other architecture contain artefacts that were organized by the residents. The interiors of pit houses are generally undifferentiated (McPherron and Srejović 1988: 78) and floor plans are simple (Bailey et. al. 2002: 351). At Lepenski Vir and Divostin, the only clear architectural feature within pit dwellings is the hearth. Most activities probably centered on this area but little study has been given to what specifically happened around this pivotal feature. Household areas are party to a wide range of domestic activities that may overlap (Jongsma 1997: 21). Specialized activity areas may see a narrower range of activities, perhaps only one activity per area (Jongsma 1997: 22).

a. *Baking*

It is a logical assumption that most kitchen activities took place around the hearth, as the heat is necessary for cooking and baking. In cold weather the hearth may become more central to activities as a source of warmth. Household goods were concentrated near carefully constructed hearths at Lepenski Vir (Srejović 1972: 47). This organization puts goods and tools within easy access of anyone utilizing the hearth and the space around it for food related activities. A Starčevo village near Zadubravljje-Dužine (Croatia) includes ovens for bread baking (Baldia 2003). It is possible that ovens doubled for baking and for firing ceramics. Small vessels have been found close to hearths as found at Lepenski Vir

(Srejović 1972: 47) and through all phases at Achilleion (Whittle 1996: 62). These smaller vessels may have been for food staples common in the daily diet.

b. *Food processing*

Activity areas related to plant consumption may be detected by associated artefacts. Saddle querns are found in almost every Early Neolithic and late Neolithic house along the shores of the Black Sea, southern Bulgaria and the lower Danube valley. A Sesklo culture pit house at the site of Achilleion has food preparation equipment found on a plaster floor (Gimbutas 1989; Whittle 1996: 55). This was identified on the basis of a quern, grinders, axe, blades and a stone vessel piece (Gimbutas 1989: 34).

It is uncertain whether food was eaten inside or outside the pit houses. Animal bones are found both inside and outside pit houses. At Achilleion, there is evidence for food sharing between later period surface houses. At Lepenski Vir, Blagotin and Foeni-Salaş, bones were discovered within pit houses (Dimitrijević 2000; Greenfield in press: 5). Animal bones were concentrated near hearths and under floors at Lepenski Vir (Srejović 1972: 47; Dimitrijević 2000: 102). A large section of a pig carcass is in a pit house at Lepenski Vir that implies that butchering took place within houses (Dimitrijević 2000: 103). The section is so large that it may have been abandoned during the butchery process or is an offering (Dimitrijević 2000: 105, 106). In many sites, faunal remains are seemingly randomly scattered throughout external areas.

There are problems with identifying the areas where animals were processed. These issues stem mostly from methodologies used in their recovery and curation. For example, faunal remains may be sieved or unsieved, which influences recovery rates. Smaller bone pieces or smaller specimens may be underrepresented in hand-recovered assemblages. Many site reports provide only summary statistics and gross quantification counts, and many Balkan reports do not discuss burned versus unburned remains (Greenfield in press: 6). There are also curation problems that render reanalysis difficult (Greenfield in press: 5). Many collections have been destroyed during the Balkan campaigns in World War I and II and the Yugoslav war (1991-1999) or discarded (Greenfield in press: 6).

c. *Pottery*

The Zadubravlje-Dužine site has features exterior to pit houses which have been interpreted as “kilns” for pottery production (Obelić 2000, Minichreiter 2001: 203). Pottery workshop pits were located in the western part of the site (Minichreiter 2001: 203). In one pit there was a large working area and two ovens for baking and two for firing pottery along the south wall. There were smaller pits inside the larger pit house that may have had a function during the ceramic making process (Minichreiter 2001: 203). Another workshop pit had smaller pits that were situated where someone could sit and control the firing process. As ceramic making can be messy they may have been formed outside houses, then fired inside pit house ovens or in exterior kilns or fire pits.

d. *Storage*

There is evidence that large pots and pits were used for storage and presumably placed out of the way of people conducting daily activities. Storage and rubbish pits are part of many sites (Divostin, Achilleion, Karanovo, Lepenski Vir and others) and are always exterior to pit houses. Some pottery types have handles that would have enabled them to be hung from ceilings or from animals. Storage utensils have been found with preserved grain inside of them (Tringham 1971: 156).

e. *Work areas*

Work areas have a variety of artefacts associated with them. At Achilleion, work areas appear to be outside the context of houses in yards and between dwellings (Whittle 1996: 61). In contrast, simple flint and bone tools and weapons were found only within the dwellings at Lepenski Vir (Srejović 1972: 131). The authors give no explanation for this, but one possible interpretation is that the Mediterranean climate of Achilleion may have made it possible to work outside most of the year. Lepenski Vir was probably wetter and saw more temperature extremes necessitating a sheltered work environment (Srejović 1972: 171). At Zadubravlje, many loom weights were found within a courtyard (Minichreiter 2001: 204) that was used for producing fabric. This courtyard also functioned as an area to process grain and other foods as many querns were found (Minichreiter 2002: 204).

VI. Conclusion

This chapter has briefly described the prehistory of the Early Neolithic as it pertains to the Central Balkans. Starčevo culture is particularly scrutinized. The earliest farming communities appear in the southern Balkans about 6500 BC (cal.) and spread to the northern (i.e. central) Balkans by 6100 BC (cal.). The Starčevo culture spans the time period from circa 6100-5100 BC (cal.) (Ehrich and Bankoff 1990; Manson 1990; Greenfield and Jongsma in press; Tringham 2000: 27). These early farming communities relied on a variety of food sources (barley, lentils, wheat, goats, sheep and cattle) that were originally domesticated in the Near East (Tringham 1971; Whittle 1996; Tringham 2000: 23).

This chapter demonstrated how by examining patterns made by artefacts and features, an image of a population's economic characteristics and how they organized their living space are obtained. In particular, it was examined how the spatial analysis of Starčevo sites can provide inside to the spatial organization.

Starčevo architectural types (early pit and surface houses), internal features (ovens, hearths) and artefacts (ceramics, chipped and ground stone tools, bone tools, weights, figurines, etc.) are relatively plain and simple, and appear characteristic of mobile short-term occupations.

Storage of foodstuffs and equipment may occur within a dwelling or in storage pits close by. Garbage pits are also close by.

Food preparation equipment tends to be concentrated near hearths and ovens. Grain processing took place inside houses at Achilleion. The evidence at Achilleion points to food sharing between homes that may indicate a form of social organization and reciprocity.

It is not yet clear whether animals were cooked and eaten inside or outside houses. Faunal remains are concentrated within pit houses, such as at Blagotin and Lepenski Vir (Srejović 1972: 47), and outside pit and surface houses at Achilleion and Divostin. Faunal remains are also found in midden pits. It is likely that plant and animal foods were eaten inside and discarded either in a midden pit or in the house itself in or near the hearth. There is no evidence for slaughtering and primary butchering within sites. It is likely that messy work such as butchering may take place outside or at a kill site, away from

dwellings. Secondary processing probably took place within houses, as bones are present in pit houses. Animal bones may also be present in pit houses as ritual offerings.

Baking ovens and hearths are situated inside pit houses. These areas imply that cooking activities were mostly conducted inside houses. This is seen at many sites including Achilleion, Divostin, Lepenski Vir, Blagotin, Karanovo and Foeni-Salaş.

Storage may take the form of ceramic vessels inside houses or in storage pits outside houses. Some vessels appear designed for hanging from roofs/walls and/or from domestic animals during periods of mobility. There is no evidence of storage pits within structures. Storage pits are always outside dwellings. External pit storage areas are seen at Achilleion, Divostin, Lepenski Vir and Foeni-Salaş.

There is no evidence of debitage from lithic knapping outside houses. Lithic production probably took place inside houses.

The activity patterns associated with pit houses at Foeni-Salaş appear to have some similarities to those associated with surface dwellings in surrounding regions or later contexts. No matter what geographic context or time period, nearly all Early Neolithic sites are organized in similar ways. For example, hearths and ovens are situated inside dwellings. Particular artefacts and activities are associated with major features such as ovens, fire pits and hearths or are in some relation to it. Early Neolithic pit houses contain oven and hearth features that are central to many activities, especially those regarding food consumption. For example, food preparation equipment (grinding stones, querns, other tools) is associated with hearths and ovens.

Through this thesis, conclusions were drawn as to how Early Neolithic spatial organization can give insights to human behaviour. The spatial relationships and patterns of artefacts and features reveal what activities they were used for and the human rationale behind decisions. "Objects created in the domestic context do not easily lose their domestic meaning and significance" (Chapman 2000: 5). Tools are associated with places where activities for which they were used took place. This conclusion will help determine which artefacts indicate what activities were undertaken and where. This thesis examines the patterns and relationships of artefacts as evidence for these activities.

In the next chapter, the specific stratigraphic, artefact and feature data from Foeni-Salaş will be summarized in order to prepare for the spatial analysis.

Chapter 4 Data description

I. Introduction

In this chapter, the data from the site known as Foeni-Salaş, and the various analyses that have been performed on them to date are discussed. First, the location and environmental characteristics of Foeni-Salaş are identified and reviewed. Second, the history of excavations near the modern village of Foeni and at the site of Foeni-Salaş is considered. Third, the methods and techniques of excavations are examined, as they were designed with spatial analysis in mind. Fourth, the types of data recovered from the site are discussed in specific terms. Fifth, each locus and artefact type are considered separately. It is these loci and artefacts, that is subject to analysis in this thesis. Finally, previous analytical research on the site is investigated.

II. Site Description

A. *Location and environmental settings*

Foeni-Salaş is located in southwest Romania, in the province of the Banat. It is 3 kms north of the modern town of Foeni. Its geographical coordinates are at 20° 51' 32.05" east longitude and 45° 31' 13.76" north latitude and 80 m (241 feet) above sea level (Greenfield and Draşovean 1994; Greenfield and Jongsma in press; ATI Technologies 2006).

The site is on an alluvial plain near the Timiş and Bega Rivers in the Carpathian Basin (Fig. 5), in a region is known as the Banat. Old meanders and channels of the rivers surrounded the site at various times as the site is slightly elevated from the surrounding area. The soils were not subject to the flooding of the Timiş and Bega Rivers; instead they were affected by a fluctuating water table (Greenfield and Draşovean 1994: 47). The soils in the surrounding region are mostly sandy loamy clay superimposed over Pleistocene löess (Greenfield and Jongsma in press).

The current climate in this region is very hot and wet in the summer to cold and slightly drier in the winter. The region receives a mild winter because of the damp warm winds from the Mediterranean. Cold and dry winds come from Russia and the Ukraine to the east (World Meteorological Organization 2006).

The area has little to no natural indigenous vegetation due to modern agriculture, draining of wetlands in the 19th century, and forestry (Greenfield and Draşovean 1994: 46).

B. The site – Foeni-Salaş

The site of Foeni-Salaş is found in the Romanian Banat about 45 kms southwest of the city of Timisoara. The village of Foeni is 3 kms to the south of the archaeological site. The site itself is very close to the Romanian border with Serbia (Fig. 5).

The site is on the right side of the Timisat stream that feeds the Timiş River (Fig. 4). The site has some old levees that indicate old stream channels. According to the land owners, the site has been continually under cultivation for several generations.

The site is situated upon a natural rise. There is a slight dip between the northeastern and southwestern part of this low mound. The rise gently slopes down to the Banat plain to the north and west (Fig. 6). To the south, there is a more rapid drop into an old river channel. The site is about 2000 square metres in size (Fig. 7).

C. History of investigations at Foeni

The first archaeological survey to take place in this region of the Banat was in 1975 and conducted by Florin Medeleţ (Greenfield and Draşovean 1994: 48-49). A salvage survey directed by Florin Draşovean occurred in 1986 when a natural gas piping station was being built. Draşovean discovered Foeni-Salaş and eleven other sites from different periods (Greenfield and Draşovean 1994: 48). The region was occupied from the Early Neolithic onwards. In addition to the excavations at Foeni-Salaş excavations in 1991 inside a Romanian orthodox cemetery in the village of Foeni revealed that the area was occupied during a wide range of periods including the Late Neolithic, Copper Age, Bronze Age, Early and Late Iron Age and Medieval periods (Greenfield and Draşovean 1994: 48; Greenfield and Jongsma in press).

Draşovean recorded the presence of archaeological materials at Foeni-Salaş in 1992. He noticed two concentrations of remains. One concentration consisted of Daco-Roman (4th century AD), Iron Age and Bronze Age artefacts (Greenfield and Draşovean 1994: 48). The other concentration was older and contained Early Neolithic Starčevo-Criş- remains. A series of campaigns were launched to excavate the site. They were directed by Haskel Greenfield in collaboration with Florin Draşovean. Small-scale test

excavations were conducted in the summer of 1992. This was followed by two large-scale excavation seasons in the summers of 1993 and 1994 (Greenfield and Draşovean 1994: 49; Greenfield and Jongsma in press). One of the research aims was to investigate social and economic organization of a nearly undisturbed Starčevo-Criş settlement (Greenfield and Draşovean 1994: 45). To fulfill this research aim, the distribution of artefacts and household features were carefully mapped.

D. Excavation method

Before excavation began, the site was divided into 20x20 m blocks. Each block was numbered, starting with 1 in the southwest corner far off of the site. Each line of blocks increased in frequency moving toward the northeast. Each block was divided into 5x5 m trenches and each was assigned a letter (A-P), beginning in the northwest corner and moving left to right. These trenches were divided into 1x1 m units (quads) and numbered 1-25, starting at the northwest corner and moving left to right (Greenfield and Jongsma in press) (Fig. 7). Each 1x1 m unit could be identified to an exact spatial provenance. For example, unit 150C/2 represents Block 150, Trench C, Quad number 2. The distance in meters from the southwest datum point on the site could be easily reconstructed for any ensuing spatial analysis.

Several surveying techniques were implemented at Foeni-Salaş. These included surface collection, excavation, magnetometer and soil coring (Greenfield and Draşovean 1994: 50-54). These were used to determine site extent, deposit extent, artefact density and to locate features and activity areas (Greenfield and Jongsma in press). All these techniques were successful to at least some degree.

Surface collection established the extent of each period of occupation based on the distribution of surface remains. Auguring established the location of surface features. In some places features were difficult to recognize and the auger missed them. A magnetometer was used to decide where to place trenches in 1992. The magnetometer was not used in subsequent years because of technical problems with the equipment. These surface surveys established Foeni-Salaş as a multi-period site and showed the extent of each period of occupation (Greenfield and Jongsma in press).

Based on the augering and test excavations, a general pan-site chronology was established from the surface downwards: plough zone, Medieval (12th cent. AD), Early

Iron Age (Hallstatt), Starčevo-Criș, and a culturally sterile post-glacial (Holocene) and a Pleistocene horizon (Greenfield and Drașovean 1994: 54-56; Greenfield and Jongsma in press).

The lack of significant archaeological deposits above the Early Neolithic strata facilitated excavation of the early Neolithic settlement. This allowed excavators to uncover a wider horizontal area than would normally be possible (Greenfield and Drașovean 1994: 53). The site was extensively excavated with detailed mapping of features and artefact locations (Fig. 8). Excavators followed natural stratigraphy as much as possible, but used arbitrary levels when soil changes could not be discerned or where deposits became too thick (Greenfield and Drașovean 1994: 53). Each quadrant was dug down to sterile soil. The heavily disturbed plough zone was shovelled as cultural debris was mixed and primary context lost.

Natural, undisturbed soils were excavated using trowels. Soils were first dry-sieved using a 0.5 cm mesh (1992) that was later replaced by a larger 1-cm mesh (1993-1994). The 1-cm screen was used most extensively since the soil was very clayey and clogged the smaller mesh screen. Artefacts were left *in situ* as much as possible and were collected only after being drawn and photographed. Soil samples were taken for flotation and general sieving, particularly when charcoal and ash were noticed (Greenfield and Jongsma in press). They were analyzed after they dried naturally.

Each deposit with unique sedimentary and cultural properties (colour, texture, type of artefacts, and density of artefact) were given individual locus numbers. Features, such as pits and artefact concentrations, were also assigned numbers.

In some excavations, there is some ambiguity as to what phenomena could be called a feature and what could be called a locus. Often the terms are used synonymously, which was the case during Foeni-Salaș excavations. Pits were given either a locus or a feature numbers. In the case of the Foeni excavations, all features should in fact have been designated loci as they are pit like in nature. The majority of pits are in fact given a locus designation. The difference between a feature and a locus for this excavation is that a feature should represent a cultural phenomenon that consists of artefacts or a built structure. For example, a wall, or a pile of bones are features. A locus number should be used when designating strata types. For example, pits should be designated as loci as they

are soil disturbances. Often the term feature is used to describe gross architecture and pits (Greenfield, pers. comm.).

E. Site taphonomy

The spatial patterning of archaeological materials, as originally discarded by people, is susceptible to alteration by various agents, both biotic and abiotic. There are at least two potential approaches for investigating this problem in an archaeological data set. One approach is to seek spatial clusters that differ in content. The assumption is then that the differences in content are due to differences in site formation processes. The second approach is to use ethnoarchaeological research to identify aspects of the archaeological record that are resistant, or even immune, to processes of disturbance. Unfortunately, due to the nature of Foeni-Salaş only the first approach is possible and is discussed next.

Taphonomy is often at the root of misunderstood patterns. Taphonomy can change the context and meaning of deposits. Events subsequent to the creation of the initial artefact patterns may mar the evidence and transform its nature.

One potential taphonomic problem is that rodents move artefacts as they tunnel through the ground. At Foeni-Salaş, rodent burrows riddle the site (Greenfield and Draşovean 1994: 56). They even came into the trenches during excavations and damaged trenches (Greenfield and Draşovean 1994: 56; Greenfield and Jongsma in press). All loci had evidence of extensive rodent activity, especially those with high organic content (Greenfield and Jongsma in press). Rodents incorporated postholes into their burrows, as it was easy digging for them. In some places rodents had made different strata indistinguishable (Greenfield and Draşovean 1994: 56; Greenfield and Jongsma in press). Fortunately, the rodent disturbances are drawn on maps and were mapped in the digitized versions. This aided in identifying anachronistic artefacts. Artefacts disturbed by rodents or ploughing will affect results.

Long-term occupation of sites results in activity area clean up and the intentional discard of waste. It is the larger tools that are most often affected in the process of clean up. Keeley (1991) observes that, in general, it is small fragments that remain in the original activity area. Trampling can break and move about artefact fragments. Clean up of debris may lead to large items moving to settlement peripheries or to refuse areas.

Social stratification and subsistence methods may have affected how material was distributed.

Artefacts associated with domestic activities such as food preparation, cooking and ceramic production may be associated with gender or age, or a particular place such as a hearth. Galanidou (2000: 257-258) states that it is “almost impossible to identify the areas in which domestic activities were performed” and notes that certain activities may never have been confined to a single particular area. Some cultural groups do segregate activities whereas others do not (Galanidou 2000: 259). Activity areas or functional spaces can be recreated if the activities performed in the location leave artefact evidence.

In the Late Neolithic of the region, houses were often purposely burnt and rebuilt on the same location (Tringham 2005). This burning destroyed a great deal of potential information about the structure and its use. Fortunately, the Early Neolithic settlement at Foeni-Salaş did not experience burning or reuse and it is possible to identify specific activities within pit houses. There is no Early Neolithic structure that intrudes into another Early Neolithic structure though later occupations have. There is no contemporary disturbance of the lower Early Neolithic strata. Several of the Early Neolithic deposits were truncated or disturbed by activities from later periods (e.g. Locus 24 is disturbed by Locus 30).

Modern and ancient ploughing affected site taphonomy, and modern ploughing still brings artefacts to the surface (Greenfield and Draşovean 1994: 57, 60). Ancient ploughing is evident in Locus 4 that extends across the site (Greenfield and Draşovean 1994: 57, 62-63). The two zones of plough influence extend to 30 cm below the surface (Greenfield and Draşovean 1994: 57; Greenfield and Jongsma in press).

The Early Neolithic layer is affected by later occupations from the Eneolithic, Middle Bronze Age, Early Iron Age, Dacian (late Roman, ca. 4th-5th centuries AD) and Medieval periods. Iron Age pits were especially destructive, intruding into and destroying parts of Neolithic pit houses (Greenfield and Draşovean 1994: 71-72). The Foeni-Salaş dataset was excavated with these taphonomic processes in mind, and the analysis takes them into account. The artefacts analyzed here are mapped with great detail and are in a primary depositional context.

F. Site chronology

Foeni-Salaş is a multi-occupational site. Most of the deposits have been dated by relative dating techniques, including stratigraphy and ceramic type cross-dating.

There are different ceramic types spanning several time periods and representing development over time. Each of the types has been assigned to a particular regional culture based upon cross-dating techniques long used in the region. These include Early Neolithic, Eneolithic, Middle Bronze Age, Early Iron Age, Daco-Roman, Medieval, and Modern.

The Early Neolithic is represented by the Starčevo-Criş, that lasted in the central Balkans from 6100-5100 BCE. The Eneolithic is represented by remains from both the Tiszapolgar and Baden complexes. The Middle Bronze Age is represented by the Vatin culture. The Early Iron Age culture is represented by Halstatt C. A late Roman culture is represented by Daco-Roman remains. There is also a Medieval presence, and recent historic remains on the site.

III. Locus description

Five loci extend across the entire site. These are Locus 1 (plough zone), Locus 4 (Early Iron Age Halstatt), Locus 2 (Early Neolithic Starčevo-Criş), Locus 5 (post-Pleistocene humus) and Locus 12 (sterile löess) (Greenfield and Draşovean 1994: 62-64). There are instances of features from different periods and loci cutting into each other. This resulted in some period overlap. For example, Early Iron Age and Daco-Roman pits often intrude into Starčevo-Criş structures and deposits. Other loci were identified as belonging to these periods but as they represent a feature, pit house, or other phenomena, they were assigned their own locus number. Each locus is discussed below and is organized by time period.

A. Modern

1. Locus 0

This is the surface of the site. The data from this locus represents the material collected on the surface.

2. *Locus 1*

The plough zone (Locus 1) is a mixture of cultural debris from all periods present at the site. It is very thick (30 cm) and loose as it has been under ploughing for many years (Greenfield and Jongsma in press).

B. Medieval

1. *Locus 4*

The Medieval pan-site locus (Locus 4) contains some Early Iron Age (Halstatt), Eneolithic and Starčevo-Criș remains. Medieval ploughing mixed this and destroyed any evidence of features. Part of this locus was subdivided. Locus 4.1 connects with Locus 8 and is the upper part of Locus 4. Sub-locus 4.2 is the lower locus and is also stratigraphically associated with Locus 8 (Greenfield and Drașovean 1994: 62-63). Structures in this period have been essentially destroyed and scattered by ploughing (Fig. 9).

2. *Locus 8*

Locus 8 is a major medieval fortification ditch. It extends across the site in an east-west direction through the center of the Early Neolithic settlement. It then turns to the south at a right angle and continues in a north-south direction to the western most edge of the site (Haskel Greenfield, pers. comm.). The remains were mixed with those from earlier periods (Halstatt and Starčevo-Criș) because the ditch dug through the earlier deposits. Post-holes and other remains indicate that it was for a fortification on the site (Greenfield and Drașovean 1994: 64).

a. *Sub-locus 8.1.*

This is the ditch's upper fill. It is a greyish brown colour.

b. *Sub-locus 8.2.*

Sub-locus 8.2 is the basal fill (Greenfield and Drașovean 1994: 64). It is much thinner than the upper fill and brown in colour.

c. *Locus 13.*

This locus is another sub-locus of Locus 8. It is at the top of locus 8, above Sub-locus 8.1. There are no ceramics associated with Locus 13. This sedimentary stratum lies above the medieval fortification ditch and below Locus 1. It is a long thin layer,

yellowish brown in colour (Greenfield and Draşovean 1994: 65). It is likely Medieval in origin.

3. *Locus 21*

This is a rectilinear Medieval pit house structure. Postholes are found along one side. Very few remains are found within it.

4. *Locus 27*

Locus 27 appears to be a Medieval pit as there are Medieval ceramics in the middle of this locus. The middle of the locus is an area of compact soil and roughly circular in shape. There is evidence of a hearth outside the compact area. There are also lithic tools outside the compact area.

5. *Locus 29*

This is another Medieval storage pit. It cuts into Loci 2 and 5 from Locus 4.

6. *Locus 35*

Locus 35 is a deeper, bell-shaped Medieval storage pit.

7. *Locus 38*

This locus is a small square Medieval pit house. It has a clay floor. Postholes surround it. There is evidence of an oven in the southern end. There is a low density of remains but many different types are present.

8. *Locus 42*

This is a Medieval pit house complex. Excavations did not find its extent. There are associated postholes and a fired clay floor similar to that in Locus 38.

9. *Locus 43*

This is a small pit. It cuts through the centre of Locus 42 (the Medieval pit house) It may have been initially used for storage, but was later filled with debris.

10. *Locus 55*

This locus is a large unfired clay base. It may have served to anchor a post for a small pit. It is situated in trench 130K. It is tentatively assigned to the Medieval period based upon its stratigraphy, architecture and association with Medieval artefacts. It was

given this locus designation based on the digital analysis of daub remains in the lab (Jongsma 1997).

11. Locus 58

This is a small pit dug through Loci 24 and 30. It was not recognized as a separate locus during excavation. It contained a cluster of Medieval ceramics and a very large round grinding stone. It was given this locus designation based on the digital analysis of remains in the lab.

12. Feature 7

This is a rectilinear bedding trench. There are very few remains associated with this feature. It is almost sterile except for a few Medieval remains.

13. Grave 2

This Medieval grave is very close to the modern surface. It is at the east edge of the terrace. Erosion and ploughing have probably helped change its proximity to the surface by bringing it closer. This grave is dug into the post-Pleistocene sterile soil horizon and the pit itself is very dark brown. The remains were fully articulated with some dislocation of elements caused by rodents. It appears to that of a middle-aged male. The feet are pointed north-east. There are some grave goods associated with this individual, including a metal spear, a metal fibula that may have served as a part of clothing, a metal belt buckle, a metal dagger, and a strip of metal around the waist (probably from a belt).

14. Grave 3

This appears to be a burial very similar to that of Grave 2. This one was disturbed in antiquity (post-burial) since the elements are not fully articulated. The burial is thought to that of an adult woman, who was possibly pregnant at the time of death since some infant remains were also excavated. The skeleton is oriented with feet pointing toward west.

C. Dacian

The Dacian occupation is found in a very small areas of the site. It is mostly limited to the southwest quarter. In general, there is very little Dacian material.

1. *Locus 46*

This locus is a deep bell-shaped storage pit. There are few remains in this locus and carbonised soil is concentrated at the bottom.

2. *Feature 4*

This is another bell-shaped storage pit that is cut by feature 5. There is a metal bell in the fill.

3. *Feature 5*

Feature 5 is another bell-shaped storage pit that intrudes into feature 4. There is a large grinding stone with a large complete deer antler fill.

4. *Feature 6*

This is another bell-shaped storage pit. There is a Medieval infant burial in the fill (grave 1). It is partially cut by the Medieval fortification ditch fill.

5. *Grave 1*

This is an infant burial that was found in the bottom of a storage pit (feature 6). It is associated with Medieval pottery, a complete red deer antler and a large grinding stone.

D. Early Iron-Age (*Halstatt*)

The Early Iron Age at Foeni-Salaş is represented by the Halstatt culture (Fig. 10). The Hallstatt culture in this region spans the period from about 100 BCE until around 500 BCE. The Halstatt culture is divided into four phases: Hallstatt A, B, C and D. Foeni-Salaş appear to have a Hallstatt C presence. Hallstatt C refers to the very Early Iron Age (800–600 BCE) complex and is characterized by the first appearance of iron swords mixed amongst bronze ones (Greenfield and Jongsma in press).

1. *Locus 11*

This locus is a small Halstatt storage pit located in Trench 150I, quad 18 (Greenfield and Draşovean 1994: 65). It begins at Locus 4, continues through Locus 2 and ends in Locus 5. A large ceramic vessel was found in the bottom. This locus disturbed the Starčevo-Criş pit house in Locus 10.

2. *Locus 18*

This is a large Halstatt storage pit or possibly a pit house is Locus 18. It is located in Trench 130 D. The floor appears to be divided into two sections.. It is associated with Feature 3, a Halstatt storage pit.

3. *Locus 22*

This locus is another Halstatt pit. It is located in Trench 150E, quad 16. Its function is ambiguous.

4. *Locus 28*

Locus 28 is located in Trench 130G quads 1, 2, 6 and 7. It is a small circular Halstatt storage pit surrounded by postholes. The postholes indicate that it may be a smaller structure. There are few ceramics in this locus. It cuts into Locus 2 from Locus 4.

5. *Locus 30*

This is a larger Halstatt discard pit. It was dug into the centre of the Starčevo-Criş pit house in Locus 24. It is located in Trench 150P, quads 13, 17, 22 and 23. There are many remains of various types in Locus 30.

6. *Locus 31*

This is a small bell-shaped Halstatt storage pit in Trench 130G, quads 4 and 5. Mostly carbonised remains are in this locus. The top of this pit is disturbed by Locus 8 (the fortification ditch). This indicates that Locus 31 is earlier.

7. *Locus 32*

Locus 32 is a small oval Halstatt storage pit in Trench 149P quads 12 and 13. There are few remains associated with it. There is darker coloured soil in this locus.

8. *Locus 33*

This is another storage pit associated with Halstatt remains. It is located in Trenches 130 H (quads 24 and 25) and 130L (quads 4 and 5). Only the base remains. The top was disturbed by ploughing.

9. *Locus 36*

This is a tiny, Halstatt refuse pit in Trench 130g, quads 22 and 23. There were few remains within. It is very shallow in depth.

10. Locus 37

There are few remains in this locus. It is probably another Hallstatt refuse pit. It is located in Trench 150H, quads 21 and 22.

11. Locus 39

Locus 39 is a small circular Halstatt garbage pit in Trench 150H, quad 1. There is an assortment of different artefact types associated within this pit. Wall daub, bones, Halstatt ceramics and some Starčevo ceramics are present. There is also a small grinding stone.

12. Locus 40

This is the remains of a large Halstatt pit. There are several associated postholes, an oven, and concentrations of wall and floor daub (Jongsma 1997). This locus is cut by Locus 8, the Medieval fortification ditch. There are mostly Halstatt remains in this locus but there are Starčevo-Criș ceramics as well. The Starčevo-Criș artefacts probably come from Locus 23 (a Starčevo-Criș stratum) that Locus 40 disturbed. This locus was divided into 2 sub-loci.

a. Sub-locus 40.1

The upper stratum, possibly wall and roof spills. It is light-grey in colour.

b. Sub-Locus 40.2

Sub-locus 40.2 is the lower stratum and base. A daub floor separates the two sub-loci.

13. Locus 44

Locus 44 is another Halstatt pit house with Halstatt remains in Trenches 129 E (quads 3-5, 8-10, 14 and 15) and 129F (quads 1, 6 and 11). Like Locus 40, there are some intrusive Starčevo-Criș remains as a result of disturbing Locus 41 (a Starčevo-Criș locus).

a. Sub-locus 44.1

Sub-locus 44.1, the upper cut of Locus 44, intrudes into Loci 6 and 7. Sub-locus 44.1 is probably the remains of the fallen roof and wall.

b. Sub-locus 44.2

This is the basal fill is Locus 44.2. The loci are separated by fallen wall daub.

14. Locus 45

This is a small Halstatt storage pit cutting into Locus 40 in Trench 129 C, quads 3 and 8. There are few remains and it is likely a storage pit.

15. Locus 47

This is another Halstatt midden pit in Trench 130L, quad 25. It was found beneath the pit house material in Locus 40.

16. Locus 48

This is a small Halstatt pit. It was found beneath the pit fill in Locus 40.2. It is likely a storage pit associated with the overlying structure.

17. Locus 54

This is a small Halstatt storage pit. It was identified during the laboratory analysis of remains.

18. Locus 56

This locus was originally designated part of Locus 23 and interpreted as a hearth. It is filled with burnt debris. However, during excavation, EIA material was found at its base and it has since been reinterpreted as an EIA fire pit. It is unrelated to the surrounding Locus 23 and has been given a new locus number (56). It is located in Trench 129D, quad 12.

19. Feature 3

This feature is the bottom of a very large Halstatt pithos (storage jar). The base was dug into the ground for stability. It is spatially associated with Locus 18, a Halstatt feature situated to the east of feature 3. Feature 3 is located in Trench 130D, quads 4 and 5.

E. Middle Bronze-Age

The following is the only evidence of Bronze Age occupation. No other Bronze Age materials are found elsewhere on the site.

1. Locus 15

Locus 15 represents a small Vatin Middle Bronze Age culture in Trench 131F, quads 7 and 8 (Fig. 11). It is a small pit and the bottom cuts into Locus 12. The upper

levels are disturbed by rodents. The rodent activity rendered it unclear where the pit begins (Greenfield and Draşovean 1994: 66). This pit locus is covered by Locus 4 (Greenfield and Draşovean 1994: 66). White, ashy clay lines this pit. There were also carbonized remains indicating that it was used for heating objects to high temperatures.

F. Eneolithic

The Eneolithic (2500–2000 BC) is the transition between the Neolithic and the Bronze Age. The complex identified at Foeni-Salaş is the Tiszapolgar complex. Loci 1 and 4 had some scattered remains from the Eneolithic but few specific features are found or excavated. Only one small feature is eventually identified

1. Locus 57

This locus is a small Tiszapolgar pit in Trench 130D, quad 1 (Fig. 11). There is no other evidence of an Eneolithic presence. It is identified in the laboratory analysis of remains by the cluster of finds. No sedimentary distinction could be made from the surrounding soils (Greenfield, pers. comm.).

G. Early Neolithic

The Early Neolithic deposit belongs to the Starčevo-Criş culture (Greenfield and Draşovean 1994: 49, 53, 58; see also Chapter 3, this thesis) (see *Starčevo_loci.tif*). Foeni-Salaş was relatively dated based on stylistic elements in ceramics using Milojević's (1950) ceramic chronological sequence, described previously (see Chapter 3), to place the site in the Starčevo-Criş-Criş phases IIA and IIB (Greenfield and Draşovean 1994: 70). Five animal bones were radiocarbon dated by Greenfield and Jongsma (in press) and one by Spataro et al. (2005). One gave an extremely old date (6900 BC calibrated) and was rejected (Greenfield and Jongsma in press) because it was too old. The next date by Greenfield and Jongsma is 5900 BC, followed by a cluster of dates from 5450-5250 BC. While Greenfield and Jongsma (in press) argued that the date of the site should fall by radiocarbon dating into the latter cluster. Paolo and Spataro (2005) give a radiocarbon date of another animal bone as c. 6100 BC. Given the early ceramic style dating, it is more likely that the site falls into the 5900-5100 BC range.

1. *Locus 2*

Locus 2 is the Starčevo-Criș horizon that extends across the entire site (see Fig 16). There is little artefact material in this locus compared to pits and features. In this locus, five pits are found, two of which are pit houses.

2. *Locus 7*

Locus 7 is a pit house complex in Trench 131F (Greenfield and Drașovean 1994: 64) containing three separate strata originally designated loci 14 (sub-locus 7.1), 16 (sub-locus 7.2) and 17 (sub-locus 7.3). Each are separately described below.

a. *Sub-locus 7.1*

Originally called Locus 14, this is the upper fill of the complex. It is possibly the collapsed roof and infill from erosion. This sublocus extends across the entire pit house. It connects with Locus 2 and is directly underneath Locus 4 (Greenfield and Drașovean 1994: 67; Greenfield and Jongsma in press).

b. *Sub-locus 7.2*

This locus was originally designated as Locus 16. Sub-locus 7.2 is the middle of the Locus 7 pit house complex, which contains a high density of ceramics and mammal bones. There are thousands of snail shells present, which are not considered food. The snails may have been attracted to the deposit during aestivation in order to feed on the rich bed of organic remains. This stratum may be the slow fill of the pit house after abandonment. The majority of this sub-locus is found within the centre of the larger pit house depression (Greenfield and Jongsma in press)

c. *Sub-locus 7.3*

Sub-locus 7.3 was originally called Locus 17. Sub-locus 7.3 is the basal living horizon. It contains many animal bones and ceramics (Greenfield and Jongsma in press). Several lithics, including cores for micro-blade production and stones for grinding, are present. Bone tools associated with food production are also found. There are also many loom weights in this locus. There is evidence of an altar that may have been used for lighting purposes (cf. Tringham and Stevanović 1990). No figurines or other religious paraphernalia is identified.

3. *Locus 10*

Locus 10 is a second pit house feature located in trenches 149L, 150I, and in quads 1 and 2 in 150M. As with all of the Early Neolithic deposits, it is below Locus 4 and cuts into Locus 5. Part of this locus is destroyed by Locus 11, an EIA pit (Greenfield and Draşovean 1994: 65). Spindle whorls and bolas are present. Loaf weights are also present (Greenfield and Draşovean 1994: 81; Greenfield and Jongsma in press), which have been interpreted in other sites as being used to hold down hide roofs (Barber 1991: 97). The stratum is extremely thin and no substrata are recognized in the field. Two substrata can be discerned from the field notes, profiles, and digitized plans during the subsequent laboratory analysis (H. Greenfield, pers. comm.). These are described next.

a. *Sub-locus 10.1*

This sub-locus is the upper stratum within the locus and consists of Cuts 4 and 5. The remains are mixed with many later Iron Age materials due to ploughing.

b. *Sub-locus 10.2*

This sub-locus is the middle fill. It is filled with roof and post-occupational debris. It consists of Cuts 6 and 7.

c. *Sub-locus 10.3*

This sub-locus is the basal level (Cuts 8-10). It contains the remains of a small central fire pit, with a scattering of bone, ceramic and other Early Neolithic remains.

4. *Locus 23*

Locus 23 appears to be a larger circular pit house. It is in the center and more or less equidistant from all other pit houses. It is in trenches 129C, 129D, 129H, 130A, 149P and 150M. Daub artefacts, including net weights, load weights, loom weights and bollas are present. There are no spindle whorls. Lithics include flake debitage, blades, an end scraper, a stone axe or adze, and grinding stones. Bone tools are found. There are awls, beads, handles and an object that may have been used to burnish pottery. Some of these, including a scoop and scraper, are associated with food production. The altar fragments may be used for lighting or ritual. A figurine is present. There is also a small, complete bowl-shaped pot. This locus was disturbed by Loci 56 and 8. It can also be subdivided into sub-loci (Greenfield and Jongsma in press).

a. Sub-locus 23.1

The upper stratum is composed of cuts 4 and 5. It is heavily mixed with later Early Iron-Age remains because of ploughing. It is hypothesized to be the fill from roof collapse and fill from post-occupational debris.

b. Sub-locus 23.2

The middle stratum is composed of cuts 6 and 7. It is filled with debris of various kind, but the percentages of pottery are overwhelmingly from the Early Neolithic. It is hypothesized to be the slow infilling of the pit house after abandonment.

c. Sub-locus 23.3

The basal horizon (cuts 8-10) is the living floor. It contains a dome-shaped oven and a large central fire pit, shelves along the perimeter, and high densities of Early Neolithic remains.

5. *Locus 24*

This pit house was found in trenches 130D (Quads 1-4, 6, 7), 150P (Quads 1-25), 150O (Quads 10, 15, 20, 25) and 150L (Quads 21-24). Unfortunately, it was heavily disturbed (particularly in its center) by post- Starčevo-Criș occupational activity. An Early Iron Age pit (Locus 30) was dug into the centre of it and disturbed the majority of this pit house. Eneolithic (Locus 56) and Medieval (Locus 58) pits disturbed the southern end, as well.

In spite of these disturbances, a number of patterns could be discerned in this feature. It had a fire-pit in the southern end. It was also unusual in that it had a large number of loaf weights (71- Zita 2006: 63). All other types of weight and daub objects are present. There are grinding stones, blades, flakes and cores among the lithic remains. An animal like figurine was recovered with part of an altar.

a. Sub-locus 24.1

This is the upper fill of this pit house. It is disturbed by medieval ploughing. It is cuts 4, 5 and 6.

b. Sub-locus 24.2

This middle fill of the pit house was disturbed by pit digging from the Early Iron Age and other later periods. It is found in cuts 5 and 6.

c. Sub-locus 24.3

Only the basal levels (130D cuts 8-10 and 150P cuts 5-6) were undisturbed in certain areas. This is particularly around the perimeter of the pit house (Greenfield and Jongsma in press).

6. *Locus 25*

Locus 25 is relatively small. It is a circular shaped Starčevo-Criș-Criș storage pit about 1 m in diameter and in depth (Greenfield and Jongsma in press). It is in trench 130A (Quad 5) and just intrudes into trench 130B (Quad 1) (Fig. 12). It is associated with Locus 2 and continues underneath it. A single large storage jar (broken into numerous fragments by ploughs) is found in this locus.

7. *Locus 41*

Locus 41 is in the western end of the site. It was discovered when postholes were discovered along with a hearth at the western end of the site during a test trenching operation. It is located in trenches 129E (quads 13, 15, 18-20, 23-25), 129F (quads 11, 16, 21), 129I (quads 3-5), and 129J (quads 1, 2) (Fig. 13). In general, there are very few cultural remains within this locus. This is the only Starčevo-Criș pit houses not densely filled with debris in the lower levels. The amount of debris declines significantly with depth, so that the lowest levels have far fewer remains than the overlying ones. Half of this small pit house feature is destroyed and/or disturbed by later activities (i.e. Loci 8, 44, and 45). Also, it is heavily disturbed by rodents.

8. *Locus 50*

The sixth pit house was not excavated as it was discovered on the last day of the 1994 field season. It was designated Locus 50. It is found between Loci 10 and 41 in the area of Trenches 149K, 149K, 149N and 149O (Fig. 16). It was discovered during the extensive augering campaign that swiss-cheesed the area. In the auger samples, snail shells, animal bones and Starčevo-Criș ceramics were found (Greenfield and Jongsma in press).

9. *Locus 51*

Locus 51 represents a surface deposit surrounded by postholes. It is found in the eastern part trench 130B (Quads 9, 10, 14, 15). While it was recognized in the field, it

was not assigned a locus number in the field during excavation. It is hypothesized to be the remains of a Starčevo-Criş surface structure, since there are several post holes were discovered around its perimeter. Many ceramics and loom weights were recovered in it, but few faunal remains. Clearly, this structure had a different function. This locus is currently interpreted as a place for weaving (Greenfield and Jongsma in press).

10. Locus 52

Locus 52 in trench 130E and F is probably the remains of a livestock enclosure (Fig. 14). It is characterized by a very uneven, but very compacted surface. The locus is very large, about 9 meters in diameter and circular in shape. On two sides, post holes could be identified around the perimeter (Greenfield and Jongsma in press). This locus is considered to be contemporary with the other pit houses since it is stratigraphically connected.

11. Locus 53

Locus 53 was identified from a surface concentration of daub (Jongsma 1997; Greenfield and Jongsma in press). The locus is mostly in trench 130F, but extends east and west into 130E and 130G (Fig. 15). There are no architectural features or artefact concentrations in the locus. The remains may reflect an above ground daub structure of unknown function. The artefacts from this feature have been mixed in with other artefacts from different loci as this locus was not recognized in the field. This locus is stratigraphically connected with the pit house loci by Locus 2. This is the only evidence that they are contemporary.

12. Other loci

a. Locus 3

Originally, Locus 3 was used to designate the sterile löess strata beneath Locus 2. However, due to recording issues in the field, it was used inconsistently and the number was abandoned. Also, too much material was found in this stratum for it to be sterile. To add to difficulties, it was commonly used to represent Locus 5, a rodent hole complex and a late prehistoric pit (Greenfield and Draşovean 1994: 64). Since there was confusion in how it was being used, this locus number was discarded (Greenfield and Draşovean 1994: 64).

IV. Previous analyses of Early Neolithic artefact and features

The artefacts from the site are rich in number but varied in quantities at the site, opening avenues for various types of research. Several types of ceramics, daub (including weights), metal and bone tools, lithics, anthropomorphic and zoomorphic figurines and bones from several species were recovered (Greenfield and Draşovean 1994: 61, 73, 74; Greenfield and Jongsma in press). Some artifact categories have been extensively analyzed (Architectural daub, flora, fauna), while others are still in process (ceramics, daub artefacts, lithics). Synthetic research has also been accomplished using artefact quantification. This section summarizes the information currently available.

A. Architecture

Evidence of architecture was based on two basic types of analyses: Feature excavation and analysis and daub analysis (Jongsma 1997; Jongsma and Greenfield 2001).

1. Feature Architecture

Postholes are indicative of wall and roof support. Posthole patterns indicate architecture type. Linear, straight postholes indicate fences. Postholes arranged in a circular or semi-circular shape are reflective of the shape of the building. Old walls may have been pulled down (Greenfield and Jongsma in press), but the presence of post holes allows them to be reconstructed. The presence or absence of postholes allow pits to be distinguished from pit houses. This can be confirmed by looking at daub type, artefacts present and other features, such as ovens and hearths. It is possible to estimate the size of pithouses. By observing postholes, features and the extent of soil type, the living floor of a pithouse may be deduced.

Architectural daub was concentrated in the large pits (Loci 7, 10, 23, 24, and 41) suggesting that these pits were residential in nature (Jongsma 1997: 212). This is confirmed by the presence of hearths and ovens in several structures. Hearth features are evidenced by depressions filled with charcoal, ashes and clay mixed with ash. Oven feature are evidence by architecture features and by the types of daub recovered. Placement of ovens and hearths is always within a pit.

Differentiation between storage and living pits could be accomplished by observing that pits have a different architectural constellation. Hearths and ovens are

present and accompanied by certain types of artefacts. In this manner, it was possible to discern whether a pit was a house or for storage.

The houses themselves are not elaborately finished. They are simply dug into the löess soil (Greenfield and Draşovean 1994; Greenfield and Jongsma in press).

2. *Architecture based on daub analysis*

Jongsma's (1997) research demonstrated that the large Foeni-Salaş pits are the remains of pit houses. Her conclusion was based on the distribution of daub architectural remains, especially hearths (Jongsma 1997; Jongsma and Greenfield 2001). For the first time, she was able to determine the nature and location of houses in Early Neolithic sites in the Balkans (Jongsma 1997: 201). Spatial distribution of daub remains was plotted using a grid-based GIS program called SURFER™ (Jongsma 1997: 193). She identified five pit features that are thought to be dwellings based on architectural remains (Locs 7, 10, 23, 24 and 41). Few artefacts were found between pit houses (Jongsma 1997: 205), which agreed with preliminary GIS map projections of the entire site. Now that researchers know that the Early Neolithic pits of Foeni-Salaş are houses, they can be investigated more properly.

Different types of daub were identified. These are wall, floor, oven and decorated daub as well as a lime based wall plaster. Disintegrated daub flecks and daub concentrations, were identified *in situ*. Daub type helps identify features. House wall daub was found with Early Neolithic pit and pit house features. Floor daub was found in similar places. Oven daub was also associated with pit features (Greenfield and Jongsma in press).

Some daub was not identifiable due to new typological schemes for analysis (Greenfield and Jongsma in press). Over time, daub disintegrates and cannot be archaeologically defined (McIntosh 1974: 167), which accounts for the abundance of miscellaneous or unidentified daub (Jongsma 1997).

The nature of architecture suggests a mobile lifestyle (Jongsma 1997; Jongsma and Greenfield 1997), which agrees with the floral and faunal remains (below).

B. Ceramics

Most ceramics were in sherds. Very few were complete or nearly complete. The Early Neolithic ceramics from the site are currently being analyzed by the Romanian

team in Romania. Some general descriptions have been published and these are summarized next. Even though a complete typological analysis has not been completed of the Early Neolithic ceramics, there is no information on the quantities of ceramics from each period in each quad.

Wide mouthed globular vessels dominate the assemblage (Greenfield and Draşovean 1994: 74). There are fewer bowls and plates. Most ceramics are painted red. Some have fingernail-impressed and pinching motifs on the rim or body in various designs. Unlike later Starčevo-Criş-Criş ceramics, the sherds at Foeni-Salaş have no barbotine decoration, implying an early date in the chronology (Greenfield and Draşovean 1994: 74). Early information from the ongoing analyses states that some redware has white painting. Many pots appear designed to be hung from the handle (Greenfield and Draşovean 1994: 76).

C. Weights

Weights have been analyzed, but the final report is not completed (Jongsma in preparation – “Weights from Foeni-Salaş”). Weights are a tool type common in the site. All of the formed daub artefacts, such as loom weights, are fired from the local soils. They were subject to high temperatures, either from baking in a hearth or oven. These weights are identified to function based on their resemblance to known ethnographic uses, such as fishing weights, loom or weaving weights, bolla weights, spindle whorls, and construction (bread or loaf-shaped) weights. Spindle whorls are used for twisting fibrous material to make thread. Some loaf weights are decorated and it has been theorized that they are used to hold down roof coverings (Barber 1991: 97). This analysis will attempt to answer the question of whether this was their function or if they served some other purpose. The bolla weights appear to have had a rope or string wound around them. These may have been used in hunting. As the frequency of wild animal bones on the site is extremely low (Greenfield and Jongsma in press), it is likely that the bollas were not commonly used for hunting, but functioned as a weight. Loom and net weights had a variety of shapes: spheres, discs and cones.

D. Faunal remains

Whole and fragmentary animal bones were excavated. The main species identified are fish, domesticated and wild pig, goats, deer and cattle (Greenfield and Draşovean

1994: 73). Domestic animals dominate the assemblage (Greenfield and Jongsma in press). Almost 40% of the domestic fauna are identified as cattle but when the caprines (sheep and goats) are combined, they dominate (Greenfield and Jongsma in press). There are few domestic pigs, and few wild fauna represented. This is surprising given the marshy environment, especially when compared to other contemporary sites in similar environmental locations (Greenfield and Jongsma in press).

Faunal remains suggest a pastoralist economy (Greenfield and Draşovean 1994: 73). The presence of a possible stockade further emphasizes a pastoral lifestyle (Greenfield and Jongsma in press.). Domestic animals including cattle, pigs and goats dominate the assemblage. Greenfield and Jongsma's (in press) investigation of mobility has shown that age classes of sheep and goats suggest year round availability and culling. Snail, mollusc and clamshells were all found. Their presence may be indicative of the wet climate or of carbohydrate replacement in human diet (Greenfield and Draşovean 1994: 74; Lubell 2004). Ground shells may be used as a substitute for flour in famine (Greenfield and Draşovean 1994: 74; Greenfield and Jongsma in press). The shells at Foeni-Salaş are intact, suggesting that if snails, molluscs and clams were exploited, it was only for meat. In contrast, it has been suggested (Greenfield and Jongsma in press) that the snails were intrusive, coming and eating remains after the inhabitants were gone. Most of the shells are found within the dwelling complexes (Greenfield and Draşovean 1994: 74; Greenfield and Jongsma in press).

Bone tools of various types are present. Needles, awls, a pierced tool, a rubber for polishing ceramics, handles and scoops are found. Most bone tool data were taken from excel spreadsheets as many bone tools were not digitized. As a result, the bone tools have less precise provenance data. Instead of precise locations bone tools have their location given as the center of the quad in which they were found.

E. Lithics

Lithics were analyzed by two different analysts. Kuijt (1994) published a preliminary report on the 1992 field season, while E. Dinan has analyzed the complete body of data from all seasons, but has not written a report. The description below derives from both sources.

Lithics recovered include chipped stone tools (flakes, blades and scrapers), ground stone tools (adzes, axes) and grinding stones. They are found in low densities across the site. Quartz, quartzites, obsidian, flint and non-descript stone are among the materials used. A use/ wear analyses is currently lacking.

F. Figurines

There are few figurines at the site. Those that were found are both zoomorphic and anthropomorphic in nature. Their placement in the site may indicate whether any religious meaning was attributed to them. At Foeni-Salaş, most artistic and religious artefacts were recovered from within pit houses. These included amulettes, a clay bracelet and a bone ring (Ciobotaru 1998: 78). Altars were uncovered from a variety of locations around the site (Ciobotaru 1998: 79). These artefacts have been identified as belonging to Starčevo-Criş phase II. Ciobotaru theorizes that a female statue and an altar with an inner tank were probably within a dwelling (1998: 79).

G. Botanical remains

Very little carbonized remains were recovered from the site, given the size of the excavation. The botanical analysis (Jezik 1998) found little evidence for agricultural production at Foeni-Salaş. The remains from each pit-house feature were very heterogeneous, and the deposits may reflect short-term use of botanical material (Greenfield and Jongsma in press). There are a few artefacts related to plant exploitation, such as grinding stones, but these are mostly few and far between. The majority of seeds were from gathered resources.

Jezik's study encountered some problems. One of which is that it was difficult to access Eastern European comparative specimens (Jezik 1998: 119). Another issue occurred during excavation: the size of the sample was limited by the small size of the settlement and the fact that only six of the nine Early Neolithic pit and storage features were sampled (Jezik 1998: 148). Few domestic seeds were recovered from the large pit features rendering it impossible to identify stages or methods of crop processing. The large storage pit, in which we may expect to have found many seeds, lacked any botanical remains (Jezik 1998: 144). It may have had a function unrelated to plant resources. There were also few charred seeds, which may account for the scarcity of botanical remains

(Jezik 1998: 136). The site reveals a range of plant species, but some plants are represented by a single seed.

H. Synthetic

Synthetic analyses attempt to understand Foeni-Salaş from a multiple artefact perspective. Several different artefact categories are analyzed in order to test larger behavioural issues. Two such attempts have already been made by Senior (2004) and Zita (2006).

1. Modes of production

Senior's (2004) analysis of this site quantified the number of artefacts into percentages as a measure per square metre unit of size. He assumed that the high percentage value of a given artefact type indicates the predominance of a specific activity in that locus over other loci. "As the quantities of Early Neolithic artefacts recovered from the site are quite sparse, a multiplication factor – different for each pit – was used to place the contents of the pits all on the same level as Locus 23" (Senior 2004: 86). The assumption here is that differences in house sizes should not be taken into account. Senior's results indicate that the similarity of activities between houses was exacerbated by the low sample size; the spreadsheet's NISP (number of individual specimens) calculations were erroneous, causing inaccurate artefact sums. Spreadsheets do not lend themselves well to spatial query and organization. Additionally, there is an issue with incorrectly identified artefacts, as well as issues related to using a grid-based system. The grid scale may have been too gross, when the site itself is not large for intra-site analyses. The issues mentioned here, as well as the adjusted artefact percentages, may have affected the statistical results indicating that the loci are similar.

Senior's results show that the dwellings at Foeni-Salaş were probably single-family homes since domestic activities were repeated in a number of areas at the site (Senior 2004: 94). This supports the theory that nuclear families resided in the pit houses, which makes sense given their size and distribution. Pit house contents are similar statistically, indicating that similar activities took place in several places.

2. *Relational database and modes of production revisited.*

Zita's (2006) thesis expanded on Senior's (2004) by using a relational database to examine socio-economic patterning and social organization at Foeni-Salaş and correcting for the quantification errors in Senior's data. He organized the spreadsheet data into logically meaningful categories that could potentially provide insight into the domestic mode of production (Zita 2006: 89). Zita used the number of individual specimens (NISP) and typological classification to group artefacts into their associated activities, thereby determining social organization (Zita 2006: 67). His results show that different artefact types occur in various concentrations across the site, and that loci do not contain the same activities. For example, Zita (2006: 81-82) theorizes that Locus 23 was used for making and mending fishnets because of the great numbers of awls, loom weights and net weights. The great number of blades found may indicate that the area was used for processing fish (Zita 2006: 82). There are also mortars and grinding stones.

Zita argues that conjugal family units of production show greater differences in the types of activities carried out between areas as reflected in the artefact representations of each locus. Extended family units show less difference in artefact representations between locations. While not conclusive, a method was provided in which data could be measured. Interpretations were based on these measurements resultant from multivariate statistics. Zita concluded that the "excavations at Foeni-Salaş suggest the presence of two domestic groups organized by extended family units that maintained and controlled access to resources or labour through social, kinship or marital affiliation" (2006: 98). Zita also concluded that social organization at Foeni-Salaş is similar to 'Big-man'-type societies. This type of social organization generally consists of autonomous kinship-residential groups (Sahlins 1963: 288-289). Small villages like Foeni-Salaş tend to be economically self-governing, and similar to surrounding villages in terms of political status (Sahlins 1963: 228).

V. Conclusion

This chapter serves to provide background to the analysis of Foeni-Salaş conducted in this thesis. The site was excavated from 1992 through 1994. While the site is multi-occupational, there is an underlying and relatively undisturbed Starčevo-Criş complex settlement. The goal of the excavations was to uncover this settlement and map

its spatial characteristics. Taphonomic issues that affect spatial patterns and configurations are summarized. Many loci occur within a single locus or may cut into several. For example, Locus 7 also contains sub-strata called Loci 14, 16 and 17 that were incorporated under the substrata of Locus 7. The principal message is that analysts need to be alert to problems and how they may impact a study area or comparisons between study areas. It is for the user to establish the quality of the data set and to establish fitness of purpose.

The Medieval occupation is spread over the largest area in the site, and most of the remains appear in the southern part of the site. Two of the Medieval pits are semi-subterranean structures (in Loci 21, 27, 42 and 43) (Greenfield and Jongsma in press). Another two are small storage pits (Loci 29 and 47) (Greenfield and Jongsma in press). Two Medieval houses were found (Loci 38 and 21), The most significant medieval feature is the fortification ditch that extends across the site (Locus 8). Several Dacian (4-5th cent. AD) deposits were also found. These include five bell shaped storage pits (Features 4, 5, and 6 and Loci 47 and 35) and grave 1 (that of an infant). All of these pits had few remains and did not appear to be organized in any pattern in relation to each other or other contemporary features.

The Early Iron Age horizon was identified as belonging to the Halstatt culture horizon. Most of the features are concentrated in the southern part of the site. Medieval ploughing disturbed much of this material. The Early Iron-Age pan-site horizon was destroyed and most of the remains were disturbed and incorporated into Locus 4, the pan site Medieval horizon. Only the semi-subterranean features are preserved because of ploughing activity. There are many Iron Age features which were preserved below the Medieval plough line, all of which are in the southern half of the site. There were many small storage pits (Loci 11, 22, 28, 31, 32, 33, 36, 45, 48 and 54), one large storage pit (Locus 18), three discard pits (Loci 30, 37 and 47) and a fire pit (Locus 56). Three possible pit houses (Loci 18, 30, 40 and 44) were recognized. It appears that after the pits were abandoned, they were filled with debris.

There is very little evidence for a Middle Bronze Age occupation. Only Locus 15, a pit used for heating something to a high temperature is present. There is a Bronze- Age settlement to the north of Foeni-Salaş and Locus 15 may be associated with it.

There were scattered Eneolithic remains in some deposits (mostly in Loci 1 and 4), but no large features were discovered. The only evidence is Locus 57, a small pit that was discovered during analysis that intruded into Locus 24.

The Early Neolithic horizon represents the earliest culture at the site and has been identified as Starčevo-Criş. The Starčevo-Criş complex at the site dates to roughly 5350-5140 B.C., calibrated (Greenfield and Jongsma in press). The thinness of the deposits, the absence and infrequency of overlapping features imply short-term occupation (Greenfield and Draşovean 1994: 72; Greenfield and Jongsma in press). The remains are concentrated in the southern part of the site. The Starčevo complex has well-preserved features and artefacts and contains a single Early Neolithic horizon (Greenfield and Draşovean 1994: 5), which are used for this study.

The Early Neolithic horizon has several associated loci. Six pit houses, a storage pit and an exterior surface were excavated (Greenfield and Jongsma in press) (Fig. 16). All of the smaller peripheral pit houses are nearly equidistant from the centre of a central and larger pit house (Locus 23). Pits are equally spaced from the centre and do not overlap. They are believed to be contemporary since none of the Early Neolithic features cut into each other and appear to be logically spaced across the site (Greenfield and Jongsma in press).

The nature of the Foeni-Salaş deposits is different from other Early Neolithic sites to the north and south. They have thicker deposits and numerous overlapping features such as at Achilleion and Divostin (Bogucki 1988: 244; Chapman 1989; Gimbutas 1989: 63).

Jongsma's (1997) research demonstrated that the pits were the remains of pit houses based on the distribution of architectural and daub remains. The results suggested a mobile lifestyle. Research on faunal and paleo-botanical remains gave new information to the nature of the occupation and economy of the settlement. Jezik's (1998) botanical analysis found little evidence for agricultural production supporting the hypothesis that the site was more pastoral in nature. This may also be evidence for a mobile population that used the site for a short term. The faunal analysis (Greenfield and Draşovean 1994: 73; Greenfield and Jongsma in press) showed the predominance of cattle and ovicaprids over wild resources, which also supports the hypothesis that the site was occupied by a

mobile population (Greenfield and Jongsma in press). Senior's (2004) analysis found that the dwellings were likely single-family homes, while Zita's (2006) research suggests the presence of only two domestic groups and the probable presence of the 'Big-Man' type of social organization.

The data described here is incorporated into the Geographical Information System that is used to conduct the analysis. In order to understand what the Foeni-Salaş data represents it is defined and understood in terms of its history, the nature of its retrieval, its various analyses, and what it represents archaeologically.

If a pattern of activities exists within pit house structures at Foeni-Salaş, this analysis should be able to determine the settlement's type, range and location of activities based on the location of different types of artefacts and what they are associated with. The thin Starčevo-Criş level should make identifying specific activity areas easier.

The short period of occupation at this site and the lack of multiple, deep cultural deposits allow for a more complete analysis of the settlement data. It is through the method of spatial analysis of the artefacts and loci discussed above those activity locations are identified. This is discussed in the next chapter.

Chapter 5 Method and technique

I. Introduction

This chapter presents and discusses the methods, techniques and technologies used in the analysis. First, spatial analyses as a broad methodological field and the kinds of insights it can generate toward enhancing our understanding of the behavioural process behind the formation of the archaeological are discussed. Second, a summarization of the importance of Geographical Information Systems (GIS) as a spatial analytical technique is presented. A brief history of the incorporation of GIS into archaeology follows. A discussion and critique of examples of recent GIS approaches to archaeological research follows. Third, the various other techniques for identifying spatial aspects of behaviour, including activity areas, are discussed. Fourthly, I discuss commonly used spatial statistics employed in spatial analysis. Fifth, there is an overview of the techniques and the hardware and software that helped produce a workable data. In particular, the discussion focuses on how specific functions and tools within the capability of ArcGIS™ identify artefact patterns. Sixth is a discussion on the specific data and the transformations that it underwent for analysis. Finally, a review of data set problems and solutions in the context of the above methods, techniques, and technologies is provided.

II. Method: Spatial Analysis

An important part of archaeology is to explore the spatial structure of behaviour. Space is the other most important vector in archaeology, considering the importance of time-space systematics in the field (Wheatley and Gillings 2002: 3). Spatial behavioral patterns are affected by human mores, values and belief systems as well as decisions according to common sense and individual preference (Wheatley and Gillings 2002: 4). Spatial analysis is the method by which activity areas and patterns and the identification of the factors instrumental in their formation are uncovered. It provides a comprehensive framework in which spatial dynamics are studied.

Spatial analysis for the purposes of this research is defined as the set of tools and “techniques whose results are dependent on the locations of the objects of analysis” (Goodchild 1987). As a method, it links all of these. Spatial analysis finds and interprets activity areas at Foeni-Salaş. As Renfrew states, “if people’s actions are systematically

patterned by their beliefs, the patterning...can become embodied in the archaeological record” (1982: 11). How people use space will be reflected in their settlements, and hence, the formation of archaeological site.

There are many ways to examine the utilization of space. The identification of spatial patterns and interpretation of their meaning has a long history in archaeology. However, there are those that argue that it is impossible since site taphonomy intervenes too much. For example, Schiffer (1987: 10) states that patterns of past activities represented by archaeological remains cannot be directly interpreted as relating to particular activities. However, interpreting patterns is a large part of what archaeology does. However, as many others (Binford 2001: 674-675; 1983; Carr: 1984; Criado 2001; Schiffer 1987; Kent: 1984, 1987) have argued, the identification of taphonomic issues must come first. The behavioural patterns in the archaeological record can then be understood. Recognizing and investigating problems with archaeological patterns is crucial to understanding them and making accurate interpretations.

Spatial analysis of patterns is challenging, as exemplified by Whallon’s (1973, 1974) pioneering but heavily criticized (Casselberry 1974; Clay 1975) statistical studies of occupation floors and Susan Kent’s (1994) spatial study of Navajo household activity areas. The best way to avoid these problems is to think through a project carefully, standardize the process and incorporate all data possible. It is important to use appropriate methods and techniques. Poor maps and errors in the data are correctable and compensations made.

Archaeologists generate many theories founded on assumptions as to the cultural processes that produce various archaeological spatial patterns, such as that activity areas are identified from the artefacts and ecofacts. Another common assumption is that the activities relating to various functions are performed in separate areas and that most activity areas have a single function. These single function areas may also be termed micro-activity areas, as they are a smaller part of a larger task.

A. Historical background to GIS spatial analysis in archaeology

Whallon (1973) was one of the first to use a computer to perform statistical analyses of the spatial distribution of archaeological remains. Pioneering studies in the application of GIS to archaeology have successfully used archaeological data in a manner

that enabled identification of cognitive patterning (Douglas 1966; Hodder 1982a, 1982b). During the early 1980s, most spatial analyses (such as site catchment analysis, location analysis of regional settlement patterns), were structural in nature and applied on an inter-site basis (Wheatley and Gillings 2002: 16-18). Spatial analyses was mostly focused on predicting site location, extent and type, (Custer, Eveleigh, Klemas and Wells 1986: 572), and for mapping out individual sites in very large regions (Balkansky 2000). For example, using archaeology and ethno-archaeology, Flannery and Marcus (1976) undertook a spatial analysis implementing GIS techniques to capture field data in which they identified population and settlement shifts, and where centres of religious and economical activity were located during the Early Formative Oaxaca Period in Mesoamerica.

In the last two decades, spatial analysis and archaeological mapping with GIS has moved beyond discussing data structure, field collection methods and visualizing data. There has been an increased examination of the dynamics between humans and their ecosystems. Savage (1990) and Green (1990) drew attention to GIS use in archaeology as a means to correct the more challenging aspects of spatial analyses in archaeology. They argue that GIS can be a useful tool when used correctly, but errors can still occur. Kvamme (1988) demonstrated how complicated the GIS algorithms used for processing data can be. Goodchild (1987) began to move towards a universal classification system for all archaeological investigations. This universalization movement is very slow as different sites lend themselves better to different classification systems. Unfortunately, the trend is for the use of GIS to be very site-specific context, with no universal method of data input or display.

Bevan and Conolly (2002) investigated modern human agricultural landscapes, how visibility affected identifying archaeological sites, and how landscapes are organized. Their regional case study in Greece investigated how GIS can be used to assess an ancient or modern landscape and proceed to more complicated spatial analyses such as data patterning, and interpretation of settlement patterns (Bevan and Conolly 2002: 123). Non-archaeological data including geomorphology, biodiversity, ethnography and historical data were incorporated. These non-archaeological data were included as it was recognized that this was an opportunity to use GIS as not only an

analytical tool but an integrative one as well (Bevan and Conolly 2002: 123-124). Integrative data combines different types of data, in this case, digitized maps in artefact information, into a cohesive system. In this case, the wide variety of non-archaeological data were digitized before fieldwork began. It was noted that different scales of measurement are a problem in incorporating data (Bevan and Conolly 2002: 124, 136). (This same problem was an issue in the digitizing of Foeni-Salaş maps and discussed further below). Quantitative measurements extracted patterns from different scales. Bevan and Conolly noted that detailed chronological and geomorphologic data are needed when integrating data sets from different times across a region (2002: 137).

The most popular trend in archaeological spatial analysis is to use GIS to examine settlement patterns at the regional scale. This is because full-coverage regional surveys including watersheds, geomorphology and natural resources of all types can be combined with land-use surveys, population dynamics, agricultural and tool production. This integration provides a holistic way of looking at the past or present. For example, Liu and Chen et al (2002) examined settlement pattern changes during 6000 years of the Early Neolithic in China. In this integrative, interdisciplinary project, data from full-coverage environmental surveys, ethnobotany, lithic analyses and geoarchaeological investigations were integrated. This enabled regional changes in population, agricultural and craft production to be examined (Liu and Chen et. al. 2002: 76). Various theories regarding the emergence of social complexity in China are assessed. Liu and Chen et. al. (2002: 95) have developed an increased understanding of how human political, economical, ideological and social complexity and development affect landscape95).

Recently, archaeological spatial analysis using GIS programs is being applied on an intra-site basis (Moyes 2002: 9; Breman 2003; Craig 2004: 2). Using the spatial analytic method to identify patterns, it becomes possible to infer what activities took place in certain areas and what reasoning was behind the decision (Peterman 1992: 162; Pettitt 1997: 209; Lavachery and Cornelissen 2000: 153). For example, Moyes' (2002) spatial analysis of archaeological remains within caves studied archaeological artefacts cemented to a cave floor by limestone flow. A GIS system was used to record and provenience artefact data, catalogue attributes and analyze patterns. Evidence of behaviour patterns is found. Most pots are in pools suggesting rituals connected with

water deities. This type of approach enables new avenues of research within single sites and comparisons between multiple sites.

III. Different scales of spatial analysis

In archaeology, the scale of analysis tended to start at the site or local level. As technology improved, it was possible for analysis to move both to a broader scale in both directions to a grosser regional (including global) studies and to a finer scale (with intra-site comparisons). Large amounts of data digitally stored in one place, facilitate global, regional and intra-site spatial analysis.

A. Global

Global spatial analysis is employed to study broad archaeological manifestations that appear in different regions. For example, an interregional comparison may contrast North American hunter-gather complexes with those in Africa. It is possible to study population movements across very large areas over time (Crumley 2006: 394-386).

B. Regional

At the regional level, archaeological data are typically plotted against environmental data. Site catchments and prediction forms a large part of regional spatial analysis. Many archaeological landscape studies are part of regional inter-site comparisons. Sites in the same region can be compared. One approach is to seek spatial clustering of sites related to external or internal cultural factors. The analysis of spatial aspects, such as viewsheds or access to water and other resources is possible (Bevan and Conolly 2002).

C. Site/Local

Spatial analysis can be applied to single sites (Moyes 2002). An entire site or a specific area is studied in terms of its spatial properties. Site surveys can also be part of a site-specific spatial analysis. Specific features locations such as house architecture can be plotted and analyzed (Caster et. al. 1986). A spatial analysis can predict the best places to excavate within a site, when integrated with surface and subsurface reconnaissance (Greenfield 2000).

D. Intra-site

Intra-site spatial analysis involves a closer examination of specific parts of a site (Simek 1981; Savage 1990). Yet, the potential of GIS as a tool for the organization and analysis of spatial data within a single site has hardly been thoroughly explored. The analysis of artefacts within specific site features such as storage pits or houses, is possible. It can be determined which artefacts are associated with which features, other artefacts or archaeological phenomena. The data analyzed from Foeni-Salaş in this thesis is investigated in these terms. A non-random distribution of artefacts was sought that would indicate a specific activity area. Specific artefact types are analyzed in terms of clustering. A specific artefact type is often the focus of study. For example, it can be queried where bones are found across a site or in part of it. These areas can infer behaviour patterns.

E. Identifying activity areas

The dynamic nature of culture is considered when identifying activity area patterns. Archaeologists are often concerned with analyses of the artefact spatial distribution within a narrowly dated layer of an archaeological site (Ferring 1984: 116). This thesis examines the Early Neolithic horizon. It will be possible in further studies to combine patterns from all horizons to obtain a complete record of changes in the site's nature and function. The details and accumulated knowledge of the specific culture are retained in the analysis of spatial patterning in order to provide insight to the specific behaviours that patterned artefacts and are evidence of activity areas.

In many cases, more than one type of artefact constitutes evidence for the same activity. For example, food consumption areas may have ceramics and faunal artefacts. Specific activity areas are identified when there is a localized pattern to what artefacts are present.

Analysis of artefacts and the activity areas they represent help in the reconstruction of activities. This makes it possible to discover what factors and behaviours were used in the decision making process that resulted in particular activities taking place in certain areas.

Archaeologists have the difficult task of having to devise archaeological artifact types appropriate to the research problem. The names or groupings that archaeologists

give artefacts may or may not coincide with the actually tool types designated by the original makers and users (Fagan 1999: 167). Assigning a functional type to tools should reflect the role and functional classifications made by the members of the society from which it came (Fagan 1999: 171). This objective is difficult to achieve because of a lack of written records and incomplete preservation. Ethnographic information and controlled experiments provide insight to how people made and used tools (Fagan 1999: 168). This forms a link between form and function. Toolkits provide a useful method of identifying activity areas. A toolkit is a group of tools used to conduct specific activity or groups of activities within a discrete area (Binford 1983; Fagan 1999). Tools, any accompanying debitage, and other associated material are grouped into activity classes based on deducing their use (Binford 1983: 147).

Artefact types relate to specific behaviours. Such activities and behaviours are varied and include food processing, preparation and storage, tool making and repair, ceramic and other specialized craft production, dumping of waste and refuse, and religious and ceremonial activities among others.

Activity areas may be placed according to human traits such as rank and status, sex and gender, age and wealth, or in relation to other activity areas. They may be placed out of convenience. For example, food preparation equipment that is stored close to an oven or hearth. They can be placed according to characteristics of the local ecosystem (Fagan 1999: 73). The location of a feature, such as a hearth, may be related to where heat and light can best be utilized. If wild and domestic animal resources and large grinding stones were present, this would suggest that a variety of resources for subsistence and activities associated with these are identifiable. Activities such as hunting, gathering and tanning are not readily apparent in a house. The tools and resources necessary to these activities and the products that they produce are apparent if they are stored within a dwelling.

The way occupants maintain their space influences spatial configurations (Galanidou 2000: 253). Upon establishing where certain activity areas are, it is possible to determine if the placement was due to an internal cultural factor(s) or due to the nature of the activity. Habits of consumption, religious beliefs, restrictions and taboo concerning disposal will affect the type and dispersal of cultural debris (Galanidou 2000: 253).

Discard behaviour may have varied during the time that the site was occupied and will reflect the nature of the occupation and put it into a wider social and cultural context. Cultural factors have been difficult to incorporate into traditional archaeological mapping techniques and a GIS analysis can incorporate the hitherto missing pieces into a more complete integration between site and its situation.

IV. Techniques

This section discusses the techniques used in the spatial analysis.

A. Geographical information systems

Geographical Information Systems are computer systems that contain various techniques and tools of analysis, including statistical analysis and creation of visual spatial data. As such, it becomes the framework within which the analysis is conducted. Geographical Information Systems have spatial analytic capabilities that enable the incorporation of ecosystems and other geographical data into archaeological modeling and the transformation and manipulation of spatial information in order to place it within a cultural context (Stančić 1996: 132). Statistical, qualitative and quantitative attributes are used to query data. The transformation and manipulation of archaeological spatial data is particularly important to this research.

GIS observes patterns within the spatial data and finds spatial relationships (Gaffney et. al, 1996: 136) according to selected values and variables. The combined site plans and maps make a larger spatial data set in which it is possible to isolate and examine specific features, artefacts and loci, visually and using GIS capability and statistical capabilities built into it. Even in preliminary work, there were relationships visually noted that merited further investigation.

Several tools are embedded within the software, such as macros and other functions, that can be implemented to identify clusters of artefacts which can be used to find activity areas. These are run on a single or multiple artefact types to identify where they occur in high or low concentrations..

When solving problems with GIS, it is helpful to have a framework in which to work. One approach is to let the data inform decisions. When one is looking for patterns in data, by trying different classification techniques and visually analyze the resulting maps, then select the technique that seems best. Another approach is to choose a

classification scheme first, and let the attribute values fall where they may. There may be a scientific or statistical reason for using a particular classification technique with particular data. From these data, both statistical and visual analyses can be accomplished using tools that look for patterns within the GIS sphere.

V. Technology

This section discusses the specific tools employed in order to create a GIS database from the hand drawn field maps.

B. Hardware

In order to digitize maps a Calcomp III™ digitizing board and the accompanying drivers were used. This digitizing board accurately aided the reproduction of analogue maps. As the project progressed, it was found that the scanning original maps as tiffs, georeferencing them, and digitizing them overtop on the computer screen was easier, more accurate and preserved the original map within the GIS program for later and easy reference.

C. Software

In order to determine spatial relationships, a GIS software program called ARCGIS™ visualized and ran spatial statistics on the data set. This software from ESRI™ has the capability to retain the data and display and manipulate it in many meaningful ways. This software does have disadvantages. Although it is a very powerful program, it is not very intuitive. Sometimes seemingly simple tasks become complicated. It has enormous capacity, but even very experienced users often refer to ArcView 3.x™ to accomplish some tasks in a more simple, expedient manner.

ArcView 3.x™ was used to accomplish the digitizing. It is an older product that is not as powerful as ArcGIS™ but is more intuitive and simpler to use, although it is not without its difficulty. It was often drawn upon during the analysis to view or change data characteristics during the merging and analysis process.

VI. Digitizing Foeni-Salaş

Different data forms may be more appropriate than others when it comes to representing a particular type of geographic data or answering different kinds of questions. In general, the vector data model is used when features have discrete

boundaries. For example, a building is a polygon feature with x, y coordinates recorded for its corners. The Foeni-Salaş maps were digitized in vector form. Although it is less sophisticated than raster mapping, vector mapping is more compact, stored as a set of coordinates, and easily customized. Vector mapping is appropriate for social, economic and demographic variations that are more intense in some areas than in others. As the digitized Foeni-Salaş data are vector in nature, raster appropriate methods and techniques are not useful.

The raster data model can be used to represent discrete features as well. A building in the raster data model, for example, is represented as a group of connected cells with the same value. Representing discrete features in the raster data model requires less storage space than storing them in the vector data model, but is less accurate. The raster data model is very useful for representing continuous geographic data; that is, phenomena such as elevation, that does not have well-defined boundaries and that usually, changes gradually across a given area.

Database data and tables can be used to create a raster format. Raster methods are sometimes not as useful as other methods. Raster methods are used when there is a lack of knowledge of spatial variation. This is not the case for Foeni. Raster data are typically flat images, such as satellite imagery (raw and classified) and elevation data. They are not very useful for the analysis of archaeological plans. It is difficult to group cells together as an object with attributes in raster. Raster “sees” the world as populated by cells of uniform size but things within that cell are not uniform. This aspect of a raster is useful when conducting analysis based on quantifications by quad, but is not appropriate for the Foeni-Salaş data.

It was initially attempted to create raster maps from the database tables. This created other problems for a precise spatial analysis, such as object location. For example, a point object must occupy a full cell in a raster. Object locations should not be indicated by raster cells of arbitrary cell size in which they lie somewhere. A raster also is less useful for determining distances accurately. To ensure a more precise analysis, single object locations are needed. For all these reasons, a cluster analysis would produce less precise results in a raster. A software related issue is that many tools provided by ArcGIS™ for cluster analysis are not appropriate or usable for raster data.

These issues changed the mode of inquiry. The database and spreadsheet data were converted into point form (centroid) data that can be visually displayed and have spatial analysis run on it. This made it easier to compare digitized data and database/spreadsheet data as the forms were more similar. The Foeni-Salaş maps are vector maps and have a shared arbitrary coordinate system. Vector data is data or object representation based on distinct points described by their co-ordinates in the reference system and their topological relations, especially edges and surfaces. Vector representations are very compact and thus do not require much disk space. Operations, such as geometrical transformations or visualization, can be performed quickly.

A. Plans and profiles

Only the hand drawn plans were digitized for spatial analysis. They were digitized into a vector form using polygons to approximate artefact shape. The profiles remain to be digitized and will not form part of this analysis. Their vertical nature makes them difficult to digitize. Options are being considered for creating accurate, useable digitized profiles and integrating them with the site horizontal plans.

B. Digitization of artefacts

While excavating, detailed maps were created of artefact distributions. Later, the maps were digitized into vector polygons. Some data types, such as quad elevations, were put into point form. Each map has an accompanying separate file folder in which to keep its associate shape files. For example, all the artefacts in map number 93-21 are in folder 93-021. The maps remain in this order since they can be separately observed and manipulated without affecting the merged data. It is worth noting here that if the shape files are manipulated (name, extension, or location changes), they will not show up on the map they are part of and the user risks losing information or rendering it incompatible with the rest of the data.

C. Digitization of features

The entire set of artefacts, features, loci and level information was integrated and incorporated into a single GIS database. The analysis conducted here was run off this database. The map information can be viewed in different ways if the original shape files in the map folders are not changed. It can be manipulated and displayed in different ways.

For example, a specific ceramic type can be observed or faunal remains from a specific cut or level.

D. Digitized data form

The digitized data currently exist in shape files and tables. Shape files are a file-based data format native to ArcView 3.x™ software. Conceptually, a shape file is a feature class—it stores a collection of features that have the same geometry type (point, line, or polygon), the same attributes, and a common spatial extent.

Despite what its name implies, a single shape file is actually composed of at least three files, and as many as eight. Each file has the shape file name and an extension. The three main files associated with a shape file have the .shp, .shx, and .dbf extensions. The information stored in these files allows the features and the attribute table to be displayed. In digitizing the data, the approximate shape of artefacts was recorded that may be useful for further ceramic studies when another party completes their analyses. This is also useful for comparing with spreadsheet data. The digitized data shows approximate artefact shape, size, and location within a quad. The spreadsheet data only gives center coordinates for points that represent an artefact.

The digitized maps consist of shape files that are used in ArcView 3.x™ and ARCGIS™. The many file folders containing the shape files created in ArcView™ were usable in ArcGIS™.

Many shape files with the same name consist of the same artefact type. These needed merging into one shape file as any analysis run on separate maps would be disassociate from the rest of the level and site and would have been meaningless. In order to do the merge, other ESRI™ software, specifically ArcGIS™, was employed to merge the map data. This was done in a matter so that the data can still be viewed as single maps in ArcGIS™ or ArcView 3.x™ and as a large all-inclusive map in ArcGIS™. A tool called Append, or merge in ArcGIS 9.1™ (the term ‘merge’ is used in this thesis) was able to put all the data into one place.

Before the artefact merge was accomplished, a test was run to make sure the technique would work. Digitized maps were compared with the original maps and information. The hand drawn maps were compared with the field notes after digitization in order to ensure that nothing was excluded and that unmapped objects indicated in field

notes were included. All the artefact and feature files that make up the original individual maps had to be checked and locus and cut (level) information added. The merge was done successfully. A single artefact type could be examined across the whole site. It remained to pull out artefacts within the same locus or sub-locus. This was done by creating copies of the merged shape file within artefact appropriate folders and removing all that did not belong. For example, to create a shape file of only the bones in Sub-locus 23.2 all the bones from all the other loci were removed.

E. Spreadsheet data form

During analysis conducted here, it was found that some database information in Excel™ spreadsheets could be displayed and analyzed if converted to a form that the GIS could use (see appendix 5 for instructions). The spreadsheet based data maps refer artifacts to an exact centre of mass (centroid). The centroid of the quad is used as a proxy (and therefore less precise) location. Only data that has an X and Y coordinate in the table information is converted. Without these coordinates the GIS does not know where to put it in space. Microsoft Access™ is compatible with newer versions of ArcGIS™ (version 9.0 and up). ArcCatalogue™ can be linked to Microsoft Access™. Data can be viewed and explored though not manipulated within ArcCatalogue™. After the table data were exported and converted to a DBASE V file, ArcView™ was used to convert this file to an event theme that enabled data to be visually displayed. The event theme cannot be manipulated but fortunately, it is very simple to convert it to a shape file that is analyzable and changeable. This process makes it possible to view the quantified data by quad. Artefacts are displayed as a point that is assigned center-coordinates for the quad where it was found. Attribute tables are also preserved.

This created a point form of the Foeni-Salaş data comparable with the digitized maps. By examining the same artefact type using different data forms (spreadsheet and digitized) it is possible to see if the same types of queries put to the data will render the same answers. It will also be possible to determine whether more precise excavations that map in artefact positions or excavations that quantify by quad render the same or different results.

The drawback to the spreadsheet data is that while we know an artefact was found in a particular quad, it is not known exactly where in that quad it was found. An artefact

may be close to an edge or associated within a cluster of like or different artefacts. Subtler artefact patterns are lost. This spatial information is not preserved in the spreadsheet data. In this light, digitized data gives precise artefact and finer patterns within a single quad that is visually observed. Additionally, the same statistical tests that can be run on digitized data and spreadsheet data if it is displayed using x y points.

VII. Running a spatial analysis

A. Visual techniques

Once the data from Foeni-Salaş were incorporated into the GIS, it was possible to pull out different data types to look at singly or to compare with others. For example, only one artefact type in a specific locus could be examined, or all the artefacts from a single locus or the whole site could be displayed. Artefacts and features from different and similar strata could be displayed. This enabled comparison within and between loci. Activity areas became apparent when artefact types from a single locus were displayed. Clustering became apparent visually. Often different types of artefacts clustered together in a single place. Artefact and feature distribution could be analyzed visually.

The digitized data were easier to interpret for patterns, as it could be seen within one quad where precise artefact locations are. Such within quad visual analysis is impossible for the Foeni-Salaş spreadsheet data. Clusters that spanned several quads were still apparent with the spreadsheet data. If a quad had many examples of a distinctive artefact, it would be seen using the spreadsheet data. What was not identifiable was if a cluster within a quad was spread out over the whole quad, or if they were very dense and found close together within the larger area of the quad. In both digitized and spreadsheet data, clusters, randomness or artefact absence could be noted and compared with other strata, artefacts and features. This visual analysis is the simplest method of GIS analysis. It yields very good results that can be truthed with statistical tools.

B. Statistical techniques

A great part of successfully using Geographical Information System to get meaningful results is the implementation use of the statistical analyses tools that are part of it. The 1970s and 1980s saw a great deal of archaeological literature that discussed statistics and quantitative methods (Whallon 1973, 1974; Riley 1974; Clay 1975; Cowgill 1977; Thomas 1980, Cannon 1983; Berry, Mielke and Kvamme 1984; Carr 1984, Hietala

1984, Thomas 1986; Aldenderfer 1987, Carr 1987; Read 1987; Voorrips and O'Shea 1987). These reviews and papers dissected problems, assessed methods and techniques, evaluated strengths and weakness, and statistics and quantitative methods became accepted into archaeology (Aldenderfer 1998: 92). Some of the early literature exhibited cases in which a statistical method's application in archaeology is not yet well understood (Whallon 1973, 1974; Cowgill 1977; Cannon 1983; Rosen 1986; Drennan 1996: v).

The great deal of use of statistical methods has standardized its use in archaeology (Drennan 1996: vi). The absorption of statistics into archaeology was inevitable as "many aspects of archaeological information are numerical and that archaeological analysis has an unavoidably quantitative component (Drennan: 1996 v). Statistical permutation tests are employed often in archaeology. It is imperative that any statistical techniques and assumptions applied to the data are appropriate (Goodchild 1996: 249) in order to have meaningful results.

Simpler statistical methods, especially for spatial analysis, are more appropriate, and easier to understand, use and interpret. This study does not condone using multivariate statistic application to conduct spatial analysis but suggests a simpler and more appropriate way based on spatial autocorrelation (similarity). Statistical methodological approaches to archaeology are expected to consider the effects of multiple-activity areas and multiple or repeated occupations (Hietala 1984: 1).

In order to conduct this spatial analysis a method was needed by which spatial autocorrelation could be tested for and detected on a variety of scales within the GIS. This study is concerned with spatial autocorrelation in point distribution not with modeling. Spatial autocorrelation is the presence of non-randomness in patterning (Voorrips and O'Shea 1987: 502). It is possible to identify activity areas using autocorrelation methods. The sensitivity and inclusiveness of methods are of interest as variability affects results and archaeological interpretations (Hietala 1984: 1).

There is a tool kit called Spatial Statistics™ within ArcGIS™ that contains statistical tools that can be used for analyzing the distribution of archaeological (or geographical) features: identifying statistically significant spatial clusters (hot spots) or outliers, assessing overall patterns of clustering or dispersion, and so on. Spatial statistics differ from traditional statistics in that space and spatial relationships are an integral and

implicit component of analysis. These tools demonstrate a variety of statistical operations appropriate for analyzing this type of archaeological data. Analyzing patterns evaluates if features or attribute values form a clustered, uniform, or random pattern across the region. Although you can get a visual sense of the pattern of features or values by mapping them, calculating a statistic quantifies the pattern. That makes it easier to compare the patterns for different distributions and to calculate the probability that a pattern is not simply due to chance. Calculating this probability is important if a high level of confidence is needed in any decision making, or if the user needs to be sure there is a pattern before undertaking additional research, such as looking for relationships between features that might be causing the pattern.

Using statistics to measure patterns has other advantages over visually analyzing the distribution of features. The classification method you use, the number of classes, and the ranges can change whether or not there appears to be a pattern. Since the statistical measures use the actual values of each feature, the resulting measure will be the same, regardless of how the map is displayed. The form of the Foeni-Salaş data meant that some spatial statistics tools and techniques were not appropriate.

1. Nearest Neighbor- statistical verification for Foeni-Salaş

After a search for a statistical verification technique that worked with the data and gave meaningful results, a technique was found called Nearest Neighbor Analysis. This technique has a long history of usefulness in archaeology, is particularly relevant for the kind of data that exists from Foeni-Salaş, and worked. This technique tests to determine if the observed spatial distributions were random or non-random. Statistical analysis ensures that there is a measure of objectivity in the analysis, it provides a means by which patterns in different deposits can be compared, and serves as a verification tool.

Nearest Neighbor analysis was first used in archaeology by Clark and Evans (1954). In archaeology it has primarily been used to describe site distributions (e.g. Adams and Nissen 1972; Plog 1974; Zubrow 1971). It has been used at a smaller scale to quantify artefact distributions on living floors (e.g. Whallon 1974). In archaeological spatial analysis it is commonly used as a technique for examining the spatial distribution of two-dimensionally recorded points, for example settlement sites within a river catchment. In the case of Foeni-Salaş, it examines spatial distributions of point and

polygon data. This technique statistically verifies the spreadsheet and digitized data by looking for non-randomness within the spatial data. This statistical technique quantifies and compares patterns in distributions. This statistic is most appropriate when the study area is fixed. For example, comparing average nearest neighbor distances for different types of artefacts within a particular site or comparing a single type of artefact for a fixed study area over time.

Average Nearest Neighbor [sic] calculates a nearest Neighbor index based on the average distance from each feature or point to its nearest neighboring feature or point. Assuming that all the points examined are contemporary and that all relevant examples are known, a series of statistics can be calculated by measuring the linear distance between sites.

The formula used is as follows:

$$\bar{d} = \left(\sum_{i=1}^N d_i \right) / N$$

d is the nearest neighbor distance for point i.

Sample size affects the analysis. In general, for statistical purposes, it is adequate if about 30 data points (large sample) from the population are available (Spiegle 1992: 230; Raudys and Jain 1991; numerous sources). Results obtained hold for large as well as small samples (Spiegle 1992: 230). Smaller samples usually give less reliable results, but the larger the data sample the better. Since entire populations of artefacts within selected loci are used in the statistical analysis, it is not considered a sample, but rather representative of populations within the site.

2. *Nearest Neighbor in ArcGIS™*

The output of the tool within ArcGIS™ gives the following:

Observed Mean Distance / Expected Mean Distance

Z score

Significance level

Critical Values

Each term is defined and discussed below (see appendix 7: Nearest Neighbor Instruction, for step-by-step instructions for calculating Nearest Neighbor in ArcGIS™).

The Observed Mean Distance is the measure of distance between each feature centroid and its nearest neighbor's centroid location. The Expected Mean Distance is the

average distance between neighbors in a hypothetical random distribution within the site's spatial parameters. It uses the same amount of points as the Observed Mean Distance. Euclidean distance was used to calculate distance for the Foeni-Salaş data. This 'as the crow flies', straight-line distance between two points is more appropriate than other measures, such as Manhattan distance that uses distance between two points measured along axes at right angles and calculated by adding the differences between point coordinates.

The Z score is the number of standard deviations from the mean (Fig. 17). The index or Z score is the ratio of the observed distance divided by the expected distance (expected distance is based on a hypothetical random distribution with the same number of features covering the same total area). If the index is less than 1, the pattern exhibits clustering. If the index is greater than 1, the trend is toward dispersion. The significance level of a statistical hypothesis test is a fixed probability of wrongly rejecting the null hypothesis, if it is in fact true. The critical value(s) for this hypothesis test is a threshold to which the value of the test statistic in a sample is compared to determine whether the null hypothesis is rejected.

The Nearest Neighbor calculation averages all these nearest neighbor distances. If the average distance is less than the average for a hypothetical random distribution, the distribution of the features analyzed are considered clustered. If the average distance is greater than a hypothetical random distribution, the features are dispersed (Fig. 18).

The Z score value is a measure of statistical significance that states whether to reject the null hypothesis. In this case, the null hypothesis states that the points are randomly distributed (Z score is greater than 1). In this case, it is measures standard deviation (Fig. 18). The equations used to calculate the Average Nearest Neighbor Distance Index and Z score are based on the assumption that the points being measured are free to locate anywhere within the study area (for example, there are no barriers, and all cases or features are located independently of one another). If the resulting Z score is less than 1, the artefacts exhibit clustering. The dividing point is the 1. The further the Z score is below 1, the greater is the clustering pattern. The greater the Z score is above 1, the more dispersed and random is the pattern. Each major artefact type that it was

possible to verify is discussed below. For each artefact type, the calculation and result is given (Tables 3, 4, and 5).

3. *Nearest Neighbor and Foeni-Salaş*

The Nearest Neighbor Analysis test is particularly good for working with the Foeni-Salaş data. It worked and gave good results with nothing added or changed in the table data (such as weights), because it was based on distance between objects and qualitative data within the table could be ignored. Nothing needed to be added or removed from data tables. It worked off where the artefact(s) are located in space. If excel spreadsheets are saved as .dbf files then they can be displayed visually in ArcGIS™.

When spreadsheet data are visually displayed (by adding X, Y event data from a .dbf file), this analysis could be run. This tool is highly useful and appropriate for event, incident, or other fixed-point feature data. For line and polygon features, feature centroids are used in the computations. Therefore, this type of analysis can be used on any kind of vector layer (point, line or polygon).

4. *Verification of visual analysis*

The goal of the statistical analysis is to provide a measure of verification for the visual analyses and to demonstrate the utility of statistical analyses within a GIS approach. For the objectives of this study, exhaustive statistical or visual analyses are unnecessary to demonstrate and confirm the utility of using GIS techniques for spatial analysis. The statistical analyses are a check on results and are not the focus of this study *per se*.

Two types of analyses were conducted with the Nearest Neighbor technique. First, the data from the digitized maps were analyzed and patterns generated. Second, the data from the spreadsheets were displayed in ArcGIS™ is using the point X, Y coordinates, followed by the same type of Nearest Neighbor analysis. This was to ensure that the patterns seen in the digitized maps were similar to those from the excel spreadsheets.

Some artefacts types were not feasible for this type of analysis. There are several examples of only one or a few artefacts being present. The test fails to execute if only one artefact is present. Any layer that had less than five records was excluded. Mostly

figurines, various weight types, lithic and faunal tools and grinding stones in various sub-loci were not included as there are so few present.

Due to the large amount of data and the time needed for the computer to run the analysis, a selection of representative artefacts and loci from pit house contexts and the site in general are statistically analyzed for spatial patterning. Both digitized and spreadsheet data are analyzed whenever practical and possible. However, some artefacts either have only the spreadsheet or digitized statistical results due to the nature of recovery processes and sample size.

VIII. Problems with the chosen method and techniques

The methods and techniques chosen for the spatial analysis were not without their difficulties. What follows is a brief description of the major problems that had to be solved, or worked through during the course of digitization and analysis. The appendices of this thesis discuss more specific problems and instructions of to how to solve them.

A. No ceramic analysis

The ceramic analysis of Foeni-Salaş is not yet complete. As a result, it was not possible to record the functional affiliation of ceramic sherds into the database. In the future, the functional and typological data and other qualitative information from the ceramic analysis may be incorporated into the digital record of this site. Currently, only their spatial and time period information are recorded and are part of this analysis.

B. Spatial problems

The spatial coordinate system is site specific. Site-specific coordinate systems make the future incorporation of data into a larger database difficult. The lack of descriptive data makes it impossible to link back to other, fuller descriptions, within other databases. Qualitative data can be added within certain GIS programs such as ESRI's™ ArcVIEW™ and ArcGIS™. There is currently no universal method of recording quantitative or qualitative data from different sites. Different excavations use a suite of different methods that are appropriate to the specific site. This problem will not hamper this site-specific analysis but will be an issue in any future cross-site comparisons. As

technology develops, it may be possible to change spatial coordinate systems to allow for inter-site comparisons.

C. Digitizing problems

The digitizing process, while greatly useful, was not without its difficulties. Many individuals digitized the maps over the course of almost a decade (Haskel Greenfield, Michael Bridgeford-Read, Tina Jongsma, Adam Allentuck, Gene Senior, Matthew Singer, and the author). Many maps digitized early in the process were re-digitized because of inaccuracies due to learning curves, different styles, and non-adherence to digitizing parameters, changing software, and software transcription issues. Errors in the field notes were noticed and corrected after digitization. This required crosschecking and often subsequent map corrections.

Some maps were digitized multiple times. After comparing the different versions of the same map the best was kept, the worst discarded. Some maps were poorly digitized and needed re-digitizing.

D. Incorrect coordinates

Three point (X and Y horizontal and Z vertical) provenance data were chosen despite flaws in collection techniques. Some maps had missing or incorrect coordinates; others had incompletely labeled artefacts, and a variety of missing data. Most of these problems were fixed by recourse to the field notes and original maps. There was an issue when the datum from the first year of excavations was lost and a new one created. These created differences in the Z-coordinates depending on the year the notes or map were created. Old Z-coordinates were corrected in ArcView™ using a mathematical formula and adding the new correct information. Artefacts do not exist in the data as three-dimensional shapes. Each artefact has one X, Y and Z coordinate. Despite these flaws, the in-field 3-point provenance system (horizontal and vertical coordinates) provided the most specific locations. An extension to ArcView™ adds X and Y points to each artefact's attribute table. The X and Y points are from the centre point (centroid) of the artefact. The Z-coordinate is based on the map and field data.

E. Data synthesis

Data synthesis challenges need to be overcome. Some of these problems involved only one specific file and the solution very specific, and/or technical and are not be discussed here. Instead, the more general problems and solutions are discussed.

There are hundreds of shape files with the same name but different spatial characteristics, attribute field names, and data. These all needed to be merged. So much data made it time consuming to combine but fortunately some stages of this process were automated. Each artefact type from each original map needed merging into a single shape file. The single shape file consists of all the artefact types from each map. Some custom extensions to ARCGIS™ aided this process but there is no single appropriate procedure. Some procedures were found that search for shape files of similar name and combine them, they were not always of a useable format or would drop data. The original shape files were kept and copies made in case of error.

There was an issue with different names for the same artefact type. In these cases, the theme list for digitizing was referred to. Some themes names were added to this list in order to have a complete list of all the themes names used.

The maps can be merged despite name differences. What is important is that all the attributes in the attribute field and shape file type (line, point or polygon) are identical. It is not possible to merge a line feature with a polygon feature.

It proved impossible to merge these maps by performing a union of thematic layers. This is complex and the data does not lend itself well to this procedure. In vector maps, to perform a union of thematic layers, algorithms that are more complex have to be applied than with raster data defined on a common grid. This technique was generally inappropriate and discarded after some experimentation.

A serious problem was the lack of level (cut) and locus information in every shape file and artefact. The information existed but was not included in the digitizing process. This is critical information for a spatial analysis otherwise there is no way to isolate artefacts by level or stratigraphy. Each shape file had to be opened and the information added manually. This was extremely time consuming and could have been avoided.

The problems and issues surrounding the digitization of the Foeni-Salaş site have raised the need for universalization of digitizing and information recording procedures.

For a GIS archaeological project to be successful and smoothly run there must be a solid idea of how the final product will be used. In the future all data associated with artefacts should be included at the time of their digitizing. This can include but is not limited to type, elevation, horizontal place, excavator, date excavated, colour, functionality, quad, quad elevation, stratigraphic information and level information.

IX. Conclusion

This chapter outlined the method of spatial analysis in archaeology and how it can be conducted using GIS and provided a review of the historical use of GIS in archaeology and its integration into archaeology. GIS use in archaeology moved gradually from gross inter-site analysis of settlement patterns and site prediction to specific analysis on an intra-site basis.

Methods and examples of identifying activity areas within a GIS system and solutions regarding problems regarding the identification of activity areas are provided. The factors that influence spatial studies, population and social differentiation are discussed. Many techniques and methods have evolved in response to data quality issues that arise in handling spatial data. Background is provided for the techniques used for Foeni-Salaş' digitization and integration. The different forms of data that the Foeni-Salaş data took and why these forms were used are examined. Statistical techniques examined and tested for usefulness and appropriateness to the Foeni-Salaş data are discussed. It is explained why several spatial patterning techniques were ultimately discarded. Nearest Neighbor, the specific technique used to verify artefact patterns within this research using the GIS software is discussed.

Two types of analysis were done: visual and statistical. While statistical analysis shows artefact patterns, a visual analysis determines the nature of the patterns. The visual analysis determines whether a pattern was produced because of activities. Other artefacts need taking into account. Knowledge of artefact size and spatial properties is needed. The statistical analysis did not do this.

Hardware and software information is provided. Problems concerning the data form, its creation and analyses, were reviewed. Solutions to these problems are also provided.

There is need to bring computerized GIS into the fold of standard archaeological tools in order to accomplish fine analytical research. This brings archaeological mapping and analyses to a deeper level of detail. GIS hardware and software can map artefacts *in situ* on site. Computerized methods have several advantages. They are more efficient and less error prone. Errors are tracked and corrected. It is only within the last decade that technology has advanced enough to render this type of microanalysis possible.

The distribution of artefacts may be random, equal or unequal throughout the site. A random or uniform distribution is not expected as the Neolithic horizon of the site has multiple features, such as the pit houses and storage pits, and was occupied for a very short period of time. The next chapter will discuss the analysis of the data.

Chapter 6: Analysis

I. Introduction

This chapter discusses the results of the visual and statistical analysis of the integrated maps generated by the GIS software. Most analyses were done using data digitized from the field maps and notes that give precise locations of artefacts. The digitized data provide an idea of where artefacts were located. This could indicate place of use, discard, or final resting place from post-depositional movement. Spreadsheet data filled gaps in the digitized data, particularly for the distribution by quad of smaller artefacts, such as lithic tools. The small finds were not always drawn on the maps because they were too tiny and were only found in the sieves afterwards. Unfortunately, spreadsheet data do not give precise three-dimensional locations for each object. They provide only centre coordinates (centroids) for the quads in which they were found. While lacking precise location data for small finds, the spreadsheets have the benefit of providing a control on the validity of the distribution of digitized *in situ* artefacts.

The structure of the chapter is as follows: First, data from each Early Neolithic locus are discussed. In this initial stage of analysis, artefacts within each locus and sub-locus are discussed. Second, the specific location descriptions for each artefact type and any apparent spatial patterns are discussed. Constellations of artefacts that occur within loci are defined. This helps to define potential tool kits. Third, the spatial relationship of artefact types and tool kits to major features, such as ovens, is explored. Fourth, all of the internal sub-loci for each locus are compared in order to determine if the patterns for the basal, supposedly occupation level, are the same as those for the upper levels (supposedly abandonment and collapse levels). This helps to determine the validity of using sub-loci as a basis for this analysis. Lastly, evidence for types of activities and activity areas is discussed for each locus.

II. Issues in the statistical analysis

A. *Data chosen for statistical analysis*

The best-preserved and completely excavated loci were selected for statistical verification in this chapter (Tables 3, 4 and 5). This ensured that the observed patterns were meaningful and statistically verifiable. Loci 7, 10 and 23 are the best preserved. The other loci (24 and 41) are too disturbed by later occupations for statistical analysis.

However, Locus 10 has the fewest artefacts and would not provide meaningful results. It was discarded for statistical analysis. The statistical verifications for each locus or sub-locus are discussed below with the visual observations. Accompanying tables show the results of the calculations and enables comparisons between the selected loci (Tables 4 and 5) and all loci together (pan-site verifications- Table 3).

Locus 7 (Table 4) was selected as it has the fewest disturbances and many different artefact types. The amount of data within Locus 7 is less than within Locus 23, but is sufficient to provide meaningful results. This locus also has very clear activity areas discovered during visual analysis. It was also possible to statistically analyze Locus 7 by each sub-locus.

Locus 23 (Table 5) was also selected. It is a large pit house with many different artefact types. It exhibits clustering high in the sub-strata in the northern half. This is due to the hearth that occurs in the basal level. It is divided into sub-loci. Verifications for the whole locus and for each sub-locus are below.

Both loci 7 and 23 have three sub-loci. The artefacts distributions for each sub-locus are verified separately. This will give the finest level of detail to see if Nearest Neighbor analysis recognizes artefact clusters. Most of the spreadsheet data were analyzed using all the sub-strata of Loci 7 and 23. This was due to the amount of data.

B. Problems with the statistical analysis

Several problems occurred during the statistical analysis. This influenced which artefacts from which data type (spreadsheet or digitized) were included. As a result, some artefacts were statistically analyzed on only the spreadsheet data or the digitized data.

The statistical results took several months to accomplish. This is a result of time-consuming multiple steps to prepare data for analysis and the runtime for the analyses. The statistical analysis of bone and daub from the pan-site spreadsheet data alone took several days.

Another issue relates to time and computer capability. When analysis was run on the animal bone, the program crashed the first time. On the second attempt, the program was still running and incomplete the morning after it started. Eventually, it had to be stopped manually. On the third attempt, a different computer was used and the bone analysis was successful. Given the differences between the two computers in terms of

available memory and processing capabilities (Pentium™ 360 with very little memory versus a AMD Opteron™ Processor 242), it is likely that the amount of data overwhelmed the capabilities of the first computer. This is not to say that the same problems did not occur during analysis using the second computer. They just occurred less often. Clearly, the amount of data for certain artefacts, such as bone, daub and ceramics, make running an analysis both memory and processor intensive and time consumptive, particularly regarding spreadsheet data. More powerful computers and statistical programs are necessary. This is one of the reasons that a representative sample was analyzed instead of doing verifications of every single artefact in every locus. Using too large a sample size is often a waste of time and resources since it merely replicates patterns achieved on a smaller scale. Due to the mechanics of Nearest Neighbor analysis, computational requirements go up very rapidly with any increase in included data.

While some data within loci were too numerous, some loci have too few artefacts to get meaningful results. For example, many areas have few figurines, tools or other artefacts. A large enough sample size is necessary for this type of analysis. The Nearest Neighbor analysis fails to run if there is only one artefact. Statistics in cases of very small data counts are meaningless. For example, if a site had only one oven daub, it is not clustered. The software fails to execute if there are less than 30 different artifact locations. Normally, in statistical analysis, a sample size of 30 is considered sufficient to be considered “large”, and will give a meaningful result. This particularly affects the spreadsheet data of some artefacts types (weights, different daub types and stone tools, in particular). It was usually possible to identify which artefacts that this would affect. When the distribution covers a small enough area, there may be only one X and Y coordinate given for many artefacts. In these cases, many or few artefacts have a shared coordinate. The statistical test will fail, as it cannot find patterns with only one or too few spatial coordinates.

Other problems relate to the amount and nature of data. It proved extremely time consuming and difficult to pull out the different types of daub and weights from the rest of the daub spreadsheet data. The program used (ArcGIS™), does not have the capabilities to do this efficiently or effectively. The daub spreadsheet data are of the nature that all types of daub and weights are in one table. Trying to pull out the data

overwhelmed the capability of the computer. After two days of trying to pull out wall daub, the analysis was manually cancelled. It is possible that a faster computer or one with more memory would be able to perform this task. This problem was encountered for all floor daub, oven daub, wall daub, and different weight types within spreadsheet data. Thus, in some loci, only the digitized artefacts are analyzed. Statistical analysis was accomplished on the digitized artefact type data, even if the spreadsheet analysis was not possible. It is considered likely, that both the digitized and the spreadsheet analysis of the same artefact would yield comparable results, particularly in loci where the samples were of comparative size.

Despite these problems, the statistical verifications are an accurate representation of the entire site. The samples are sufficient to verify visual results and determine types of patterns present. Providing more would be repetitive and unnecessary within the scope of this study. In future research, other artefacts can be analyzed. This can be extended to all loci and thoroughly discussed. Another study could determine if all artefacts in this and other sites follow the same patterns as the selected artefacts in this thesis. The scope and size of a complete statistical analysis is large enough to be the subject of a major study and is outside the focus of this thesis.

III. Analysis of the Early Neolithic data

The Early Neolithic levels analyzed consist of six semi-subterranean structures (pit houses). Five small pit houses (Loci 7, 10, 24, 41, and 50), are arranged in a half circle around a larger central structure (Locus 23) (Fig. 16). The peripheral pit houses are regularly spaced around the central structure. All were excavated, except for Locus 50. There is also a small non-pit house subterranean feature interpreted as a storage pit (Locus 25) and a number of open-air surface loci. Locus 51 has a high concentration of ceramics and daub in the centre of the site that is interpreted as a weaving activity area. Locus 52 is a possible enclosure for livestock at the southern edge of the site. Locus 53 is a low-density concentration of ceramics and daub of uncertain function along the southern edge of the site (Fig. 16). Locus 2 is the major pan-site open-air horizon connecting all of the above pit features and exterior Early Neolithic loci (Jongsma and Greenfield 2001; Greenfield and Jongsma in press). When relevant, references are made to other loci in the following discussions.

A. Locus 2

This pan site locus is the exterior Starčevo-Criș cultural horizon (Fig. 19). It is found outside of the contemporary features (Loci 7, 10, 23, 24, 25, 41, 50, 51, and 53). It is the earliest pan-site cultural horizon on the site (Fig. 16). During analysis, three loci were recognized based on different soil types or artefact clusters. These are Loci 51, 52 and 53. These are analyzed following the Locus 2 analysis.

1. Artefacts

There are seventeen types of remains associated with Locus 2: altars, figurines, bones, bone tools, carbon, ceramics, floor daub, wall daub, oven daub, and unidentified daub, chipped lithic tools, grinding stones, postholes, bola weights, loaf weights, loom weights, and unknown weight types. The large variety of artefact types in this locus is because Locus 2 is the largest of all site loci. It also includes the exterior areas immediately around pit houses.

a. Altars

Five altar fragments are located in Locus 2. They are all altar legs. Most are located immediately (within one metre) outside of various pit houses. There are fragments outside the Loci 23 (n=1), 24 (n=2), and 7 (n=1) pit houses. All except one were noted in the spreadsheet data. Their locations were not noted on any field maps. Only the location of the fragment in Locus 23 was digitized. It is found within two metres of the pit house edge (in Trench 129H quad 6). The altar fragments north of Locus 24 are located within one metre of the pit house edge.

b. Figurines

Several figurines and labrettes are found in Locus 2 (n=6). All the figurines are found near altars. The distribution is similar to that of altars, in that most are directly associated with the peripheries of pit house loci. Three of these figurines are found north of Locus 24. This is significant because Locus 24 has the largest quantity of altars and figurines within any of the pit houses. Locus 7 has a single figurine located at the eastern edge of the pit house (in Trench 131F quad 20). These figurines are likely the result of outward peripheral collapse from the nearby pit houses. As a result, these should be analyzed with respect to those pit houses and are reconsidered later.

A zoomorphic figurine was found 5 m to the north of Locus 7 and 6 m to the east of Locus 24 (in Trench 131B quad 1). It is too far from either pit house to be associated with them. There is no feature or other artefacts associated with this figure.

There are two labrettes in this locus. One is located in Locus 2, just outside Locus 53 (in Trench 130G quad 20). It may have been deposited in this location simply as a result of being lost while worn. It is not associated with any clearly defined activity area. The other labrette is located just outside (1 m) the north edge of Locus 24 (in 150L quad 3). The labrette is spatially associated with Locus 24 and is probably the result of peripheral spread of debris around pit houses.

c. *Bones*

There are a large number of animal bones (n=492 digitized), but they are lightly scattered throughout Locus 2. They appear in increasing densities closer to the Loci 7 and 24 pit houses.

There is an absence of bone in the central part of the excavation where the Medieval Locus 8 intruded into and disrupted the Early Neolithic levels. The northern central and central parts of the excavations (Trenches 130B, 130C and 130D) have fewer bone fragments (Fig. 20). To the south of the central part of the excavation, the quantity of bone increases. This is close to Loci 52 and 53. The higher densities of bone in this area may be associated with these outdoor features.

When the distribution of bones is viewed in terms of the species represented, the distribution points toward differences between species. Larger quantities are present in the spreadsheets data than in the digitized data. In the digitized data, all of the larger species are present in this locus. Smaller species and elements were recovered in sieves and not in their primary context. As a result, smaller animals are underrepresented in the digitized data.

Bone is clustered in Locus 2 with ceramics outside and along the north and east sides of Locus 24. The species in this area are unidentified large mammals and *Bos taurus* (n=88). The bone density dramatically increases at one metre from the pit house edge and increases within the pit house. There is a second cluster of bones (and ceramics) at the eastern edge of Locus 7. Bone in this area is not identified to species.

Bos primigenius (n=5 digitized) is the least frequent species in this locus. Only a femur, a mandible with teeth, a vertebrae and a molar are identifiable elements. A cluster of three *Bos primigenius* bones is present in Trench 129 K (Quad 1) about 5 m east of Locus 41 (a mandible with teeth, a humerus and an upper molar). There are some lithic tools associated with this cluster, including an axe head. This small cluster of tools and bones may have been a butchering area. The following *Bos primigenius* elements are scattered randomly throughout Locus 2, but show no spatial clustering: a vertebra is found between Loci 52 and 53 (in Trench 130F quad 7) and a scapula is found about 4 m northeast of Locus 10 (in Trench 150B quad 1).

Bos taurus (n=71 digitized) remains occur in greater numbers than *Bos primigenius*. Mostly limb elements are present. However, there are several instances of vertebrae, teeth, mandibles, ribs and horn cores. *Bos taurus* elements occur in three clusters in Locus 2. The first cluster is just north of Locus 23 (Trench 149P, in the eastern quads). The second cluster is five m to the west next to Locus 24 (in Trench 150N quads 11 and 17). This may imply that butchering activities are directly associated with some, but not all pit houses. There is a large and widespread concentration of cattle bones in the southern part of the main excavation area. This loose cluster spans three trenches: 130F, 130G and 130H. It is contiguous with two open-air loci (Loci 52 and 53). These outdoor loci may have functioned as butchery sites.

The *Bos taurus* distribution in the spreadsheets (n=212) shows more elements, but the pattern is the same. Except for areas around pit houses, *Bos taurus* is clustered in the south part of the excavations (Fig. 21).

Canis familiaris is present only in the spreadsheet data (n=10). Elements are scattered all over the exterior loci of the site (in trenches 131E, 150M, 130H, 150O, 150L, 130F, 130L, 129L, and 130H). In Locus 2, elements present include a humerus (Trench 131E quad 9), loose teeth (Trenches 150M quad 23, and 150O quad 13), a phalange (Trenches 130H quad 7 and 130L quad 15), a metapodium (Trench 150L quads 21-24), an innominate (Trench 129L quad 21), a metacarpal (Trench 130H quad 5) and a scapula (Trench 131E quad 19). Elements are from juveniles, sub-adults and adults as indicated by bone ageing analysis. This indicates that the dogs (though domesticated) may have been eaten though no elements show evidence of butchery.

Capreolus capreolus is not well represented in this locus. The remains are scattered very far apart in a highly dispersed pattern.

There is a concentration of *Cervus elaphus* bones in Trench 130F (in the northwest quads). The elements in this concentration consist of a humerus, a scapula, a first phalange and a metacarpal – possibly the remains of an articulated limb. The concentration may represent a butchery area. Other single elements are located in various trenches that are far apart and spread over the site. There is no clear pattern of concentration.

There are few *Ovis aries* remains. Part of the problem is that sheep were often not distinguished from goats in the field maps. They are more clearly distinguished in the spreadsheet data. There are varieties of single elements scattered throughout the site, but they are not distributed in any visually discernable pattern.

There are few *Capra hircus* remains in Locus 2. Single elements are located directly outside pit houses and likely a result of outward collapse.

Elements indistinguishable between sheep and goats are also located directly outside pit houses. Two elements of *Sus scrofa domesticus* are found together in Trench 129E. A tooth and a mandible lie next to each other. Other elements are found in the southern bone concentration (discussed above). These include three scapulae and a lower incisor. Other *Sus scrofa domesticus* elements are scattered loosely in the southern part of the trench and there are no concentrations.

Only one unidentified fragment from *Sus scrofa ferous* is found in Locus 2. It occurs to the east of its domestic counterpart in 129F quad 4.

Large mammal elements are present in most of the site except for the northern and eastern parts. Single medium mammal elements (mostly long bones) are scattered randomly throughout the site. There is no clustering pattern to the remains.

d. *Bone tools*

A single bone tool is digitized in Locus 2 (in Trench 150O quad 21). It is a large awl with a handle. It is not directly associated with any feature or pit house. It is found immediately adjacent to and northeast of Locus 51, the floor in trench 130C. Its proximity might indicate the function of this locus as an above ground house structure.

The rest of the bone tool data are from spreadsheets (n=33) demonstrating one of the constraints of limiting this study to only the field maps.

Two awls are present near Locus 25 (storage pit). One is at the edge of the interface between Loci 25 and 2 (in Trench 130A quad 10). The other is located a few cm to the east of Locus 25 (in Trench 130A quad 9). Another awl is to the west of Locus 51 (in Trench 130C quad 11). It is likely associated with the Locus 51 surface distribution. Another is located two metres to the southeast of Locus 24 (in Trench 130D quad 17). It is not associated with any feature or other artefacts. Two others are located near Locus 7. They are both to the northwest of its edge. One is within a metre of the edge of the locus (in Trench 131J quad 1) and the other is slightly further away (in Trench 131E quad 23).

A bone handle is found within a metre of the east edge of Locus 23 (in Trench 130A quad 13). It is likely an intrusion from pit house collapse from Locus 23. Ceramics are found in denser quantities in this area than other areas of Locus 2. This may be evidence of pit house contents spreading as pit houses collapsed and settled.

Other items found in Locus 2 include the following: A scoop is to the northwest of Locus 24 (in Trench 150P quad 10). A presser is outside Locus 41 and is likely from the collapsed pit house wall shelves. It is in Trench 129J quad 2. A pendant is in Locus 53 (an area now thought to be an outdoor activity area).

e. Carbon

There is a large piece of carbon in Locus 2 to the south and east of Locus 41 (in Trench 129F quad 4). There is no evidence of any feature or concentrations in this area. Little more can be determined from this. There are some light scatters of carbon in the spreadsheet data in Locus 2, but they do not show any sign spatial clustering.

f. Ceramics

Starčevo ceramics are scattered throughout Locus 2 in a light scatter (n=2367 digitized) (Fig. 22). Ceramics in certain areas tend to be denser. These are discussed next.

Ceramic density increases for 1-3 m south and north of Locus 23. There is a concentration to the east of Locus 23 (in Trench 130A quad 13) but little to the north and south. Locus 40 destroyed the ceramic distribution to the west of Locus 23. The density declines towards the centre of the main excavations, but picks up again when it approaches Loci 24 and 7.

There is a concentration of ceramics immediately to the south of Locus 7 (Fig. 22). It is at its densest within a metre of the edge of the pit house. Along the west side of the pit house, there is a small space beginning very close to the pit house edge (in Trench 131B quad 20). This empty space continues to grow larger to the north in quads 5, 10 and 15. Quads 5 and 15 have no ceramics. The ceramic scatter is west of the empty spaces in quads 5, 9, and 14.

The ceramic distribution around Locus 24 exhibits a different pattern. The quads south of Locus 24 do not show any evidence for a similar ceramic concentration. There is an increase in ceramic density towards the east edge of Trench 150N that may indicate further unexcavated concentrations in this area (Fig. 22). The density here is not as great as that around Loci 7 or 23. It is possible that there is a concentration to the northwest of this locus, as density appears to increase. However, the excavation stopped at this location. Auguring around this area makes it unlikely that any features occur (H. Greenfield pers. comm.). These concentrations appear to be related to activities around the Locus 24 pit house.

Another ceramic concentration occurs around the exterior of Locus 10 (Fig. 22). The distribution is not as dense as in Locus 7 or 24, but fragments are large.

There is a dense scatter of ceramics in the space between Locus 10 and Locus 23 (in Trench 149P) in the northwest quads. This concentration is in the direction of Locus 50 and may be related to it. The ceramics around Locus 23 are densely clustered. They are clustered around the edges of the pit house. The distribution tapers farther from the pit house.

There is a light concentration of ceramic materials immediately to the south of Locus 41 (in Trench 129I quads 3, 4 and 5) (Fig. 22). The limited excavation in this area does not allow much more to be said about these patterns.

In the area now designated Locus 53 ceramic density increases. This distribution is discussed later.

It appears that ceramics, in Locus 2 tend to cluster near pit houses (Fig. 22). The densest distributions are close to pit house edges. This may represent storage vessels placed along the exterior to the pit house, outward pit house collapse, and/or activities concentrated around the perimeter of the pit house.

The distribution of ceramics can also be used to test for site limits. Areas with little to no ceramics show the extent of Locus 2. The excavations clearly found the limits of the site in each of the cardinal directions. This corresponds with the analysis of the surface distributions (Greenfield and Jongsma in press).

There are other areas with very few ceramics. One such area occurs in the strip of quads running east/west across the centre of the site (Fig. 22). This is the area where Locus 8 (a medieval ditch) disturbed the underlying deposits. The centre of the site was not excavated. It is likely that ceramics were thrown out of their original context during the creation of Locus 8, so that dirt in this locus was relatively barren of Early Neolithic ceramics. Another barren area is in the quads to the east of Locus 10 (in Trench 150I quads 19 and 20). They have no ceramics at all. Excavations did not continue at this area but it is likely that the extent of Locus 2 is very close by and ceramic distribution would taper off near this point.

There are several examples of later period ceramics intruding into Locus 2. Most of these intrusions are the result of rodent and ancient ploughing activities. This is likely in the cluster of Early Iron Age (Halstatt) ceramics (n=31) found to the south of Locus 23. Halstatt ceramics are located within several intrusive pits and pit houses, particularly within the upper levels that were affected by rodents and ploughing.

g. *Daub*

Digitized floor daub occurs in several small scatters (n= 23 digitized). Most floor daub scatters are close to either storage pits (near Locus 25) or pit houses (near Loci 23 and 24). There are small fragmented clusters of wall and floor daub outside all pit houses and at the edges of Locus 52. The spreadsheet data reflect the same pattern of distribution (n=2 spreadsheet).

Spreadsheet data show wall daub present (n=4 spreadsheet) at the peripheries of two large pit houses (Loci 23 and 7). There is digitized wall daub at the north edge of Loci 23 and 51. It was clearly used in their construction.

The digitized data show wall daub in other places (N=26 digitized). There is wall daub at the edge of Locus 52 that may have been part of a fence construct for the animal enclosure. The wall and floor daub in Locus 52 may be associated with the line of postholes that indicate a fenced enclosure at this location. Daub may have been used to

reinforced and stabilize posts for the fence. As daub is not associated within post holes, it seems likely that it was used for the fence itself. All of the scatters are at the peripheries of large loci.

There is more wall daub at the south end of Locus 41 (in Trench 129I quad 4). A small cluster of wall daub is at the north edge of Locus 53 (in Trench 130G quad 3). It also appears east of Locus 53 (in Trench 130H quads 7 and 20). These pieces are not associated with any feature. The presence of daub outside of pit houses at the edge of Locus 53 may indicate that it was made in these locations and its presence here is a result of that process.

Unidentified daub is scattered throughout Locus 2 (Fig. 23). Spreadsheet data show that it occurs all over the site in all loci and in nearly all quads. Data show that it appears slightly more frequently in the southern half of the main excavations (n=660). Locus 53, in this area, may have been used to make daub and the increased quantity is a result of that process. There is an increase in unidentified daub density in the excavations in Trench 150N. This may indicate a feature not discovered in excavations. Ceramic density increases in this area as well.

There is little oven daub in Locus 2. Only a single piece is outside Locus 23 and it may have come from the large oven in Sub-locus 23.3.

h. *Chipped lithics*

Chipped stone tools are scattered throughout this locus. They are found by themselves and in clusters. The digitized data show a chipped lithic of undetermined type in Trench 130B quad 2. This is in an open area in the central part of the excavations between Locus 25 and Locus 52.

Data that is more complete comes from the spreadsheet data rather than the digitized data. The spreadsheet data show that lithics tend to cluster outside of pit houses with storage ceramics. This is evident on the south side of Locus 23, the east side of Locus 24 and the east side of Locus 7. This clustering pattern outside of pit houses and their association with ceramics indicates that they are being stored in these areas.

Lithics are also found where there are few other little artefacts. A single axe head is in the extreme southwest part of the excavations (in Trench 128K quad 5). A pebble (in quad 4) and a complete blade (in quad 2) are west of it. There are few other artefacts in

this area. Only a test trench was excavated in this area and there is no other information about possible features or other artefacts in this area. Ceramics are associated with these objects.

Blades are everywhere throughout Locus 2. There are no blade concentrations, but they do occur with other lithics and artefacts. They occur outside and at the edges of pit houses. Blades are at the edges of all pit houses except for Locus 41. One is found in Trench 150I quad 7 near Locus 10. Three are found in the east edge of Locus 24 (in Trench 150P quads 10, 14 and 24). A blade is in the south edge of Locus 7 (in Trench 131F quad 23). There are three blades in Trench 150O (in quads 12, 17 and 18). Another is just south of the edge of Locus 51 (in Trench 130C quad 1). Loci 51 and 53 also have blades associated with them and are discussed below.

There are few chipped stone tool cores (n=7 spreadsheet) and little debitage. Most do not appear with other artefacts or features. A core is far away from the main body of the site (in Trench 150C quad 16). Other cores are closer to pit houses. One is at the north edge of Locus 23 (in Trench 149P quad 19). This is likely from pit house collapse or activities occurring in direct proximity. Another is in the same trench further north in quad 2. These are between Locus 23 and Locus 10. Another core is associated with Locus 23 on its east side (in Trench 130A quad 13). The rest of the cores are on the east side of the site. They are near but not immediately associated with Locus 7. One is to its northwest in Trench 131A. The other is to the southwest in Trench 131E. Both of these are about 3-4 m away from the Locus 7 pit house. There are some flakes associated with the cores but they are also found across the site. They appear to be used for many different types of work.

A single endscraper (n=1 spreadsheet) is associated with Locus 53 and is discussed below.

i. *Grinding stone*

Few pieces of grinding stones were found. None were intact. A grinding stone fragment is found in Trench 130C quad 8. This is one of the few grinding stones not immediately associated with Loci 51 or 53. This grinding stone is located within 3 m of both Loci 24 and 51 and may be associated with either. Lone grinding stones are found south of Locus 24 (in Trench 130D quad 23) and north of Locus 7 in (in Trench 131K,

quad 20). The grinding stone in Trench 131K is associated with a blade. A grinding stone is at the south edge of Locus 41 (in Trench 129I quad 4) and it is likely related to this pit house.

The grinding stones by themselves indicate that food preparation occurred outside in any place. Food preparation was not confined to pit houses or to specific outdoor places. When food preparation was done outdoors, there was no specific activity area. It was simply done where the worker felt like doing it. A more communal area may have existed in Locus 53 and is discussed later. Other grinding stones are found in association with Loci 51 and 53 and are discussed below.

j. *Weights*

Digitized data show weights occur alone and in loose clusters. They are so tiny within Locus 2 which is a pan-site locus, that they are not readily visible on maps. Unidentified weights (n=46 digitized, n= 22 spreadsheet) are in the southwest part of the excavations. One is found immediately outside Locus 23 (in Trench 129H quad 12). This is at the edge of Locus 52 (enclosure). This is an area where ceramic density increases. Unknown weight types are on the east side of Locus 24 (in Trench 150P quads 14 and 15). These are associated with the Locus 24 pit house and may be from pit house collapse. Three unknown weight types are in Trench 149P in quads 1, 4 and 21. These are between Locus 10 and Locus 23 in an area of high ceramic density. Two more weights are in Trench 150N (quads 13 and 17). One weight is in 150O quad 18. These weights are not associated with any pit house.

Weights occur south of Locus 52 (animal enclosure) in test trenches in Trench 130I quads 5, 15 and 25. One more weight is south of quad 25 (in Trench 130M quad 5). This is an area of high ceramic density south of Locus 52. Two unidentified weights are in Trench 130K quad 5. This is south and east of Locus 53. Two more weights are found to the east (in Trenches 130L quad 20 and Trench 130P quad 10). There are no large excavation trenches in this area so little more can be said.

Fifty-three loom weights are identified in the spreadsheet data (n=17digitized). Two loom weights are located north of Locus 23 (in Trench 149P quads 13 and 20). The loom weights in quads 13 and 20 are associated with Locus 23 (a pit house). Another loom weight may be associated with Locus 24 (Trench 150O quad 5), since it is only a

metre away from its periphery. The rest of the Locus 2 loom weights are associated with Locus 53 (the outdoor activity area). There are three loom weights in Locus 2 just outside the Locus 53 area (in Trench 130G quad 20, and Trench 130H quads 12 and 21). In sum, the digitized loom weights are associated with both pit houses and outdoor activity areas.

While, the spreadsheet data show some additional loom weights in Locus 2, it follows, for the most part, the same pattern as the digitized data. Some additional clusters of loom weights are apparent in the spreadsheet data. There are five loom weights in Trench 130H in quads 9, 10, 15, 20, and 21. Two more are south of this cluster (in Trench 130L quad 5 and in Trench 130P quad 15). The rest of the loom weights are associated with the peripheries of pit houses or other loci except for two exceptions in Trenches 150N and 130H. A cluster of loom weights (n=5) is present in Trench 150N (quads 13, 14, 15, 18 and 22) and in Trench 130H (quads 6, 11, 18 and 20). These are not located in direct proximity to any pit house and are three m away from the closest feature (Locus 51). These could have been used or dumped there. The surface and subsurface survey did not uncover any structures to the north. Since excavations did not continue north of these quads, these clusters may be related to open-air micro-activity areas. It is unlikely that these clusters represent the presence of other unexcavated features as the site's extent was determined by surface collection and these artefacts are found near the site's periphery.

The digitized data show loaf weights mostly at the peripheral edges of Locus 24 (n=16 digitized). It is likely that all the weights in this location belong in Locus 24 and these are discussed later.

Other digitized loaf weights occur singly (Table 3, Fig. 139). One digitized loaf weight is in Trench 129H quad 12. This is in an area where there are other weight types and a higher density of ceramics. It is located between Loci 23 and 52. Another loaf weight is found south of Locus 52 (in Trench 130I quad 3) near the site's southern periphery. There is a denser quantity of ceramics in this location, but these are probably associated with Locus 52 that is only 1.5 m away. However, no weights were found in Locus 52.

The spreadsheet data show many loaf weights (n= 98, Fig. 140). Loaf weights cluster towards the centre of the site. Part of this was unexcavated because of a Medieval ditch (Locus 8) that runs through the site. Loaf weights are on either side of the ditch as a

result of being thrown out to the sides when the ditch was dug. A concentration of many loaf weights is in Trench 149P. There is one in each quad except for quads 1, 2, 3, 5, 7, 9, 10, 11, 16 and 17. This is between Loci 23 and 10, where Locus 32 intrudes into the Starčevo horizon. This concentration may be from Locus 32, but it seems unlikely, as Locus 32 is a small Halstatt pit filled with blackened grain and few remains. The loaf weights in Trench 149P are associated with a higher ceramic density, a core and other weight types. Loaf weights occur in a very light random scatter around Locus 51 (an animal enclosure) but not within. This may be a result of excavation technique

Loaf weights are found around the exterior edges of pit houses. There are two on the west edge of Locus 10 (in Trench 149L quads 15 and 19). Many loaf weights are situated around Locus 23 (in Trench 149P quads 18, 19, 21 and 22). Two more weights are located at the eastern edge of Locus 23 (in Trench 130A quads 3 and 13). Two more occur in Trenches 129H quads 6 and 20. The loaf weight in quad 20 is actually in Locus 52 but is probably associated with Locus 23. There are two additional loaf weights just outside Locus 23 in Locus 52 (in Trenches 130E quads 2 and 8).

Six loaf weights are in Trench 130F. Three are found between Loci 53 and 52 (in Trench 130F quads 2, 3 and 8). The other three are in Locus 53 and are discussed later.

Loaf weights occur at the exteriors of all the large pit houses (Loci 7, 23 and 24) and at the large exterior activity area (Locus 53). This is likely due to outward peripheral spread as pit houses collapsed. Additional loaf weights exist in areas between pit houses and storage pits with no clear association with either. In general, the weights between Loci 2, 52 and 53 tend to appear close to other lithic tools. Weights always appear with at least some ceramics. There is a tendency for areas immediately outside pit houses to have weights occur where the ceramic density increases. Weights may be stored in the same places as ceramics or within the vessels themselves. This is seen in between Locus 23 and Locus 10 (in Trench 149P) and could be the result of outward spreading as the pit house collapses.

k. *Post holes*

All post holes in Locus 2 are associated with pit dwellings. They are constructional in nature. Postholes occur around most pit house features (Fig. 24) and are likely associated with the pit house around which they occur even though they appear in

Locus 2. They are clearly structural support for the pit house roof and walls. This is particularly evident on the east exterior edge of Locus 7 (Fig. 24) (in Trenches 131F quads 9, 14, 19 and 25, 131J quads 2, 3 and 7). In Locus 2, post holes occur around the south side of Locus 10 (in Trench 150M quads 1 and 6). Post hole support for the Locus 23 pit house are found on the northwest side (in Trench 150M quads 12 and 22) and southern periphery (149D quads 1-5) (Fig. 24).

There are many post holes around Locus 51 (outdoor activity area) (Fig. 136). This indicates that while this locus was not a pit house, it may have had some kind of overhead protection. The post holes associated with Locus 51 are in Trench 130B quads 4 and 8, and Trench 130C quad 11. Postholes surround a storage pit (Locus 25) (in Trench 130C quads 1 and 6). There are two instances of post holes with no associated pit or other feature. There are two of these post holes located three metres west of Locus 24 (in Trench 150O quad 12). These seem too far from Locus 24 to be involved in its construction. A chipped stone blade is associated with these post holes. The area to the north of these post holes is unexcavated. There may be an undiscovered feature here to which the post holes are related.

Intrusive post holes are probably Medieval in origin. These appear associated with an unexcavated part of Locus 8 in the east part of the excavations (in Trench 131E quads 1, 2 and 3). They follow the line of Locus 8 (medieval ditch) and are intrusive in the Early Neolithic horizon.

1. *Baked Soil*

Baked soil is found on the digitized maps in three locations. One is a large section (in Trench 129H quad 16), south of Locus 23. The other two sections of baked soil are smaller. The location of the second section is located in Trench 150O quad 12. Postholes are in the same quad. The last section is found in Trench 130K quad 5. This section is shaped like a ring with baked soil on the outside, unburned on the inside and a posthole in the centre. It appears to be a Medieval intrusion as there are no Early Neolithic features or artefacts associated with it.

2. *Interpretation*

Locus 2 is the exterior living surface for the Early Neolithic occupation at Foeni-Salaş. As it is exterior, it is more prone to attritional factors, such as erosion and

weathering. In general, it is assumed that the density of organic remains (e.g. bone) is affected more than inorganic remains (e.g. ceramics). However, their distribution appears to be parallel, undercutting the assumption that organic patterns govern the distributions. The similarity in their patterns might be because of the way materials were used and discarded. As a result, some interesting observations about the general patterns and activity areas can be made.

The sparse areas where there is little bone, ceramics and other artefacts may be work areas, though there are few artefacts such as lithic tools or grinding stones. No area is completely devoid of bone. Sparse artefact densities in the northern half of the site may indicate higher foot traffic. The less dense scatter may have been created by foot traffic that pulverized remains over time. There are more pit houses in the northern area so this part of the site may have had more traffic. However, there is no evidence of pathways between pit houses.

Bone and lithic tools tend to be found near and at the edges of pit houses. This is because they were either used here or were deposited here as structures collapsed. Tools may have been stored in the walls on shelves or hung from the roof. As the pit house fell, implements stored in the rafters would come to rest outside the pit house itself. This outward pit house collapse may be responsible for the increased ceramic density and the associated weights and lithic and bone tools that are often associated around pit house edges.

Evidence of outward collapse is also seen in the location of construction daub. The location of construction daub is often around pit house edges. This implies that as the pit houses fell, some debris did not collapse inside of them but collapsed outward. Daub had a function outside of pit house construction. It was also used to make the fence around Locus 51 (animal enclosure). Its increased density in the southern part of the excavations in the Locus 53 area may indicate that it was made in this location.

3. Activity areas

a. Butchery

The very random bone scatter could be from a randomized spatial pattern of butchery activities. It also could be from taphonomic sources. Outdoor butchery areas expose the bone to more taphonomic processes. Despite this, there are spatial patterns in

the bone and lithic scatter that indicate that butchery practices are more responsible for the spatial distribution of bone remains. It is often assumed that places where elements from the same species cluster together indicate possible butchery areas. However, there is no single area where butchery takes place. No area has great quantities of multiple elements from multiple animals. Small concentrations of several elements from a single species (perhaps even a single individual) are present. The bone concentrations from single species (and likely a single animal), occur albeit removed from the immediate area of pit house, but tend to be within 3-5 m. Animal butchery did not occur in a single location. Butchery of single animals occurred all over the site with no preferred location. There may be a preference to where cattle were butchered, as there tend to be more cattle bones in the southern part of the site in and around Locus 53. After butchery, meat was likely immediately cooked inside the pit houses over the ovens and hearths, as there is no evidence for hearths or ovens in Locus 2.

b. *Lithic tool production*

Lithic tool production appears at the site periphery. Rather than full tool production, it appears that repair and retouch were occurring mostly within pit houses, well away from other activities. There is a single core north of Locus 23, between it and Locus 10. It is so close to Locus 23, that it is likely associated with that pit house. In general, in Locus 2 and in the site in general, there is little lithic debitage and no dense lithic concentrations. It is most likely that tool maintenance was the extent of tool making activities at Foeni-Salaş.

c. *Storage*

Ceramics are scattered throughout Locus 2. The densest concentrations appear in immediate proximity to pit houses (Fig. 22). Some storage areas are outside pit houses (Fig. 25). This keeps vessels out of the way of daily activities, but within convenient access. An example is Locus 7, where large, dense ceramic fragments are at the south and east edges (Fig. 25). There is also a dense concentration between Locus 23 and Locus 10, likely related to the much larger Locus 23 pit house. The ceramics are not associated with any specific artefact type. Vessels containing food may have been stored together. Weights are in locations where ceramics are in dense quantities. The weights may have

been stored with or within the ceramics. Ceramics and weights in this area may have held down covers or provided additional wall supports for pit houses.

d. *Entrances*

The south and east part of Locus 2, outside of Locus 7, has ceramic concentrations. However this concentration is not continuous (Fig. 25). There is a pronounced and definite break between the scatters at the west and east sides. This is a very clear entranceway. The absence of artefacts outside Locus 7 is continuous with the inside. Storage would have been on either side of the path into the pit house. Locus 23 also has such a pattern but it is complicated by an intrusive Medieval ditch (Locus 8) extending through the southeastern part of the pit house. It appears as though ceramic density may taper off in the same pattern and location, but it is not clear because of the Medieval ditch.

e. *Religion*

Religious paraphernalia including altars, figurines and labrettes tend to be found very close to pit houses and are clearly associated with them. The exception is an altar and figurine found in Trench 130G, in a communal outdoor work area identified as Locus 53. There is an association between ritual, pit houses and domestic activities. There are almost no altars or figurines in areas far from pit houses. The exceptions are those found in Locus 53 (in Trenches 130G and 130H). However, this locus is an outdoor activity area in which activities that took place mostly in pit houses were conducted outside. This lends weight to the argument that figurines were associated with domestic activities and not just with pit houses.

4. *Conclusions*

Spatial patterns are similar for each of the artefacts analyzed in Locus 2. They all show a clustered pattern. This is because most artefacts cluster in and around pit houses. In between pit houses, there is relatively little material and it appears to be more or less randomly distributed (visual observation). Clearly, the focus of the analysis has to be on the pit houses.

The majority of Locus 2 remains are a reflection of the outward peripheral collapse of pit houses. The rest is the normal build-up of debris surrounding living

spaces. From the above analysis, it appears that no features are directly associated with the remains in Locus 2. This is partly a result of decisions made during the analysis, where semi-subterranean features (Loci 7, 10, 23, 24, 25, 41, and 50), were analyzed separately.

During the analyses of Locus 2, three concentrations of surface remains were identified (Loci 51, 52 and 53). Each of these is a surface locus, not a pit locus. These have been assigned new locus numbers to reflect their significance and are analyzed separately. These are three activity areas defined in the exterior deposits associated with Locus 2. They are considered a subset of Locus 2. However, they are not stratigraphically beneath Locus 2, so were given unique locus numbers and are considered within this context.

Locus 51 is a surface structure, not a pit house. There are postholes in Locus 2 surrounding this area. Locus 52 is a possible animal enclosure. There are fence posts in this area and compact soil. Locus 53 is a non-architectural concentration of daub and other artefacts related to the domestic realm. The analyses of Loci 51, 52 and 53 are discussed below.

B. Locus 51

Locus 51 is the remains of a large circular-shaped concentration of ceramics and bones in the eastern half of Trench 130B (quads 9, 10, 14 and 15). It is a surface deposit (Fig. 26). Post holes were identified around it in Locus 2. It was not given a separate locus at the time, but was recognized during analysis as the possible remains of a later Starčevo-Criș structure on the site. The artefacts are mostly in quad 10 of Trench 130B.

1. Artefacts

Artefacts present in Locus 51 include Early Neolithic ceramics, chipped lithics, constructional daub and weights. Each is discussed below.

a. Ceramics

The ceramic fragments in Locus 51 are large in size (n=29). These could be the remains of one large ceramic vessel or a few smaller ones (Fig. 27). The majority of this distribution is in a dense round cluster (in Trench 130B quad 10). This distribution is likely the remains of a storage jar.

b. Chipped Lithic

A flint flake is found in the centre of the ceramic cluster (Fig. 28). It may have been stored here with the ceramics. It is a nondescript tool and not likely associated with the pit itself. It is likely in this location as a result of structure collapse, as three flakes and a blade are found outside Locus 51 on the northern and eastern side in Locus 2 (in Trench 130B quad 5 and Trench 130C quads 1, 11 and 12).

c. Daub

The digitized data show unidentified daub associated with the dense cluster of ceramics (in Trench 130B quad 10) (Fig. 29). The spreadsheet data show daub to be constructional in nature. It is in a dense cluster that is located more towards the outside of the pit. It appears that it formed a floor or base for the surface structure.

d. Weights

Only the spreadsheet data have information about weights for this locus (n=25). A single bola is present (in Trench 130B quad 10). Two fish net weights and two unidentified weight types and seven loaf weights are present (in quad 10). Three loom weights are present, but one is in quad 10 and the other two are in quad 9. Weights cluster in this one area.

e. Post holes

There are post holes exterior to the locus in Locus 2 (Fig. 30). These postholes are associated with the Locus 51 concentrations. They surround it, indicating an above ground structure with some covering.

2. Interpretation

The majority of remains are in Trench 130B quad 10. The artefacts are in a very dense cluster. Daub was probably reinforced the walls or floor of this area. It occurs more towards the edges so it is likely wall reinforcement. There is no bone in this locus. This may mean that it was used to store non-meat food stuffs, meat off the bone, or dry goods such as the chipped stone tool. Weights may have been stored here as well. The weights are found in two quads only. Most are in quad 10. There are so many weights present, that the area may have had a weaving function. The small cluster of loom weights to the north, in Trench 150N, may be associated with this feature. Loaf weights are in the

majority but there are several loom weights and a couple fish net weights. No spindle whorls are present.

3. *Conclusion*

Locus 51 may be a later aboveground Starčevo structure and have functioned as a weaving area. If it was an above ground structure, it may have contained one or more looms. There are no postholes within the locus itself, but they are distributed around its periphery (in Locus 2). There is no evidence of a loom structure found within, however, the many weights indicate weaving activity.

C. Locus 52

Locus 52 is the remains of a possible enclosure in Trench 130E (Fig. 14). It was identified based on the perimeter of post holes, an uneven surface, extreme compaction and light coloured soil. The dearth of artefacts in the centre is a product of poor excavation rather than a reflection of artefacts present.

1. *Artefacts*

Bone, ceramics, chipped and ground stone artefacts: daub and a weight are present in Locus 52. Each type is elaborated upon below.

a. *Bones*

There is no digitized bone in Trench 130E. Based on the bone distribution in the other trenches and spread sheet data, it appears that this is a product of excavations. Bone is present at the eastern and western edges of this locus in Trenches 129G and 130F. The spreadsheet data show that the distribution is very light and that there is no clustering. There are only three fragments, one of which is identified as a *Bos taurus* radius. Animals in this area may have trampled and pulverized artefacts within this area, which removed them from the archaeological record. This would account for the light distribution and the small fragment size.

b. *Ceramics*

No digitized ceramics are in Trench 130E. Like the bone, this appears to be a product of the excavation. Ceramics are found on either side of this area (in Trenches 129G and 130F) and lightly scattered (Fig. 31). The spreadsheet data show no clear or

dense clustering. Fragments are relatively uniform in size. Most are small to medium in size.

c. Chipped lithics

Chipped lithics are found at the edges of Locus 52 (n=14 including natural unmodified stone). Also, a blade is present (in Trench 130E quad 20). Other lithics present are a flake (in Trench 129H quad 18), found with a natural granite stone. Two flakes and a piece of unmodified pyrite or hematite are in Trench 130E quad 9.

d. Grinding stone

A single grinding stone is located in Locus 52. It is at the extreme eastern edge (in Trench 130F quad 11). It may have found its way to this location from Locus 53, only two metres further east.

e. Daub

Unidentified daub is present in Trench 130F only (Fig. 32). Fragments are very small with the exception of one large piece. The spatial distribution is random.

Wall daub is present in Trench 130E (n=4) (Fig. 32). One large piece and one small piece are found in quad 20. A small piece is situated in quad 4 and another is found in quad 15. Spreadsheet data show construction daub in every quad in this locus. This forms an unclustered spread out distribution.

f. Weights

The digitized maps show a single weight (in Trench 130E in quad 6). It is not associated with any other artefact or feature. Similar to the grinding stone, it may have been originally associated with Locus 53 (outdoor work area).

The spreadsheets data show a few more weights (n=13 spreadsheet) in this locus. They appear to be randomly distributed. Loom weights are found in Trenches 129H quads 19, 20 and 130E quad 3 and 18. A spindle whorl is located in Trench 130E quad 10. Fish weights (n=2) occur in Trench 130E quads 5 and 25. A loaf weight appears in the same quad as a loom weight (in Trench 129H quad 20). A loaf weight is found in 130E quad 2 and another in quad 8. Two more loaf weights are located in 129H quad 24. There is some loaf weight clustering in the western part of the locus (in Trench 129H quads 19, 20 and 24). A spread out cluster of loom weights is located at the edge of this

locus in the northern quads of Trench 130E. There is no spatial association between the spindle whorl and the loom weights.

g. *Post holes*

Post holes are located along the eastern edge of Locus 52 (in Trench 130F) (Fig. 30). The post holes run north south along the edge. They appear to curve to run along the north edge of the locus. If they were present at the north edge, they were not preserved or not recognized in the field.

2. *Interpretation*

The difficult conditions for excavations (e.g. bright sun, barely perceptible changes in soil colour and texture), made this a difficult locus to identify and interpret. Based on the spreadsheet artefact distributions in Trench 129H and Trench 130F, there is much more in Trench 130E than the excavator recorded on maps. Fortunately, the spreadsheet data filled this gap.

Locus 52 is located in direct proximity to Locus 23 (located immediately to the north). Other pit houses are located more distantly to the west (Locus 41), east (Locus 7) and north (Loci 10). Excavations did not continue further south, because there was little evidence for further structures based on the surface and subsurface surveys.

The best evidence for Locus 52 to be a fenced enclosure is the line of post holes in Trench 130F (Fig. 30). However, the presence of weights is very unusual in an area there are animals. It is unexpected that weights are associated with a livestock enclosure. If this is an animal enclosure, the weights at the edges may be associated with it. The weight distribution is very light in the centre area of the corral and may represent randomly thrown or discarded pieces. Therefore, those at the periphery may relate more to activities in the surrounding Locus 2 or nearby Locus 53.

D. Locus 53

Locus 53 is a surface concentration of daub without associated architectural features or other artefact concentrations. It is located in Trench 130F and extends east and west into Trenches 130E and 130G (Fig. 15). Originally, the central and eastern part of the locus was identified as Locus 2. However, a scatter of loom weights and other artefacts indicated that the locus was bigger than originally thought. It may extend as far

as Trench 130H that contains a light loom weight scatter. It peters out gradually to be continuous with Locus 2.

1. Artefacts

Seven different artefact types are within Locus 53: altars, figurines bones, ceramics, daub, stone tools and weights. Each artefact type is discussed below.

a. Altars and figurines

There is an altar fragment located in Trench 130G quad 18 (n=1 spreadsheets). A labrette (n=1 spreadsheet) is found close by (in quad 19)). A stone pendant (n=1 spreadsheet) was also found in this location. Precise locations are unknown because the data for these artefacts are from spreadsheets. Only centroid locations are given.

b. Bones

The bones in the west part of the locus are very small (n=31 spreadsheet). They are all located at the edges (Fig. 33). There is no central distribution. An Ovis/Aries humerus is present (in Trench 130G quad 6). A dog vertebra is found (in Trench 130G quad 11). All unidentified fragments are small. A loose bone cluster spans three trenches east of Trench 130F into Trench 130G and Trench 130H. This distribution is continuous with Locus 2.

Ovis/Capra elements are located in a loose cluster in Trench 130F. The elements are small and consist of an upper and lower molar, second phalange and a calcaneous. The phalange and calcaneous may have been articulated.

The central southern part of the main excavations (in Trench 130G) has a concentration of large mammal remains. This concentration is very similar to the surrounding bone scatter in Locus 2.

c. Ceramics

The ceramics in Locus 53 are almost all uniform in size (n=81). There are some larger pieces in the northern edge (in Trench 130F quads 9 and 10). The rest are smaller. The distribution is very even across the locus (Fig. 34) and there is little clustering. Larger pieces tend to be closer to the edge, particularly in Trench 130F quads 9 and 10.

d. Daub

Unidentified daub is located in this locus (n=22 digitized). Mostly small pieces are present, but there are some larger pieces. The larger pieces are located at the south central edge (in Trench 130F quad 19) (Fig. 35). There is no daub in the southeastern part of the locus.

e. Chipped lithics

Two lithics are located in Trench 130H quad 20, just outside Locus 53 in association with loom weights and a grinding stone. This may indicate a work area where weaving and food preparation took place. An end scraper (n=1) is found with the loom weights (in Trench 130G quad 6). There are two flakes found near the grinding stones and pestle (in Trench 130G quads 19 and 6). The spreadsheet data show two blades located in this locus (in Trench 130F quad 19 and in Trench 130G quad 6).

f. Grinding Stone

The grinding stone fragments in Locus 53 were originally designated as belonging to Locus 2. Grinding stones, with other artefacts, appear clustered in Trenches 130F and 130G. A grinding stone is located with loom weights and lithics in 130G quad 16. In this area, grinding stones are located close together. Two are found in Trench 130G quads 1, 12 and 16, and one is close by in Trench 130F quad 5. These may be intrusive from Locus 27. A pestle is found with the grinding stones and is located just outside Locus 53 in Locus 2 (Trench 130G quad 20). It is likely associated with the grinding stones. The grinding stones form part of this outdoor work area.

g. Weights

There are large loom weights in Locus 53 (n=5) (Fig. 36). The majority of loom weights are located in a loose scatter (in Trench 130G). There is one found in Trench 130G quad 6, two located in quad 11, one found in quad 18 and one located in quad 19. This was probably a weaving area. Other loom weights are located just outside Locus 53 (in Locus 2 Trench 130H quads 13, 16 and 22). These are likely affiliated with Locus 53.

Loaf weights (n=8) are located at the edges of this locus. It is difficult to tell if they are associated with Locus 53 because the data for these comes from spreadsheets and only centroid coordinates are given. There are five loaf weights within Locus 53. Three are located in Trench 130F quads 9, 10 and 14. Two appear in Trench 130G quads

9 and 15. Three more are at the peripheries in Locus 2 (in Trench 130G quads 3 and 20 and Trench 130K quad 5). There are no other artefacts in this locus.

2. *Activity areas*

a. *Food preparation*

Grinding stones and a pestle are found in this area. Like the loom weights, there is no dense clustering, but all occur within Trenches 130F and 130G. Few lithic tools are present. They are scattered in this area and would aid in the food preparation process or in other activities such as weaving.

b. *Hide processing*

An end scraper is present. This indicates that hide processing occurred here. There is only one other end scraper, in Locus 23. Hides may have been first been worked on outside (as it is gross and smelly work), then brought inside to Locus 23 for further work. A few lithic tools that would have aided in this process, including blades, are present. The loom weights may have also aided in holding down hides while they were cleaned.

c. *Weaving*

There are a great number of loom weights in this area. They are scattered and not clustered in any one quad or even in one trench. If the area was for weaving, it is possible that over time loom weights became widely distributed due to taphonomic factors. This is one of the few areas where there are enough loom weights to constitute a loom.

d. *Religion*

There is an altar and a figurine in this locus. They are associated with the grinding stones. This association may give the figurines importance in domestic activities.

3. *Interpretation*

There are no post holes or other evidence to indicate a structure. There are no dense concentrations of artefacts within a smaller area within Trenches 130E, 130F, 130G and 130H. The lack of bone is unusual. In pit houses, bone is found everywhere. Outside of pit houses, bone is in a light dispersed distribution. In Locus 53, there is very little bone and it is only located towards the edges. It may be the result of some infill or the vagaries of open-air preservation. Ceramics dominate the assemblage in this area. There are many inorganic remains, such as loom weights and grinding stones, a pestle

and other chipped stone lithics. All are in a loose scatter across two trenches. This loose artefact clustering in open spaces indicates outdoor activities.

4. Conclusion

Activities including weaving, food preparation and hide processing took place at Locus 53. Locus 53 is to the east of the animal enclosure (Locus 52) within the circle of pit houses. A flat area faces the south slope of the site. If this area were entirely outdoors, then people could spread out more. They were not confined to a limited space in which to work, such as they would have been in a pit house. There is less need to confine activities. This results in the looser artefact scatter that is present in this locus.

This locus (in Trenches 130E, 130F, 130G and 130H) is an outdoor work area. An outdoor work area would be more prone to taphonomic effects, spreading out across a larger area. This explains the wider distribution.

E. Locus 7

Locus 7 is a pit house divided into 3 sub-loci: Sub-loci 7.1, 7.2, and 7.3. Locus 7 is located in Trench 131F. These are discussed below.

F. Sub-locus 7.1

This is the upper stratum of Locus 7. It is a result of roof collapse and erosion around the edges toward the centre.

1. Features

There are no features in Sub-locus 7.1. The features in this locus are in deeper substrata and will be discussed later.

2. Artefacts

The highest substratum of Locus 7 has altars, bones, faunal tools, ceramics, grinding stone, chipped stones, daub and weights present. Each is discussed below.

a. Altars

The spreadsheet data show a single altar leg fragment in Sub-locus 7.1 (Fig. 37). It was found at the very bottom of this substratum (in Trench 131F quad 18) in the southeast part of the pit house. This area is devoid of any other artefacts and is located near the entrance. There are no figurines associated with the altar leg or within this sub-

locus. It may have been associated with the entranceway into the pit house. If it was placed above or near the entrance in the walls, it would have fallen towards the centre.

b. Bones

The digitized bones in Sub-locus 7.1 are not identified to element or species type (n=12 digitized). Most of the bone is concentrated in the northwest part of the pit house (Fig. 38). In this part of the pit house, bone fragments are located very close to the edge. The furthest a cluster of bone is from the edge is only .27 m. The bone fragments are very small.

The spreadsheet data show bone occurring more frequently (n=474). It also gives element and species type. Species present include *Bos taurus*, *Canis familiaris*, *Capra hircus*, *Capreolus capreolus*, *Cervus elaphus*, *Homo sapiens*, *Lepus europeus*, *Ovis aries*, *Ovis/Capra*, *Pisces sp.*, *Sus scrofa domesticus* and *Sus scrofa ferous*.

Bos Taurus remains occur most frequently. They are found in all quads except for Trench 131F quads 7, 8 14, 15, 19 and 20. Elements from all over the body are present.

Two elements of domestic dog are found in this sub-locus. A loose tooth fragment was found (in Trench 131F quad 11. A cervical vertebra is in Trench 131F quad 13.

Three elements from *Capra hircus* are present. A scapula is located in Trench 131F quad 6, a loose tooth in quad 22 and a metapodium in quad 17.

A few *Capreolus capreolus* remains are present. A loose tooth is found in Trench 131F quad 22 and two metatarsals in Trench 131D quads 12 and 17.

A single *Cervus elaphus* vertebra is found (in Trench 131F quad 13).

There are two human remains located in this sub-locus. A loose tooth fragment is found in Trench 131F quad 11 and a humerus is located in Trench 131F quad 13.

A single rabbit phalange is found in Trench 131F quad 22.

There are 15 *Ovis aries* elements present in this sub-locus. All of them, except for two atlases and a cranial fragment, are from limb elements. The *Ovis aries* remains are clustered in Trench 131F quads 6, 12, 13, 17, 18 and 22. This species' distribution is at the centre of the sub-locus.

The *Ovis/Capra* distribution overlaps the *Ovis aries* distribution and is also in Trench 131F quads 6, 7, 8, 16, 17, 18, 11, 21, 22, and 23. The northern and eastern edges

have no Ovis/Capra. Elements present include a wide variety of body parts including cranial, core and limb elements.

Fish remains are found in Trench 131F quads 12, 17, 21 and 22.

Two loose teeth from *Sus scrofa* (one of which is a domestic pig) are present in Trench 131F quad 17. Two *Sus scrofa* ferrous vertebrae are found in Trench 131F quad 23 and 13.

Different species tend to overlap in the centre of the locus. The northern and eastern edges have few remains. Large and medium mammal fragments are scattered throughout the locus. Statistical analysis shows that the bone pattern is neither clustered nor dispersed. This agrees with the visual analysis. Bone is found everywhere in higher pit house sub-strata and exhibits little evidence of spatial clustering.

c. *Bone tools*

Specific location data from bone tools is lacking since they were not digitized. Bone tool location data came from centroid coordinates obtained from spreadsheet data. The data show bone tools only in the central part of the pit house (Fig. 39). There are only seven bone tools in this sub-locus. These are not clustered together, but are associated with the different activity areas within the pit houses. There are no bone tools at the edges.

Awls and scrapers are present, but not clustered together. Awls are found in Trench 131F in quads 13, 19, and 22. A scraper and an ornament are found in quad 19, spatially associated with one of the awls. All the tools are in the east central part of the pit house. This pattern is indicative of roof storage. Tools stored in the roof remain high in the locus substrata as they fall on top of the living floor when the pit fills and collapses. Bone tools appear to be associated with large ceramic fragments. The awls and scrapers indicate that hide processing or weaving took place here.

d. *Ceramics*

The Starčevo ceramics (n= 38 digitized) in this sub-locus follow a similar pattern to the bone. Small fragments cluster to the northwest within less than .5 m from the pit house edge (Fig. 40). The majority is around the pit house edge (in Trench 131F quads 6, 7 and 11). A little to the east of the pit house centre, there are some large ceramic fragments (in quads 13 and 18). There is another dense ceramic cluster in the extreme

south. Most ceramics are extremely small except for those in quads 13 and 18. Larger ceramic fragments are in the same location in Sub-loci 7.2 and 7.2.

e. Grinding stone

The spreadsheet data show a single grinding stone fragment. It is located at the periphery of the locus in Trench 131F quad 16. This might be construed as evidence that some of the peripheral data actually belonged to the basal living horizon and was incorporated into this sub-locus by later ploughing activities.

f. Chipped stone

The spreadsheet data show many chipped stone tools located in this sub-locus (n=17). Many blades are found in Sub-locus 7.1 (n=4). These are in addition to a core and a few flakes (n=4) and natural pebbles (n=5). All the blades, an adze fragment, and the core are found centrally located (in Trench 131F quads 17 and 22). They are associated with bone and ceramics.

g. Ground stone

A hammer stone is in the southwest part of the sub-locus. This is one of the few ground stone tools found at this site in this horizon.

h. Other stone

Stone temper (a mica-schist type) is found in the central part of the locus (in quad 16). It likely relates to ceramic production. In general, there is little solid evidence of ceramic production.

i. Daub

All of the daub was identified as miscellaneous for this locus since it was analyzed at the beginning of the project (and unfortunately discarded so it could not be reanalyzed – T. Jongsma, pers. comm.). These daub fragments (n=24 digitized) occur mostly around the locus' edge. A concentration is in the northwest edge of the locus (in Trench 131F quads 6, 17 and 11) (Fig. 41). There is a second small concentration in the southern part (quad 21) and in the central part (quads 12 and 17). The fragments are small.

j. Weights

Two weights are digitized. A loom weight and a bola are located in the extreme northwest part of Sub-locus 7.1 (Fig. 42). The loom weight is found in Trench 131F quad 6. The bola is situated in quad 7. Both are located very close to the edge. There are no loaf weights or other weights digitized in this sub-locus.

The spreadsheet data show spindle whorls (n=27 spreadsheet) at the pit houses edges and at all the sides of the pit house except the east. So many fragments are present that some kind of weaving activity must have occurred at this location.

Bolas (n=38 spreadsheet) are in Trench 131F quads 8, 11, 12, 13 17, 17, 18, 21 and 22. This distribution is at the western edges, the central part and at the northwest part of the pit house. So many bolas in the high stratum of Locus 7 indicates preferential storage in the roof or on shelves.

Two fish weights (n=4 spreadsheet) are found together in the centre of the sub-locus (in 131F quad 17). They are not found where the other weights tend to be found. They likely hung in a cluster in the roof. Two more net weights are found in quad 18. These may have been all stored together but precise location data are not present.

Loaf weights (n=2 spreadsheet) are found in the same area as the fish weights (quad 17) and may have been stored in the roof. All these different weight types may have been stored and hung in the roof. There are no other artefacts in this sub-locus.

G. Sub-locus 7.2

This sub-locus is interpreted as the result of structure abandonment. After abandonment, it slowly filled with sediment. It is very different in terms of artefacts from the basal (living) floor beneath (Sub-locus 7.3).

a. Bones

The digitized bone (n=49) of this sub-locus is not identified to element or taxon because it was not a regular part of the field recording when this locus was excavated during the first season (H. Greenfield pers. comm.). The digitized bone appears to be the larger fragments since many more bones are described in the spreadsheet data. The bone appears in only the western part of the pit house (in Trench 131F quads 11, 12 16, 17, 22) (Fig. 43). It is scattered randomly though these quads. The two easternmost quads of the pit house contain no bone at all. Bones are larger in size as compared to that in Sub-locus 7.1 and whole or near complete elements are present. The statistical analysis could not

discern where bone is clustered. The visual analysis is necessary to discern precisely where clusters are. More bone (n=270 spreadsheet) is present in the spreadsheet information and this is described next.

Mostly *Bos taurus* (n= 59 spreadsheets remains are present. The assortment of elements is very similar to that in Sub-locus 7.1. Mostly limb elements with a few examples of cranial fragments, ribs and vertebrae are present. There is a concentration of *Bos taurus* remains in Trench 131F quad 17. Ribs, vertebrae and different limb elements are present. Quad 12 also contains *Bos taurus* elements from all over the body. Quads 16, 18, 22 have *Bos taurus* present as well, but not in such great quantities as quads 12 and 17.

A *Capra hircus* cranium fragment and a sacrum fragment are in quad 18.

Three *Cervus elaphus* elements are present. A cranial fragment is in Trench 131F 17. Two more elements, an ulna and a tarsal are in quad 18. This wide variety of elements could be interpreted as food remains or selection of certain elements for potential tools.

A single *Homo sapiens* ulna is present in Trench 131F quad 17. There is no evidence of a burial in this area and its presence here is strange.

Ovis aries (n=13 spreadsheet) remains are present (Trench 131F quad 17). This dense cluster in one area is indicative of butchering. Except for a lumbar vertebrae and a cranial fragment, most elements are from limbs. An *Ovis aries* humerus is in quad 22. A tibia is present in quad 16.

Ovis/Capra remains are present (n=24 spreadsheet). The majority of it is in Trench 131F quads 17 and 18. This overlaps the *Ovis aries* distribution. Elements from all over the body are present though the majority is from the lower limbs. Metatarsals and metacarpals are present.

Fish remains are present in Trench 131F quads 17 and 11.

Sus scrofa domesticus remains are present (in Trench 131F quads 11, 16 and 22). Two vertebrae and two phalanges are present. A *Sus scrofa domesticus* ulna is located in Trench 131F quad 17. A mandible and a loose tooth from a wild pig are found in Trench 131F quad 16 and 17.

There is a clear and dense concentration of bones from different species in 131F quad 17. This spreads slightly into surrounding quads. Quad 17 may have been a meat

processing area. It includes a mixture of high and low quality elements in terms of meat counts. The majority of elements present are from limbs though cranial, vertebral and rib remains from several species are present.

b. Bone tools

Bone tools (n=13 spreadsheet), including three awls, a punch and a handle are present (Fig. 44). There is also a possible pendant. The awls are found in the centre of the pit house (in Trench 131F, quads 12 and 13). Other tools are found in the same areas and in the northwest part of the pit house (in quads 6, 7 and 11). Statistical verification shows that while the bone tool pattern appears to be slightly clustered, this pattern may be due to the small number of bone tools.

c. Ceramics

There are Medieval ceramics (n=76) in the northwest quads, the central quads and the southern quads. The distribution tapers off towards the northeast and east parts of the pit house where there are none. There are no Medieval ceramics in the southwestern most part of the pit house.

Starčevo ceramics (n= 265) are densely clustered in the centre of the pit house (in quad 17), but there is a sharp decrease towards the northeast (quad 13) and easternmost part of the pit house (quad 18), where only a few very large fragments are located (Fig. 45). These are continuous with large fragments in Sub-locus 7.1. The ceramics also occur in a less dense array at the edges of the pit house. Ceramic fragments are slightly larger than that in Sub-locus 7.1. Storage ceramics may also be in Sub-locus 7.2 if they were stored on shelves or hung from roof above main floor.

d. Daub

Daub occurs in the northwest part of the pit house (in Trench 131F quad 11) (Fig. 46). This is where an oven appears in Sub-locus 7.3. There is also a concentration of daub in the central part of the southern section of the pit house spanning quads 16, 17 and 22 (Fig. 46). This is where a large hearth appears in the lowest substratum. There is no daub in the eastern part of the pit house.

Statistical analysis shows a more random pattern. Falling daub from the roof may have created this somewhat clustered pattern as the pit house collapsed.

e. Chipped stone tools

A blade is present in Trench 131F quad 11. This is south of the oven that appears in Sub-locus 7.3 (Fig. 90). The blade was probably used for slicing meat. There is a cluster of bones around it. A core is found with the loom weights (in quad 22). There are flakes with the loom weights and the core. The majority of this flake distribution carries into Sub-locus 7.3. These are the only chipped lithics in this sub-locus

f. Grinding stones

There is a single grinding stone located south of the centre of this pit house (in Trench 131 quad 17) (Fig. 47).

g. Weights

There are two loom weights located adjacent to each other in the southern part of Sub-locus 7.2 (Fig. 48). There are no other weights digitized in this locus.

The spreadsheet data show greater numbers of weights. Three loom weights are present (in Trench 131F quads 17 and 22) that are contiguous with digitized data. Spindle whorls (n=10 spreadsheet) are located in quads 11, 17, and 22. This follows the exact same distribution as bolas (n=4 spreadsheet). Two loaf weights are present in quads 12 and 17. Loom weights and loaf weights do not occur in as great a number but are found in the same quads as the other weight types.

H. Sub locus 7.3

This is the lowest level of the locus. It is the living floor. The features and associated artefacts are different than found in the overlying deposits. Each is described next.

1. Features

A clay floor, a hearth and an oven become apparent in the basal living floor of Locus 7. These three features are discussed below.

a. Clay floor

There is a strip of a clay floor in the northwest part of the pit house. It is located mostly in Trench 131F quads 8 and 13. It appears to start at the edge and extends like a finger into the northern central part of the pit house (Fig. 49).

b. Hearth

A hearth appears in the central part of this locus (in Trench 131F quad 17). It is just south and east of the centre. It is represented by an ashy carbon and fishbone concentration (see Figs. 49). Fish remains were discarded in the fire after consumption. Many other bones are present within quad 17, in the upper sub strata, including *Bos taurus*, *Capreolus capreolus*, *Ovis aries*, and others. The hearth was used to cook food and food consumption likely took place near the hearth.

c. *Oven*

A small oven is located in the northwest corner of the pit house (in Trench 131F quad 11). The oven has baked the soil around it (Fig. 49). The oven does not appear to have bones or ceramics associated inside it. In higher substrata, many artefacts including bone, daub and ceramics are in this location. Large ceramic fragments are found behind the oven. It is not as large or as well built as the oven in Sub-locus 23.3 (see Locus 23 analysis this chapter).

2. *Artefacts*

Sub-locus 7.3 has faunal remains, faunal tools, ceramics, chipped and ground stone lithics, daub and weights. Each artefact type and its location are described below.

a. *Bones*

Statistical analysis shows that bone is highly clustered. This agrees with expectations. The majority of the bone (n=77) is concentrated in the central part of the pit house (Fig. 49). There is a concentration of fish bones to the south of the central part of the pit house. They are all in and around the hearth. Clearly, after consumption, bones were discarded in it. There is a single bone fragment in the extreme eastern most part of the pit house. There are relatively few fragments digitized, but they are large in size. The digitized bones in this locus are not identified to species or elements. One exception is a humerus between the oven and hearth area. The frequency of digitized identified species declines in this sub-locus.

The spreadsheet data show what species are present. The following was obtained from spreadsheet data.

The frequency of *Bos taurus* remains drops off abruptly in this locus. Only two elements, a scapula and a cranial fragment, are present (in Trench 131F quad 13).

There is one *Capra hircus* scapula located in Trench 131F quad 18.

Two *Capreolus capreolus* remains are present. A tibia is found in Trench 131F quad 13. A metatarsal is in quad 18.

An *Ovis aries* radius is present in Trench 131F quad 13.

Ovis/Capra (n=8) remains are present. Loose teeth (n=4) are found in quads 6, and 8. A femur is present in quad 10. A cranial fragment is located in quad 8. A humerus is found with a loose tooth and a metatarsal in Trench 131F quad 6.

One domestic pig ulna is in Trench 131F quad 13.

b. *Bone tool*

Statistical verifications show that contrary to expected results, the tools in this sub-stratum are highly dispersed. It is likely that tools are not clustered together, but are found in the activity areas in which they were used. They cluster with other artefact types.

Bone tools (n=8 spreadsheet) are mostly present in the south half of the pit house (Fig. 50). This may represent a work area. There are two in the very centre of the northern quads of the pit house, but none at the western or eastern edges. An awl is present in the very southern part of the pit house (in Trench 131F quad 22). Other tools are not identified to type. Unidentified tools are found between the hearth and the entrance (in quads 7, 12, 18, 21 and 22). All the tools are associated with weights and ceramics. They do not appear with grinding stones (Fig. 51). This indicates that the tools were used perhaps in conjunction with the weights for weaving or processing hides.

c. *Ceramics*

There are many small Starčevo ceramics (n=275) in the central part of the pit house and in the northwest and south. Statistical analyses show these to be found in a clustered pattern. One cluster is found in the eastern most quads, where there are several large ceramics fragments. These are located within a metre of the pit house edge. These pieces may have been from storage vessels. The large pieces are in an area (Trench 131F, quads 8, 13 18), where there are no other artefacts, and in the space in front of the entranceway. The clustering of ceramics around the edge of the pit house may represent storage areas. They occur away from the central work areas as represented by the bone and lithic work tools (Fig. 52). There are no ceramics within the hearth or the oven, but several were located in close proximity.

d. Chipped stone

The spreadsheet data show flakes and unknown tool types (n=4 spreadsheet) in the north part of the locus. There are no artefacts associated with them. They are near the edge of the locus. There are some small, unidentified lithics close by, including two possible tools are in the north part of the locus (in quad 12).

The digitized data show a chipped stone tool in the central southern part of the pit house. It is associated with other lithic tools and weights (Fig. 53). This appears to be a work area, possibly for weaving.

e. Grinding stone

Grinding stones (n=4 digitized) are only in the southwest part of the pit house in one quad (Fig. 51). Two of these are made of quartz. The grinding stones are all within about .3 m from the pit house edge. They are located between and behind the heat and light sources directly opposite the entranceway. This appears to be a work area, probably for food preparation and other work needing light. There are several grinding stones in one place. The grinding stones are located directly opposite from the chipped lithic tools. This implies different function.

The statistical analyses show that while somewhat clustered, the pattern may be due to random chance. The grinding stones are all almost exactly 1.5 m apart. This may show space between workers preparing food. It may also be evidence of storage areas.

f. Daub

There are few daub fragments digitized in this locus (n=12). There is a concentration of daub located west to the hearth and south of the oven (in quad 11) (Fig. 54). The pieces are small.

The spreadsheet data show architectural daub (n=130) located in all quads of this locus. This widespread distribution may indicate a daub floor as it is located low in the strata of the pit house. Daub was used to build the oven and its presence here may be a result of its construction.

Statistical analysis shows that the daub pattern is neither clustered nor dispersed. This meets expectations. The random distribution on the living floor is likely a result of pit house wall and roof collapse or floor disintegration. Daub will be more fragmented

and dispersed the further it has to fall. This is why the lowest level of the pit house has the most dispersed daub pattern.

g. *Weights*

The digitized data show a bola located near the grinding stones in the southwest part of Sub-locus 7.3 (in quad 16). Two other unidentified weights are situated in the same location (Fig. 55). As the bola is associated with a grinding stone, it may have been for food preparation. It may have been a hunting bola. It is not found with loom weights or other weight types, so it likely did not function as a weaving tool. There are no loaf weights digitized in this locus.

The spreadsheet data show five loom weights in this sub-locus. Three are located in the southwest corner in quad 8. One is in the northwest corner (quad 9) and the other in the centre (quad 10). Loaf weight distribution is opposite from the spindle whorls. This indicates that the two different weight types had different storage patterns, or different functions.

The spreadsheet data show spindle whorls (n=18 spreadsheet) located in the centre part of the locus (in quads 12 and 17) and at the northern part (in quad 7). There are few in the east (in quads 13 and 18). The spindle whorls overlap the central distribution of loom weights. The many spindle whorls may be evidence of an indoor weaving area.

A fish net weight is found in the centre of the locus. A single stamp is present in the southeast part of the locus. The stamp may indicate that this locus is associated with ceramic production. There are no other artefacts around it.

h. *Post holes*

There is a post hole, likely a central support beam, located southwest of the centre of the pit house (in Trench 131F quad 17). There are a large number of small post holes distributed around the periphery of the pit house in Locus 2 (and 5) but each is directly associated with the superstructure of Locus 7.

3. *Interpretation*

Sub-locus 7.1 represents the roof collapse, erosion, and fill of the pit house. This is why artefacts are concentrated at the sides (Figs. 56 and 59). The artefacts in Locus 7.1

appear more at the edges though some artefacts are found to be in the centre of the pit house when spreadsheet data are consulted. Tools on shelves fall to the edges as collapse occurred. It is likely that the clusters in the centre of the pit house are artefacts that hung from the ceiling. These tend to be easily hung artefacts, such as weights, including spindle whorls and fish net weights.

Artefact fragments become progressively smaller as the horizon get closer to the surface. This is true of both bone and ceramics. The daub fragmentation rate is a little less. Daub is relatively the same size throughout the locus. Sub-locus 7.1 has the smallest size of artefacts. This is due to greater exposure, ploughing and other taphonomic procedures.

The artefacts of Sub-loci 7.1, 7.2 and 7.3 follow very similar general distributions. The digitized maps show that most artefacts are found in the western half of the pit house. This is partly a result of excavation procedure (the Romanian team excavated a 1x3m wide block in the eastern half without piece-point plotting artefacts – quads 8, 13 and 18). However, it also represents a real gap in the material, since all the areas around their excavation strip had few artefacts. This probably reflects the fact that the entranceway is located to the east and artefacts were not present in large quantities in the pathway.

The pattern distributions in Sub loci 7.2 and 7.3 are similar. Sub-locus 7.3 has a denser array of artefacts, but follows the same spatial patterns as those in Sub-locus 7.2. Sub-locus 7.2 has a less dense distribution and could represent a slower fill of sediment over time, or may be part of the living floor. Sub-locus 7.1 has higher densities closer to the edges of the pit house, but artefacts are mostly located in the west half of the pit house.

The bone distribution patterns between Sub-loci 7.1 and 7.2 are very similar. Bone is concentrated in and around quad 17 in Sub-loci 7.1 and 7.2. This is directly over the hearth in Sub-locus 7.3. This indicates that bones accumulated as they were thrown on top of the hearth.

In all of the loci, the eastern part of the pit house closest to the edge is almost completely devoid of artefacts (Fig. 57). This is representative of an entranceway whose floor, roof and walls to the side were kept clear.

4. *Activity area discussion*

The area in the central south part of the pit house has a larger unidentified daub concentration that appears in Sub-loci 7.2 and 7.3. It is in a circular pattern. Grinding stones are located just outside this circular daub concentration on the west side. Ceramics within the circle are in the same density as that in the other half of the pit house. Two loom weights are located just outside the daub circle to the south. This concentration is adjacent to the hearth. This daub circle may relate to the hearth. It probably reflects the firing of the soil around the edges of the hearth, and may have functioned to contain it, or to reflect heat towards the opposite side of the pit house where there is no source of light or heat. It may also been the remains of daub floor.

Sub-loci 7.2 and 7.3 have activity areas towards the rear of the pit house. This is between and behind the heat sources, and opposite the entranceway. Artefacts associated with any type of food related work tend to be on the wall side of heat sources. This is particularly true in the case of the oven. Many artefacts are associated around the oven area and particularly close to the wall in all the sub-loci.

There is evidence for at least two activities taking place adjacent to each other behind the heat sources: food preparation, weaving, and there possibly lithic production. These are discussed next.

a. *Food preparation*

Lithic tools, including chipped stone and grinding stones, represent a food preparation area. This area is behind the hearth in the southwest corner of the pit house. The oven is located just to the north. This places food preparation between two areas, the hearth and oven, where food can be cooked. Their proximity makes cooking food easier as cooking is in the same place where it is prepared.

In Sub-loci 7.2, there is a concentration of bone with the hearth (in quad 17 in Sub-locus 7.3). In Sub-locus 7.3, the bone concentration is not in quad 17 associated with the hearth. This implies that bones found in the upper sub-loci were discarded on top of the hearth after it ceased being used. This explains why they are slightly higher than the hearth itself. The hearth area was used for bone discard after it was no longer used as a hearth – just prior to abandonment. As mostly limb bones are present, it can be surmised that limbs were being cooked and then discarded in the hearth area.

b. *Weaving*

The area in the south and central part of the pit house appears to be used for weaving or secondary butchering. A single loom weight is found at the pit house edge in Sub-locus 7.1. The rest of the weights are in Sub-loci 7.2 and 7.3. This implies storage in the walls or roof and use on the floor. A weaving area may be in the area near the hearth. This would be in a location that takes advantage of natural and hearth light. It would also be out of the way of the food preparation area in the southwest and the lithic production area in the north. The heat of the oven is unnecessary for weaving activities, so there is no reason for weights to be as close to the oven as the grinding stones are to the oven. Light from the hearth is more important to weaving than heat. Weaving areas are closer to the hearth than the oven. The enclosed nature of the oven may make it a poor light source.

More convincing evidence for weaving is the many spindle whorls in the south part of the locus, particularly in Sub-locus 7.3. The loom weights and spindle whorls are separate from food preparation artefacts. Food preparation activities did not occur where weaving areas occurred. They shared the pit house but each activity had a separate little area.

There are no bone tools associated with grinding stones in this area. Bone tools are found with chipped lithics and weights in the centre part of the pit house. The bone tools in this locus may be more for weaving and butchery purposes. Awls can be used in weaving. No loaf weights are in this locus. This indicates that loaf weights had a non-weaving purpose.

c. *Secondary butchering*

Bones are located in the central and south part of the pit house (Fig. 49). A lighter concentration is found in the northwest and in the western part of the pit house in association with the oven and grinding stones. It is likely that some butchering took place before cooking in this immediate area. In Sub-locus 7.3, two flakes are in the area that could help slice meat from the bone.

d. *Lithic production*

The very northern edge of the pit house may be a lithic production area. Evidence for this is the presence of a core and flakes. These are located well away from food production and any other activity, probably because lithic production is messy and stone

can fly off unexpectedly. No one wants stone in their food, so such areas would be kept separate. There are no weights, few ceramics or bone in this area. There is so little debitage that repair and retouch may have been the primary lithic production activity and no tool creation took place.

e. Ceramic Production

There are few artefacts in the northern part of Locus 7. This area may be kept clean in order to make ceramics. Evidence of ceramic production is the stamp and tempers. There are tiny fragments of ceramics in the northern part of the locus. This may be evidence of recycling old vessels to make temper for new ones. While the temper and stamp are not found together to demonstrate a ceramic production area, they may indicate storage areas. The evidence for ceramic production in this locus is not as strong as in Locus 23. The oven in Locus 7 is not as large or as sturdy. There are no ceramics inside the oven. Ceramics may be formed in Locus 7 then fired in the large oven in Locus 23.

f. Entrance way

An entrance way is located in the east edge of Locus 7. The entrance way is essentially devoid of any artefacts. The entrance way is clear both inside and immediately outside of the locus. There is a space between the ceramic concentrations in Locus 2, where the entrance is located, and inside Locus 7, making an unbroken clear path into the pit house (Fig. 25 and 57).

g. Storage

There are large ceramic fragments in the eastern part of Locus 7, close to the entrance. These were likely storage vessels placed on the wall or hung from the ceiling. They fell into the entrance after abandonment. Shelf storage is observed in Sub-locus 7.1 (Fig. 59). The distribution at the northwest side of the pit house is from shelf collapse. The items upon the shelves come to at the sides of the pit house and could have rolled towards the centre.

Storage also occurs outside this pit house. Outside the pit house interior, in Locus 2, ceramic density increases at the south and east edges around the pit house (Fig. 25). The proximity of the vessels is convenient and may help shield the pit house against inclement weather, or hold down a roof cover.

5. *Conclusion*

This locus is clearly a domestic living space. Activities revolving around a domestic household took place. There is evidence for specific activity areas. Different parts of the pit house are used for plant food production (e.g. grain grinding), animal food processing (i.e. secondary butchering), lithic repair, and ceramic production. There is an oven, a hearth, benches for sitting, shelves for storage and a clear entranceway. All of these are located in specific areas.

Food preparation activities are located between hearths and ovens with access to both. Other activities, including weaving, are located slightly away from the area of the grinding stones and the oven. Non-food related activities are close to at least one heat or light source. The weaving area is closer to the hearth and the entrance way, taking advantage of the light from both. Messier activities, such as lithic production, ceramic production and butchery, appear at the other end of the pit house in the north (in and around Trench 131F quads 7 and 8). This area may have been for the messier jobs.

Food preparation, lithic production, and weaving areas are located in places that make use of the heating power and light of the rising sun as the doorway faces east. This would light and warm the pit house faster after the cool of night. The heat and light sources, the oven and hearth, are opposite the doorway. When the sun moves away from the east, work activities are still accomplished using the heat and light sources within the pit house.

The statistical analysis shows that the general pattern in Locus 7 is for artefacts to become more clustered as the stratum deepens. Artefacts such as daub and bone exhibit distributions that are more random. This is likely for two reasons. First is the very large sample size. Daub and bone exist in large amounts in virtually every quad. The second is that different unidentified daub types were lumped in with the miscellaneous daub. It is possible that identified daub would be clustered. Bone exhibits a dispersed, random pattern due to being haphazardly discarded. Lithic and faunal tools exhibit more clustered patterns.

1. Locus 23

Locus 23 is a pit house divided into 3 sub-loci: 23.1, 23.2 and 23.3 (Fig. 58). Each sub-locus and its associated artefacts are discussed. Two later deposits disturb the pit

house locus – Loci 8 and 56. Locus 8, a Medieval ditch, cuts east/west through this locus (Fig. 59). The greater part of Locus 23 is north of this ditch. The Locus 56 disturbance is an Early Iron Age fire pit. It is located in the northern part of the pit house (Trench 129D quads 12 and 13). Distinguishing between Locus 56 and a hearth in Sub-locus 23.3 was difficult because the two are located close together.

J. Sub-locus 23.1

1. Artefacts

Religious paraphernalia, bones, bone tools, ceramics, chipped stone, daub and weights are found in the high substrata of Locus 23. Each is described below.

a. Figurines and other special items

None of the figurines or other special items was digitized. All were analyzed from the spreadsheets. A figurine is located in the northwest part of the locus (in Trench 129D quad 2). Two clay balls are located close together in the north central part of the locus (in Trench 129D quads 4 and 9). A labrette is found just east of the balls (in quad 10) and a ceramic handle is present in the centre west part of the pit house close to the edge (in Trench 129D quad 11).

b. Bones

Bone (n=59 digitized) appears mostly randomly distributed in this sub-locus although some vague spatial patterns emerge (Fig. 60). There is a slight trend towards a denser distribution towards the centre of this locus in the northern quads (Trench 129D). There is much less bone in the eastern central part (in Trench 130A quads 1, 2, 6, 7, 11, 12, 17, and 21) and the western central part of the locus (in Trench 129D quads 1, 6, 11, and 21). Bone is concentrated to the middle in the southern part of the locus. The bone fragments are extremely small because they are nearer to the surface and subject to various attritional sources.

The statistical analyses show that the distribution of bone shows some clustering. Clustering is in the high strata of Locus 23. This clustering became more pronounced and dense in lower strata. It was not possible to separate the bone data into sub-loci for statistical analysis because of the large amount of information.

Bos taurus remains are clustered together in the extreme northwest of the locus (in Trench 149P quads 24 and 25, and Trench 150M quads 17, 21 and 22). Bone appears less frequently in the central and western part of the locus.

Two Ovis aries elements, an atlas and metatarsal are found in Trench 129D quad 8. An innominate of an Ovis/Capra is found in the southern central part of the locus (in Trench 129D quad 18) at the edge of the Locus 8 disturbance.

There is a single Sus scrofa domesticus rib in the southeast part of the locus (in Trench 129H quad 4).

Large and medium unidentified mammal fragments are found mostly in the centre of the locus and towards the northwest corner.

c. Bone tools

The location data for bone tools (n=7) was extracted from spreadsheets. Centroid coordinates approximated the location of the tools, as precise location data are not recorded. Only awls and a handle are present. Three awls are located towards the edges of the pit house (in Trench 129D quads 6, 20 and 24) (Fig. 61). There is one each in the northern, western and southern edges of the pit house. The handle appears in the centre (in quad 8).

Statistical analysis shows bone tools are more dispersed in the upper stratum. This more dispersed pattern is likely a result of the tools falling from shelves and coming to rest in a jumbled array. It is expected that they will become more clustered or be associated with other artefacts in deeper strata. These clusters designate activity areas.

d. Carbon

Carbon is found in association with two postholes at the western edge of the pit house (in Trench 129C quad 10) (Fig. 66). There is another small concentration of carbon outside the pit house about 1.5 m west of the edge.

e. Ceramics

There are a few Halstatt (n=6 digitized) and Roman ceramics (n=1 digitized) intrusive to this locus. The Starčevo ceramics are much more numerous (n=672), and have an even distribution throughout most of the locus, with slightly denser distributions occurring in the middle (in Trench 129D quads 8, 9 and 10) (Fig. 62). The density tapers

abruptly towards the eastern quads. The very northeast part of the locus (Trench 150M quads 16, 21 and 22), are completely devoid of any ceramics. The ceramic pieces are very small, similar to the pattern with bones. Remains described as ceramic waste are located in Trench 129D quad 2. These may be crushed ceramics used for temper in ceramic production. The statistical analysis shows that the pattern is clustered, agreeing with the visual analysis and the Locus 23 ceramic verification.

f. *Chipped Lithics*

The digitized data show flint and obsidian chipped stone artefacts (n=5) in the central part of this locus (Fig. 63). This is within and around the hearth area. It is possible that the lithics in the central part of the locus may be associated with the Early Iron-Age fire pit (Locus 56). However, this fire pit seems to consist of a few charred remains and this seems unlikely. The lithics seem to be associated with the loaf weights. Two small microliths are found at the western edge (in quad 11) and in the extreme southern edge (in quad 13). These locations are at the edges of the hearth that appears in Sub-locus 23.3.

The spreadsheet data have more information on stone tools (n=35). Most of the chipped lithics are associated with the dense bone and ceramic cluster in the northern part of the pit house.

Flake tools are all located in the northern central part (in Trench 129 quads 3, 4, 5, 7, 8, 9, and 18). An exception is a flake in the extreme southeast edge (in quad 24). The majority of flakes are in an area that becomes a hearth in the lower stratum. An end scraper is in this area (in Trench 129D quad 4).

Blades surround what will become the hearth in Sub-locus 23.3. They are close to the edge in the north and west part (in Trenches 129H quad 3, 139P quads 18 and 24, 130A quad 7, and 129D quads 4, 7 and 11). There are two blades located in the southeast part of the pit house in quads 15 and 20.

Unmodified flakes are centrally located and are also present in the southwest corner of the pit house. They do not cluster together. A core (in Trench 120D quad 21) is in the southwest part of the pit house away from any artifact clustering. There are fewer quantities of bones, ceramics and other debris in this area.

g. *Daub*

Like the bone and ceramics, unidentified daub fragments (n=113 digitized; n=249 spreadsheet) are very tiny in this locus. They have a loose distribution (Fig. 64). Spreadsheet data show much daub to be constructional in nature. Constructional and unidentified daub are mixed. The statistical analysis shows that the daub patterns are clustered. It is expected that all the miscellaneous daub will follow this pattern. The daub distribution tapers off towards the eastern part of the locus (in Trench 130A quads 1, 2, 5, 6, 11, 12, 16, 17, 21 and 25).

h. Weights

All digitized weights are located in the northern part of the pit house (Fig. 65). A single bola (n=1) is found in the central northern part (in Trench 149P quad 23). There are numerous loaf weights (n=7). Most digitized loaf weights are located in the northern part of the locus, east of centre (in Trench 149P quads 23, 24 and 24). Four are in quad 24. There are two loaf weights located close to the edge in the northwestern part of this locus. The statistical analysis shows that the loaf weights are somewhat clustered, but the pattern may be due to random chance. This may be because of the small sample size (n=7), giving a more random pattern than expected. Several unidentified weight types are at the northern part of the pit house (in Trench 149P quads 21, 23 and 25).

The spreadsheet data show 342 weights in the entire locus. This includes all types. Most are in the northern part of the locus. A cluster of fish net weights is situated in the northern part of the locus (in Trench 149P quads 19, 23, 24 and 25). Another fish net weight is by itself in Trench 129D quad 11.

Loom weights tend to cluster in the northern part of the locus (in Trench 149P quads 22 and 23, Trench 150M quad 21 and Trench 129D quads 2, 3, 4, 5, 7, and 8). Other single loom weights are located away from this cluster (in Trench 129D quads 14, 18 and 25, and in Trench 130A quad 21).

There are many loaf weights located in this Sub-locus 23.1 (n=74). These follow a similar distribution to the digitized weights. The majority of clusters in the northern part of the locus are in the area that becomes the hearth in lower strata (Sub-locus 23.3 Trench 129P quads 13, 14 and 25, Trench 129D quads 2, 3, 4, 5, 7 and 8, and Trench 130A quads 1, 6 and 7). Loaf weights also occur outside the main northern cluster in other parts of the

pit house (in Trench 129C quad 5, Trench 129D quads 13, 16, 18, 22, 23 and 25, and Trench 129H quad 3).

Unidentified weight types follow the same pattern as the loom and loaf weights but seem more dispersed in a looser pattern. The Locus 23 statistical analysis (Table 5) shows that the unidentified weight pattern is neither clustered nor dispersed. It makes sense that the weights in the highest sub-strata that represent pit house collapse have a more random distribution.

i. Post holes

The post holes that supported Locus 23 are found in the north and northwest part just outside Locus 23 (Fig. 66). They follow a gentle curve along the north and west sides. The post holes are slightly outside Sub-locus 23.1 in Locus 2, but are clearly associated with this pit house. There are preserved post holes at the southern part of the pit house in Sub-locus 23.3. These patterns make a near complete circle of post holes around the pit house that were clearly for support of the superstructure.

K. Sub locus 23.2

The intrusive presence of Locus 8 continues into Sub-locus 23.2. Locus 8 becomes narrower and disappears in the eastern part of Sub-locus 23.2.

1. Features

The top part of an oven is the only feature apparent in Sub-locus 23.2 (Fig. 67). The main body of the oven is in Sub-locus 23.3 (Figs. 80, 90) and reconsidered later.

a. Oven

The top of an oven is in the southwestern part of Sub-locus 23.2 (Fig. 67). In this sub-locus, only the oven wall closest to the pit house edge is visible. The rest of it is in Sub-locus 23.3.

2. Artefacts

No altars or figurines are present in this sub-locus. Artefacts present include, bones, bone tools, ceramics, chipped and grinding stones, daub and different weight types. The distribution of each artefact is analyzed below.

a. Bones

In general, the distribution trend for bone (n=311) to be denser in the middle of the sub-locus. Bone tapers off towards the edges of the pit house (Fig. 68). A great quantity is concentrated in the area of a hearth that appears in Sub-locus 23.3 (in Trench 129D quads 4, 5, 7, and 8) (Fig. 80). The eastern part of the pit house has only a few small pieces in the western most quads of Trench 130A. There are very few bones in the eastern quads. The bone pieces tend to be larger than that in Sub-locus 23.1. There is a concentration of larger bone pieces in the centre part of the northwest corner. This is adjacent to a large hearth in Sub-locus 23.3 (Fig. 80).

The statistical analysis (Table 5) shows that the bone pattern has grown more clustered than in the higher strata. This pattern was expected for the faunal remains verification for Sub-locus 23.3, as bone clearly more clustered closer to the basal living floor.

Bos primigenius (n=3) remains are located only in the southern part of the locus (in Trench 129D quads 14, 19, 20 24 and 25). There are three identified pieces: a long bone, and calcaneus metacarpal that may have articulated. This may be evidence of secondary butchery.

Bos taurus elements (n=27) are located in all parts of the locus except in the easternmost quads. There is a higher density of *Bos taurus* in the middle of the sub-locus (Trench 129D quads 4 and 8). With the exception of a rib, all *Bos taurus* elements found in this sub-locus are limb bones.

There are a few instances of *Capreolus capreolus* (n=6). Similar to the *Bos taurus* remains, all identified elements are from limbs. The *Capra* (goats) remains have a more random, loose distribution.

All *Cervus elaphus* remains (n=6 digitized) are in the central sub-locus (in Trench 129D quads 2, 4, 5, 10 and 14). Elements found include a mandible, cervical vertebrae, a humerus and an ulnar carpal.

A single fish element is in the southern part of the sub-locus, south of the Locus 8 intrusion (in Trench 129D quad 23).

Ovis aries (n=8) remains occur in two clusters. The first consists of three elements in the north central part of the locus close to the edge (in Trench 149P quad 23). The second is a less dense, looser cluster that occurs along the south edge of Locus 8 in

Trench 129D quads 16, 17, 18, 19 and 23. Except for a single vertebra, all the elements represented are from limbs.

There are only two elements of Ovis/Capra. They are located close to the northern edge of Locus 8. A mandible is located in Trench 129D quad 13 and a femur is found in quad 15.

There are two possible clusters of *Sus scrofa* sp. elements (n=5). There are only a few elements in each location. There are two elements situated in the western central part of Sub-locus 23.2 (in Trench 129D quads 6 and 7). They are a maxilla and a tibia from domesticated pigs. The second cluster is located in the south where there are three pieces: a humerus, a vertebrae and an astragalus (from a wild pig). These are present at the dividing line between Trench 129D and Trench 129 H (in the Trench 129D quad 3 region).

Large mammal and medium mammal fragments follow the same general pattern. There is a tendency for bone fragments to cluster in the central part of this locus in the eastern part of the large hearth in Sub-locus 23.3.

b. Bone tools

Bone tool information was obtained from spreadsheet data. Most bone tools (n=10 spreadsheet) are located in the centre and central eastern part of the pit house (Fig. 69). One exception is a scoop situated in the extreme northwest edge of the pit house (in Trench 149P quad 21). Awls are located in the central south half of the pit house (in Trench 129D quads 14 and 24 and Trench 130E quad 1). They do not occur with weights. The tools are more spatially associated with ceramics and bones. A handle is located in Trench 129D quad 5. Given the association of bone tools with ceramics and bones, it would seem that most bone tools are associated with food processing.

The statistical analysis (Table 5) shows a dispersed pattern. This dispersed pattern is in keeping with the theory that the middle strata represents roof and wall collapse.

c. Carbon

Carbon occurs in a very light distribution. There is none in the eastern quads and most of it is located at the southern part of the pit house, south of Locus 8 (Fig. 70). There is some carbon found in the hearth and oven areas.

The statistical analysis (Table 5) also shows that carbon is clustered. This makes sense as it clusters in a hearth area. This is the only locus in which enough carbon is digitized to make a statistical verification possible.

d. Ceramics

Starčevo ceramics are very numerous and dense in this locus (n=226). They are in every quad at various densities (Fig. 71). The statistical analysis shows a clustered pattern. They are at their most dense in the central part of the locus. The densest quads are Trench 129D quads 5, 10 and 15. Density tapers towards the edges of the pit house. The edges are the least dense. The eastern part of the locus has a less dense distribution as well. The fragments range from very small to medium. There are no larger pieces present. Locus 8 is completely void of Starčevo ceramics, as any would be thrown to the surface as it was dug.

e. Chipped lithics

According to digitized information, chipped lithics (n=8) are found mostly in the north central part of the pit house. However, there are some in the very centre and in the southwest close to the wall daub edge (Fig. 72).

Spreadsheet data show more detail (n=28). There are many blades located in this locus (n=6). They are concentrated around the hearth area, associated with the bone and ceramic cluster (in Trenches 129D quads 2, 10, 12, 16 and 150M quad 22) (Fig.72). This indicates that the activity that utilized the blades took place around the hearth. Flakes are located at the northern edge of the hearth and just outside. They occur only at the north side of the hearth. Two flakes are located on either side of the oven. One is found in Trench 129D quad 16: the other is located in quad 18. A core is located in the southeast corner of the pit house (in Trench 150M quad 21). A flake and some unknown lithics are also in this quad.

f. Grinding stones

The digitized data show a single grinding stone situated just south the hearth between it and the entrance (Fig. 72). The spreadsheet data show five grinding stones (one of which is previously mentioned). Two grinding stones are in the northwest corner, behind and between the oven and hearth (in Trench 129D quad 6). More are in Trench

129D quad 4 and 14. These are at the edge of the hearth and the bone and ceramic concentration. Food preparation activities may have taken place around the hearth to take advantage of the light as well as for the proximity to the cooking area.

g. *Daub*

There is unidentified daub present in this locus (n=302). Statistical analysis shows that the pattern is clustered (Table 5). The daub is concentrated in the central part with frequencies dropping off closer to the edges (Fig. 73). There is a tendency for daub to be concentrated close to the hearth that appears in Sub-locus 23.3 in the northern central part of the locus. Daub may be a byproduct of forming and using the hearth. Larger pieces are present towards the northern part of the pit house close to the edge of the locus. This may have been part of a wall protecting the edge of the pit house from the heat of the fire. This is similar to the daub wall for the oven in the same locus (Fig. 67).

There are few fragments of floor daub (n=15) in Sub-locus 23.2. Small fragments are central to the locus (Fig. 74). The statistical analysis (Table 5) shows that, while somewhat clustered, the pattern may be due to random chance. This result may be a product of the small sample size (n=14). Floor daub disintegrates as well. It would form a more dispersed array over time.

More wall daub is present (n=19). There is an extremely large, thick piece of wall daub in the southwest corner (Fig. 75). It curves in a C-shape to roughly follow the pit house edge. This may have been placed here as part of the oven structure to protect the pit house wall from the heat and fire of the Sub-locus 23.3 oven. Smaller wall daub fragments are located in the central northern part of the pit house and may be part of the hearth feature. The centre and eastern parts of the pit house have no wall daub present. The statistical results (Table 5) agree with the visual analysis. Daub is somewhat clustered. Because of pit house collapse and natural disintegration, the wall daub in the middle stratum is fragmented and scattered.

The spreadsheet data show constructional daub (n=520) all over in every quad of Locus 23. As only centre coordinates are given, any within quad patterns are impossible to see. Very few quantities of wall daub are present (n=10). Wall daub is located in Trench 129 D quads 9, 10 and 16, Trench 149P quads 20 and 25 and Trench 130A quad

11. Clustering of wall daub occurs within the large hearth (in Trench 129D quad 9). The wall daub here may relate to its construction. No floor daub is present in this sub-locus.

h. *Weights*

The spreadsheet and digitized data show similar distributions. The majority of weights are located in the northern central part of Sub-locus 23.2 (Fig. 76). The southern part has a less dense scatter of unidentified weight types. No weights are in the eastern quads of the locus, or in the southwest quads where a large oven is located in Sub-locus 23.3. Statistical analysis (Table 5) shows that unidentified weights are neither clustered nor dispersed. This meets expectations. It makes sense that the weights in the highest sub-strata (that represents pit house collapse), have a more random distribution.

A single fish net weight is digitized in the northern central part of the locus (in Trench 149P quad 25) (Fig. 77). The spreadsheet data show five additional net weights. Two are located next to the digitized net weight in Trench 149P quad 24, making a small cluster. There are also net weights situated in Trench 129D quads 4, 6 and 16. The net weight clusters may indicate net storage at the edges of the pit house, on shelves, or hung from the roof. As these locations are all at the edge, the weights were likely on shelves.

Loaf weights (n=25) are scattered in the north central part of the locus (Fig. 78). The spreadsheet data show many (n=75) loaf weights in this sub-locus. The majority are in the northern half of the locus on the north side of Locus 8. Statistical analysis (Table 5) shows that the loaf weight pattern is slightly more clustered in this sub-locus. If this trend continues, Sub-locus 23.3 will exhibit the highest degree of loaf weight clustering.

Only two loom weights appear in the entire sub-locus (Fig. 77). One is located at the central northern part of the pit house edge (in Trench 129D quad 2). The other is central to the pit house (in Trench 129D quad 9).

All the weights occur in roughly the same place. They may have been used for the same purpose or share storage space.

i. *Post holes*

Post holes appear to continue the pattern already seen in Sub-locus 23.1, but also appear along the eastern periphery. Additional post holes appear at the northwest, south, and east sides of the oven in Sub-locus 23.3 (Fig. 67). These are very close to it and appear to start to circle it. They follow the edge of the pit house (Fig. 79). Post holes

occur both inside and outside of the pit house. The interior post holes surround the oven feature and may have been part of its construction.

The oven (see below) is surrounded by post holes on its northwest and southern side (Figs. 80 and 81). These post holes were for internal pit house support (a similar pattern is within Loci 7 and 10). There is a cluster of bone within the circle of post holes.

L. Sub-locus 23.3

1. Features

A very large hearth and an oven are present in Sub-locus 23.3 (Fig. 80). These are described in more detail below.

a. Hearth

There is a large hearth in the north central part of the locus (in Trench 129D quads 3, 4, 5, 8, 9, 10 and 13) (Fig. 80). It is to one side and north of the entranceway. It is large and oval in shape. A great quantity of bone, carbon, weights and ceramics are situated within it. The location of the hearth probably moved slightly over its period of use. If it were a single use, it would have been a very large and potentially dangerous blaze in the pit house unless it was banked. The colour of the burnt bones (dominated by blackened and not whitened bones) supports the banked theory (H. Greenfield, pers. comm.). The daub fragments within it may be structural in nature. The hearth takes up most of the northeastern part of the pit house. It is more likely that the carbon and ash distribution is from several small hearth fires rather than one large blaze. The presence of weights within the hearth area also indicates that its location tended to vary.

b. Oven

A domed oven is situated in the southwest corner of the pit house (in Trench 129D quads 16, 17, 18, 21, 22 and 23) (Figs. 80 and 90). Almost 10 cm of the domed wall was still standing and the floor was intact. The mouth of the oven was clear. Its back was to the southern wall. This oven was particularly sturdy and well built (Fig. 90). This may indicate its use to heated food and ceramics to relatively high and constant temperatures.

The oven was probably a very useful source of heat. It appears that it may have radiated heat towards the entranceway, as there is less daub at the eastern part allowing

heat and light to escape (Fig. 90). There is some small but identifiable bone fragments (Capreolus capreolus), found within the oven (Fig. 81). This implies that it may have been used to cook meat. There are also some larger sized Starčevo ceramics within the oven. A multi-purpose oven such as this would have made it important to several different activities. This oven may have cooked meat and fired ceramics, as both bones and ceramics are found within.

2. *Artefacts*

The living floor of Sub-locus 23.3 has religious artefacts, bones, bone tools, ceramics, chipped and ground stone lithics, daub and different weights. The distributions of these artefacts are detailed below.

a. *Altars*

Altars are found in the hearth, north of the hearth and between the hearth and oven. The fragment north of the hearth (in Trench 149P quad 24), is identified as an altar leg. Two more altar fragments are located in quads 9 and 12. An intact miniature ceramic is situated within the hearth just south of the altar in the hearth (in Trench 129D quad 9). All the altars appear in areas of very high-density remains. Bones, ceramics and loaf weights are especially plentiful. There are no figurines associated with the altars. A labrette is found in Trench 129D quad 4.

b. *Bones*

Many complete bone elements (n=394) were found in this locus. The majority is concentrated in the northern central part where the large hearth is (Fig. 82). There are few in the southern central part. Along the southern edge, there is a less dense array of bone. Towards the western edge there are very few as well.

Statistical analysis (Table 5) shows that there is less than 1% likelihood that this pattern could be the result of random chance. As expected, the pattern shows a strong cluster pattern. Bone is becoming more and more clustered as the sub-strata deepen. The strongest degree of clustering is on the living floor. According to visual data, bone was concentrated in the hearth area.

Bos primigenius (n=3) is represented by a horn core found in the north-eastern part of the sub-locus (in Trench 149P quad 25) and by two cervical vertebrae located in the southern part of the sub-locus east of the oven (in Trench 129D quads 23 and 24).

Bos taurus (n=33) remains are present mostly in the northern part of the sub-locus. A few teeth, ribs and vertebrae are present. The majority of bones found are limb bones. Some elements including teeth, a femur, tibia and rib are within the hearth itself.

A single phalanx represents *Capreolus capreolus* in the southern central part at the edge of Locus 8. A cluster of *Capreolus capreolus* (n=6) remains are found inside the oven and may have been cooked there, but the bones do not show any evidence of burning (Fig. 81). Within the oven, there are three radii, a tooth, a rib and thoracic vertebra (Fig. 81). It is not intrusive from higher levels.

This is the only pit house that has domestic dogs present. The rest of the canid remains are in Locus 2. Four elements are present at the very bottom of the sub-locus. A radius and an ulna are in Trench 129F quad 4 and a vertebra and a maxilla are in quad 13. The ulna has been modified into a tool and is discussed with bone tools. Dogs may have been eaten and their bones used to make tools.

Capra hircus is present at the northern edge of the sub-locus. There are three elements: a scapulae, horn core and mandible.

Cervus elaphus (n=6) remains are found in the central part of the locus close to Locus 8 (in Trench 129D quads 12 and 14). A variety of elements are found in this area including a mandible, vertebrae, innominate, tibia and a radius/ ulna.

Ovis/Capra remains (n=36) are found mostly in the large hearth. Other elements are found close by (in Trench 149P quads 24 and 25). There are limb, cranial and central elements. The variety of elements may indicate that primary butchery of this species took place in the hearth area.

Sus scrofa (n=11) remains are found in the southern part of the locus, south of Locus 8 (in Trench 129D quads 18 and 25). There are also a few fragments located in the northern part (in Trenches 149P quad 25 and 129D quads 5 and 9). Some clustering is apparent as up to three elements are found in the same quad. Wild and domestic individuals are present. Aside from a rib, an atlas and some lumbar vertebrae, all the

elements are from limbs. There is a *Sus scrofa* phalanx within the oven and an ulna and two lumbar vertebrae immediately outside of it (in Trench 129 D quad 18) (Fig. 81).

Unidentified large mammal remains are concentrated in the central part of the locus. Medium mammal elements follow the same distribution pattern.

c. *Bone tools*

Two bone tools are digitized in this locus. The rest of the information is from spreadsheet data (n=17). Their location may indicate work areas placed to take advantage of the light from both the hearth and the entrance. These are mostly located in the northern half of the pit house (Fig. 83), around the hearth. Awls, handles, scoops, scrapers and a rubber are present. The rubber is located in the northern part of the pit house (in Trench 149P quad 24). Most awls appear in a light cluster in the central north half of pit house (in Trench 129D quads 4, 7, 8 and 13). They are located adjacent to and within the hearth area. The awl in quad 13 is made from a dog ulna. Two scoops are found in the hearth area (in quads 5 and 3). A third is located just east of the oven (in quad 19). A scraper is located in the centre of the pit house (in quad 14). Their location indicates that work areas are placed to take advantage of the light from both the hearth and the entrance.

Statistical analysis (Table 5) shows that the faunal tools on the basal living floor exhibit a more dispersed pattern. The dispersed pattern is a result of different tools being used in different places for different activities. If only one activity were present, all the tools would be in one area. This is not the case.

d. *Carbon*

This is one of the only sub-loci, besides Sub-locus 23.2, where there is enough carbon to justify a statistical analysis. It was expected that the carbon would be clustered. However, there is less than 5% likelihood that this pattern is the result of random chance (Table 5). This is contrary to expectations. While the carbon still exhibits clustering, it was thought that it would exhibit a higher degree of clustering. This may be evidence of a built up hearth that was slightly higher than the surrounding basal floor. Carbon is mostly located in the western part of the locus, particularly in the northwest and southwest corners (Fig. 84). The central and eastern parts of Sub-locus 23.3 are almost void of

carbon. The carbon locations are strange as they are not located near fire features (oven and hearth).

e. Ceramics

Starčevo ceramics (n=1527) range from very small fragments to larger fragments (Fig. 85). Statistical analysis (Table 5) shows an overall clustered pattern. Visual observation of the patterns shows that the larger fragments are concentrated in the central part of the pit house, in and around the hearth. The ceramic density tapers towards the edges. Ceramics are found in all quads, but density becomes particularly light in the eastern quads south of Locus 8 (in Trenches 129 D quads 19, 20 24 and 25 and 130A quads 16 and 21). Within the oven, ceramics are clustered around the edges (Fig. 81). This oven may have been used to fire them.

f. Chipped lithics

The digitized data show chipped stone tools (n=4) in the northern part of the pit house (Fig. 86). They are associated with the weights and hearth. They are not found clustered together but are spread out over about 3 m. An unidentified tool is present at the southeast edge of the sub-locus. One more is found just north of the pit house. Spreadsheet data show slightly different arrays because there are more tools in this substratum than are recorded in the digitized data (n=14 spreadsheet). There are two flakes located in the extreme northwest part of the pit house (in Trench 130A quad 1), outside the hearth area. Another flake is found in the central west part of the pit house (in Trench 129D quad 12), within the hearth. There is a flake and a core in Sub-locus 23.3 (Trench 129D quad 25). There is another flake located at the extreme edge in the south. Unknown tools or unmodified flakes are mostly in the north part of the pit house.

A polished ground stone axe is located at the very edge of the locus (in Trench 130A quad 21). This tool is situated near the entrance and was likely stored on the ground close to the wall.

A tool described as a sandstone abradier is present in the east central part of the sub-locus (in Trench 130A quad 11). It is located in an area where there is no artefact clustering and the scatter becomes light.

g. Grinding stone

The digitized data show a single grinding stone located directly to the east of the oven, between it and the entrance (in Trench 129D quad 8) (Fig. 86). Activities at this location may have made use of the light from the oven, hearth, and entrance. This is a convenient food cooking area. The spreadsheet data show two grinding stones in the hearth area (in Trench 129D quads 4 and 10). As there are so few grinding stones, it may be that the preparation of plants for food was a minor activity at this particular pit house.

h. *Daub*

Unidentified daub (n=275) is found in small pieces and range to larger in size. There is a concentration of daub in the eastern part of the pit house, overlapping the eastern part of the hearth (Trench 129D quads 4, 5, 9 and 10). This daub distribution increases towards the edge (in Trench 130A quads 1, 6 and 11) (Fig. 87). This is contrary to other artefact patterns where the eastern quads of pit houses have fewer artefacts. Daub pieces get smaller the closer they are to the edges of the pit house in other pits. This may reflect structural disintegration over time. This may also be related to the large hearth and be part of its structure or function. According to statistical analysis (Table 5), the daub is clustered.

Some wall daub also appears in this area (in Trench 130A quads 1, 6 and 11) (Fig. 87). Wall daub (n=84) is clustered in the northern half of the pit house. Large and small fragments are present. It appears associated within and surrounding the hearth. The daub in the hearth may have been part of its structure. Some wall daub is situated with the large unidentified wall daub concentration (in Trench 129D quads 5, 10 and 15).

Oven daub (n=14) is concentrated in the southwestern part of the pit house (in Trench 129D quads 16, 7, 18, 21, 22 and 23) (Fig. 98). A large oven is here. It is shaped like an irregular circle. The large concentration of wall daub located in Sub-loci 23.2 and 23.3 in the area of the oven is associated with it. There are three small pieces in the rest of the sub-locus. It was expected that the results of the statistical analysis (Table 5) would show clustering because of the large oven preserved in this locus. While somewhat clustered, the pattern may be due to random chance. The result is not what was expected. This could be a result of the small sample size (n=14) and large fragments.

Wall daub surrounds the oven area and was used in its construction (Fig. 89). The distribution of wall daub has a break in it at the eastern part of the oven. This is the

opening to the oven. In the basal levels, wall daub appears mostly around the edges of the pit house. Statistical analysis (Table 5) agrees with the visual analysis. The wall daub is clustered.

i. *Weights*

The digitized data and spreadsheet data show similar weight distributions. There are loaf weights (n=46) and unidentified weight types (n=71) in Sub-locus 23.3. Loaf and unidentified weights are found together. They are located in a loose, wide concentration in the northern central part of the sub-locus within and around the hearth (see Figs 91 and 92). Loaf weights are denser in the northwest quarter of the locus (Trench 129D quads 3, 4, 5, 8, 9, 10, 11 and 13). These are within the hearth itself. The statistical analysis (Table 5) shows that the loaf weight pattern is neither clustered nor dispersed. The loaf weights in this sub-locus did not show the greatest degree of clustering. Those in Sub-locus 23.2 did. This may be because of the smaller sample size. However, these results agree with visual analysis. Loaf weights were highly clustered in the hearth area in Sub-locus 23.2 and 23.3. There was slightly less dense clustering in the living floor.

Statistical analysis results show that miscellaneous weights exhibit a higher degree of spatial clustering are in the living floor strata. This is because the weights here clearly cluster within the hearth area. They are not representative of shelf collapse or pit house collapse.

Loom weights have a wider distribution covering the same location as the loaf weights (in Trench 149P quads 24 and 25, and 129D quads 13, 14 and 15). They may have had the same function, or weaving activities may have shared space with the activities that employed the loaf weights. It seems likely that different activities shared space as awls and blades are located in the same area as loom and loaf weights.

The spreadsheet data show larger numbers (n=312) of different weight types in this locus. Single loom weights are in Trench 130A quads 11, 21 and 22. Two loom weights are also in Trenches 150M quad 16 and 129D quad 5. Three more are found in Trench 129D quad 9. Loom weights appear singly and in clusters of no more than three. Loom weights are situated mostly at the eastern edges of the pit house. There are a few found in the hearth.

Many fish net weights (n=40) are located in the northern central part of the sub-locus. They are in and around the hearth (in Trench 129D quads 2, 3, 4, 5, 7, 9, 10, 11, 13, 14, 15, and Trench 130A quads 2 and 3). Other net weights are located at the pit house corners (in Trench 150M quad 16 and Trench 130A quads 21 and 22). Loaf weights (n=61), are all over in Sub-locus 23.3. There are fewer at the extreme edges of the sub-locus. They are within and surrounding the hearth in the northern quads of Trench 129D.

One bola is present. It is within the hearth (in Trench 129D quad 9). It may be in this location because it fell in from the roof where it once hung.

There are more weights associated with the hearth than there are by the oven or in the southeast corner (which is an entrance). There are very few weights in the extreme west of the pit house. Few weights appear in the northwest, east and southern parts of the sub-locus.

j. *Post holes*

Post holes are associated with the oven. They appear on the west and north sides in Sub-loci 23.2 and 23.3. The post holes around the oven are the only ones evident in Sub-locus 7.3 (Fig. 93).

3. *Interpretation*

The living floor of this pit house is Sub-locus 23.3. There is a large well-structured oven and a large hearth (Fig. 80). There is some continuity between Sub-loci 23.2 and 23.3. Artefacts follow similar spatial distributions, concentrating in the middle and tapering towards the edges particularly in the eastern quads. The majority of artefacts are associated with the large hearth, lying within or around it. Sub-locus 23.1 appears to be later collapse of the pit house. There are few artefacts and they are very small. There is some artefact clustering beginning in Sub-locus 23.1, becoming clearer as the locus deepens. The concentration of ceramics, and bone at the hearth location begins in Sub-locus 23.1 and continues through to Sub-locus 23.3. This is not the case of weights and bone tools. Weights and most bone tools tend to be at the edges in Sub-locus 23.1. If they were stored on shelves, they would fall to the edge as the pit house filled in and collapsed over time.

4. *Activity area discussion*

a. *General Patterns*

Most artefact types are at their densest in the northern half of the locus where the large hearth is. This hearth was central to many activities. Weights, including loaf weights, were likely used for an activity outside the scope of weaving. They are not burned so it is unlikely that they were used for heating sauna-style. Daub and grinding stones are not associated with the hearth. These are in the southwest part of the locus where the oven is located. This locus has two major features. Both had many activities revolving around them. There is evidence for many activities in the immediate vicinity of the hearth. Food preparation activities appear associated with the oven.

Generally, unidentified weights in the different sub-loci occur at their densest in the northern section of the pit house, opposite the oven and at the hearth associated with the bone concentrations. There is little clustering between weight types, though overlap exists. Weights in Sub-loci 23.2 and 23.3 have very similar distributions. Many weight types, including loaf and fishing net weights, are in close association with the hearth. The activity(s) that employed them are clustered around and in the hearth area. It is possible that weights were stored over the hearth or on shelves at the northern wall and fell in the hearth as the pit house collapsed.

b. *Food preparation and consumption*

The large oven and the hearth indicate that cooking must have occurred within this pit house. Vast quantities of meat were consumed as evidenced by the many bones within and around the hearth. While bone is scattered all over the locus it is densest in the hearth area. The hearth was likely used for both cooking and bone disposal. *Capreolus capreolus*, in particular, is concentrated within the oven (Fig. 81). This species may have been preferentially cooked in the oven instead of over the hearth. Another possibility is that bones were tossed in after consumption and the remains here are a result of disposal. However, as bones are found all over, it is very likely that they were disposed of anywhere in particular.

Grinding stones appear close to both the hearth and the oven. This location is likely to take advantage of the cooking potential of both.

c. *Secondary butchering*

There are bone concentrations to the north and east of the hearth, clustering in the centre (Fig. 82). Certain species, such as *Cervus elaphus* and *Sus scrofa*, cluster in different places. Butchery of different species may have taken place wherever there was space in the pit house and not in one select area. There is bone clustered outside the oven and within it (Fig. 90). The central part of the pit house may have been for secondary butchery in preparation for final cooking at the nearby hearth and oven. Mostly limb bones are present, so it is likely that secondary butchery occurred here. There are very few cranial elements or other core bones such as vertebrae. There are awls, a scraper and flakes that would be used in the butchery process. Many blades are found in the northern part of the pit house. They are concentrated around the hearth area, where butchery would take place perhaps immediately before cooking. Flakes are located in the same area. The tools at this part of the pit house may be used for another activity, namely hide processing.

d. *Weaving*

There are so few loom weights that it is unlikely that this area was as a major weaving area. There are not enough loom weights to constitute a weaving area. No spindle whorls are present. Other weight types may be used to weave, but it seems that the weights in this locus were utilized for other purposes

e. *Hide processing*

The northern part of the locus, near where the hearth is located, appears to be a hide processing area. Loaf weights may have been used in hide processing since they also occur in this area. In contrast, there are virtually no loom weights in this area, so weaving activities do not seem likely. There are so many loaf weights that it is likely that they were used as weights to hold down hides while they were being cured here. The large hearth would lend itself well to curing animal skins, even those from large animals. Weights would help stretch hides or hold them down while being worked on. Weights may have fallen into the hearth as hides cure and shrink.

A scraper and blades in this area would aid in this task. The many blades and flakes would aid in butchery or hide processing. Skinning and butchery were both accomplished in this large hearth area.

f. Fishing

Fish net weights were not used in weaving. A single fishing weight is present in Sub-locus 23.2. It is in the northern area, close by to where all the other weights were found. There are more fish net weights in Sub-locus 23.3, and they are heavily clustered in the north part of the pit house. They are found only in this location. They overlap with loom and loaf weights, but are not likely used in the same activity as they are tightly clustered. Nets may have been stored in the roof at this location. Net repair may have also taken place.

g. Lithic production

Cores, the best evidence for lithic production, occur away from the bone and ceramic cluster, grinding stones, the hearth, the oven, or any other clear feature or artefact concentration. There are only two cores in this area. The cores are in the northeast and in the southeast part of the pit house, where there are few other artefacts. It is likely that only basic tool maintenance occurred here, as there is so little debitage and unretouched flakes. There is no large build up of flakes. Despite only lithic maintenance as the primary lithic production activity, it appears that parts of the pit house were set aside for this. As lithic production can be messy, it makes sense that this would be set apart from other activities, particularly food production. No one wants to tread upon sharp stone fragments so these areas would be away from high traffic places. This is why they are set in the corners.

h. Ceramic production

Bone and ceramics are found in the same distribution in the oven area and in the oven itself (Fig. 81). The ceramics may have been eating vessels or storage vessels. This indicates that the oven area was for two very different activities, cooking and ceramic production. A rubber is located within the pit house, but not immediately associated with the oven, is further evidence for ceramic production. A sandstone abraded tool may be for polishing and refine ceramics. Like the rubber, this tool is not associated with the oven. After firing, ceramics may have been polished and finished at another location of the pit house where the tools are located. Remains described as ceramic waste in Sub-locus 23.1, may relate to ceramic production. Old crushed ceramics are often recycled as temper for

new ones. Further evidence for ceramic production, particularly their formation, is found within Locus 7 (see Locus 7 discussion this chapter).

i. *Religion*

All religious paraphernalia is located in the north half of the pit house. It tends to cluster towards the hearth, thus religious activity may have tended to occur closer to the hearth. Figurines and altars are not located together. Figurines and the little clay balls are in Sub-locus 7.1. This indicates that they may have hung from the roof or placed on shelves, as they tend to be nearer to the edges.

Altars are in the lowest substrata. It is been well documented that figurines were sometimes thrown into the fire but that does not seem the case here. There are no figurines within the hearth itself.

In this locus, religious activity is a little ambiguous since no clear pattern emerges. It is odd that the altars and figurines are not clustered together, as in the case of Locus 24. The Locus 8 disturbances may have obscured any clustering or further spatial patterns that would help clarify religious activity for this particular area, but given the fact that other patterns are visible, this is unlikely.

j. *Storage*

Clustering of weight types (particularly net weights) at the edges of the pit house, indicate that roof and wall storage occurred. When not in use, it is likely that many other weight types hung from the roof or were stored on shelves. Roof storage results in the central distribution in the higher substrata of Sub-loci 23.1 and 23.2. In the high substrata, lithics are located closer to edges and walls. Storage may have been on shelves for easy access. Exterior storage occurred outside the pit house in Locus 2 at the southern and southeastern edges where ceramic distribution is dense.

k. *Entrance*

The entrance of this pit house is in the eastern part of the pit house. The area of the entrance has very few artefacts both within Locus 23 and immediately outside the pit house in Locus 2 (Fig. 94). There is a path leading into the pit house from Locus 2 between artefact distributions. There are no postholes on the eastern side. The oven and hearth are opposite the entrance. This provides the users of the pit house with heat and

light from two sources at opposite ends. It is also possible that there is an entrance on the northern side as exhibited but an upward gradual slope. This seems less likely as this entrance would lead directly into the hearth.

5. Conclusions

In Locus 23, as in Locus 7, artefact patterns tend to be more randomly dispersed in the higher strata, but become more clustered as the strata deepens. The greatest amount of clustering is exhibited by specialized material. These include artefacts such as tools (lithic and bone), oven daub and the various weight types. This fits with the visual analysis where tools cluster in activity areas. More common, general artefacts, such as daub and bone, usually show a dispersed pattern.

This pit house had a domestic function. Locus 23 shows evidence of all sorts of activities and some spatial overlap. Hide processing and secondary butchery spatially overlap. This locus was for meat processing along with many other activities took place as evidenced by the numerous weights, different bone and stone tools and grinding stones. Other activities include food preparation, cooking, hide curing and ceramic production. Cooking food and firing ceramics share oven space. Food preparation, lithic production and storage occur separately.

Food processing activities, particularly those involving meat processing and food grinding took place. Many bones, ceramics and weights are located together. It is likely that hide processing, and some degree of butchery, took place in the same location. It is a possibility that these activities did not take place simultaneously. Space is needed for both. In lower strata, lithics are found more towards the outside or edges of the bone concentrations, closer to the walls. This implies that work was done while facing towards the centre of the pit house towards light and heat sources.

The large size and position of the Locus 23 pit dwelling is indicative of its importance to the community. The size of the house, the interior and the inventory meant that it was more important than the other pit houses. Locus 23 is centrally located and is much larger than the pit houses around it. The size of the artefact inventory is relative to the size of the pit house (see Senior 2004 and Zita 2006). The artefact inventory does not have any artefacts that are unique to the locus. There are just a lot of them. The nature of this pit house may indicate that it belonged to a leader or perhaps a larger family.

In a semi-egalitarian society, a leader figure may occupy the larger pit house. As a leader figure, he may be entitled to more space or have a larger family that would need the space. It is unlikely that this house is evidence of social differentiation, where one would expect differences in artefact quality, origin, and source. It is more likely that it is a communally used structure given the above considerations.

M.Locus 10

Locus 10 is located in the west part of Trench 150I and the east part of Trench 149L (Fig. 95). Locus 10 is a small pit house with very thin microstratigraphy. The microstratigraphy is so thin and artefact distribution so light, it has been treated as one strata. There are no figurines, altars or other material related to religious activity in this locus. It appears purely utilitarian in nature.

1. Features

a. Entrance and path

There is a clear path with few artefacts through the centre of the pit house from east to west across Trench 149L quads 15 and Trench 150I quads 11, 12 and 13. This pathway extends from the entranceway in the east. The edge of the pit house is smoother in this location. It is much steeper on the other sides. There may be a second entranceway in the west.

2. Artefacts

There are few artefact types in this locus. Faunal remains and tools, ceramics, chipped stone tools, daub and some weights are present. Each type is detailed below.

a. Bones

Bone (n=70) appears in this locus in the northwest part, the central part and the south central part (Fig. 96). All fragments are large. The cluster in the south (in Trench 150I quad 16) is associated with post holes, ceramics, a chipped lithic and bolas.

There is no digitized bone in the extreme west, the northwest or eastern sections because it was not recorded in this manner during 1992 (the first season of excavation). The majority of the bones were not identified to taxon or element.

The spreadsheet data show more bone (n=299) than the digitized data. Some of the spreadsheet fauna are identified to taxon and element. This is discussed below.

Bos primigenius (n=5) remains are present. A vertebrae and a cranial fragment are present in Trench 149L quad 19. Another cranial fragment and a mandible are located in Trench 150I quads 16 and 17. A scapula is found in quad 6. Quad 19 has a humerus, femur, a tibia, and a rib. A rib spans quads 16 and 17. Ribs, vertebrae, a femur and a tarsal are located in Trench 150I quad 17.

Bos taurus (n=94) remains are densely clustered in some quads. Many elements including, ribs, vertebrae, a carpal and a femur are present in 149L quad 20. A large cluster of *Bos taurus* remains is found in Trench 150I quad 16. Elements including four mandibles, limb bones, cranial fragments and vertebrae are present. Trench 150I quad 16 also has a clustering of cattle remains. Mostly cranial fragments and vertebrae are present here. A single *Bos taurus* element is present in the other quads of Locus 10.

Few *Capra hircus* remains are present. A scapula is found in Trench 149L quad 20. Next to it (in Trench 150I quad 16), an articulated radius and ulna are present.

The only evidence for *Capreolus capreolus* is a metatarsal located in Trench 150I quad 6.

Few *Cervus elaphus* (n=6) bones are present. Most are located in the northern part of the locus. Only one upper limb bones is found- an ulna located in Trench 150I quad 16. Two tarsals are present (in Trench 150I quad 8). A metatarsal is found (in Trench 149L quad 20). The only element not a limb is a cranial fragment (in Trench 150I quad 11).

Ovis aries remains are present in greater numbers (n=15). They cluster in the northern part of Locus 10. All the elements are limb bones. There is some possible clustering in Trench 150I quads 21 and 22 where two humeri, two scapulae, an ulna, and a tarsal are present. The clustering of bones implies butchery at this location.

Ovis/Capra remains have similar distributions to that of *Capreolus capreolus* and *Ovis aries*. Mostly limb bones are present (in Trench 150I quads 2, 11, 12, 16, 17, 21, 22). The elements in quads 16 and 17 are contiguous with the *Bos taurus* concentration in this quad.

Only three pig elements are present. One is a loose tooth from a domestic pig (in Trench 150I quad 21). The other elements are a tarsal (in quad 12) and a radius (in quad 16).

The bone concentration in Trench 149L quad 10 is associated with a possible small hearth. Two *Bos taurus* humeri and an *Ovis aries* scapula with smaller unidentified fragments are present in this location. Three larger unidentified fragments are located west of the hearth (in Trench 150I quad 6).

There is clear clustering of bone in Trench 150I quads 16 and 17 (Fig. 96). Many elements are present but limb bones from various species make up the majority. This clustering is in the same area as a weight and ceramic cluster.

The presence of the four *Bos taurus* mandibles is odd. There is little meat on the face and the residents of Foeni-Salaş did not lack for meat, as evidenced by the wide variety of limb and torso bones. The mandibles may have had another purpose or may indicate that this is a refuse area. However, the pan-site bone distribution is so scattered and messy that it is strange that four mandibles would be so close together in one place. The cluster where the mandibles are is dense and concentrated in the east half of quad 16. The natural shape of the mandible forms a hook and they may have been employed on the posts to that end. The bolas or ceramics could hang from them.

b. *Bone tools*

The majority of bone tools (n=4) are located in the northeast part of the locus (Fig. 97). There are two spatulas found the south central part that are associated with bone, ceramics and post holes (in Trench 150I quad 16). An awl or handle is located just outside the locus and is probably part of shelf or roof collapse.

c. *Carbon*

There is a single carbon piece located in the northwest corner, right at the edge of the locus (in Trench 149L quad 9). It is located next to a single small piece of oven daub near a scatter of ceramics. There may be a small hearth situated in the area, not recognized by excavators.

d. *Ceramics*

The ceramics (n=94) are concentrated in two places (Fig. 98). There is a large, dense concentration in the south half of Locus 10 (in and around Trench 150I quad 16). This cluster consists of large pieces. Bones are associated with these ceramics in the

southern part of the locus (Fig. 99). These may have been storage jars. This cluster is associated with postholes, bone, chipped lithics and bola weights.

Smaller pieces are located in the north half, particularly in the northwest central part (Trench 149L quads 5 and 10). This distribution tapers eastward across the locus.

There are no ceramics in the south central part of this locus. There are very few in the eastern and extreme north.

e. *Chipped lithic*

There are many lithics (n=15) in the south central part of the locus (Fig. 100). One is larger and described as 'decayed granite'. It is the only digitized lithic. It is associated with the large artefact concentration (in Trench 150I quad 16). A blade is found within this same quad. There are many flakes located in the same area and surrounding this cluster. Unknown lithic types and pebbles are situated in the southern cluster (in quads 16 and 17). Another flake is found to the northwest of the cluster in the central part of the locus (in Trench 150I quad 10). This is in the same area as the hearth, some bones and ceramics. A core appears just outside the locus at the northwest side (in Trench 149L quad 9).

f. *Daub*

The unidentified daub scatter (n=10) is very loose (Fig. 101). There are only a few pieces and these are located in the northwest corner of the locus, the central part and just south of centre. The pieces are medium in size.

There is a single fragment of oven daub found in the northwest (Fig. 101). It is located with the ceramic scatter and bone scatter in this location. If there is a hearth present in this area, the oven daub may have been an element of its construction.

The spreadsheet data show the daub to be construction daub (n=40). There is no identified floor or wall daub in this locus. Some is located outside the locus and is probably a result of wall collapse. Construction daub is located around the exterior of the locus (in Trenches 149L quads 9 and 19, and 150I quads 1, 2 and 3). More constructional daub is found in the interior (in Trenches 149L quads 10, 15 and 20, and in 150I quads 11, 12, 13, 15 and 21). The interior construction daub clusters in and around the artefact concentration in Trench 150I quad 16.

g. *Weights*

Two bolas are present in the southern central part of the locus (Fig. 102). They cluster with the bone and ceramic concentration described previously (in Trench 150I quad 10). There are not enough bolas to make a loom. The bolas may not be for weaving activities but for another purpose. For example, they may be hunting bolas. They are associated with bones and ceramics. They may have hung from the nearby posts. The spreadsheet data show more weights (n=24) other than the digitized bolas. Two more bolas are located in the western part of the dwelling close to the edge. Two net weights are present. One is situated in the southern cluster of bone, ceramics and other artefacts. The other is located in the north part of the pit house (in Trench 150I quad 6).

Loaf weights (n=5) are present in the northwest part of the pit house and east of the artefact cluster in the south. Two loaf weights are present (in Trench 150I quad 17). Two are located in Trench 150O quad 1. One loaf weight appears in Trench 149L quad 10.

According to spreadsheet data, spindle whorls (n=10) are all located in the southern part of the pit house in and around the artefact cluster (in Trench 150I quads 16, 17, 21 and 20). There are none in the rest of the dwelling.

A loom weight is located in 150I quad 6. This is the only loom weight in this locus.

h. *Post holes*

The post holes of this locus are oddly located (Fig. 103). There are two post holes located in the south central part of the locus near the bone concentration. Smaller post holes are present in the central eastern part and in the extreme south. The postholes in the south surround a bone and ceramic concentration (Fig. 99). It is likely that the postholes surrounding the artefact concentrations were for pit house support. Artefacts such as the weights may have been hung from the posts. This means support posts could be utilized for storage.

i. *Interpretation*

The substratum of this locus is so thin that it has been treated as one stratum. Most of the artefacts are in the southern half of this locus (in and around quads 16 and 17) (Fig. 99). There is a scattering in the northwest, but it is not as dense or as varied. The eastern

part of this locus is almost devoid of artefacts. The eastern part is the entrance and was kept clean.

The dense cluster located in Trench 150I quad 16, consists of many different artefact types including bone, ceramics, spindle whorls, bolas, and lithics. There is no artefact separation as is present in other loci. It is not likely that this area was for a specific activity as many different artefacts with different functions are together. These artefacts may have been stored together. Some, such as the bolas and weights, may have hung on the surrounding posts.

3. *Activity area discussion*

a. General pattern

Most artefacts are located in the southern part of the locus in and around Trench 150I quad 16. Another much smaller concentration of artefacts is situated in and around the area of a possible hearth (in Trench 149L quad 10).

b. Hearth

The northern half of the locus is ambiguous. There is a much less dense concentration in the northwest corner and it is possible that a small hearth or oven was present. The only evidence for this is the single piece of oven daub and some associated carbon. The small hearth appears to have been used for cooking meat. Bone and carbon are situated in the same area. There is so little debris in this area, that it may be interpreted as a sleeping place.

c. Entrances

An entrance way is on the east side of the locus (in Trench 149I quad 9). There are few artefacts present and there is a gradual slope down to the centre of the pit house. The south and west edges of the pit house are steeper. A path continues through the pit house and runs east west. It runs right to the west edge of the pit house. It is unlikely that there is another entrance at the west edge since the slope is very steep on this side.

d. Storage

The south half of this locus in and around Trench 150I quad 16 was for storage. In this area, bone, bone tools, bola weights, lithic tools and large ceramics fragments are associated together. Unlike the rest of the pit houses, bone is clearly concentrated in one

area instead of spread throughout the locus. There are also no grinding stones. The bone and other non-ceramics are concentrated in the middle of the ceramic scatter (Fig. 104). Post holes surround the bone and ceramic concentration (Fig. 99). It is likely that these posts were support posts for the pit house. Posts could store objects when things hung from them. Some artefacts, such as the bolas, net weights, spindle whorls and ceramics may have hung on the posts. The four mandibles may have acted as hooks. This would account for their presence between the postholes.

4. Conclusion

The absence of major features, such as ovens or hearths, in Locus 10 indicate its utilization more for storage or garbage, than cooking, food preparation or other work. There is some evidence for a small hearth and abundant animal remains but not on the scale of other larger pit house loci (e.g. Loci 7, 23 and 24). It is possible that some cooking and food preparation took place here but other activities took place elsewhere.

The only evidence for possible consumption is the bones in the hearth area (in Trench 149L quad 10). If consumption took place here then the bone distribution would be much more random: as it is in other pit houses. This is the only locus where a clear area, possibly indicating a path, runs through the dwelling.

N. Locus 24

Locus 24 is a long pit house (Fig. 105). It is about 7 by 5 meters. This pit house is disturbed by activities during several later periods. The major complication is by Locus 30, an Early Iron-Age pit (Halstatt), cutting into the centre of the pit house, mixing and disturbing it (see Figs. 8, 104 and 106). A second is an Eneolithic pit (Locus 56), in the southwestern corner. A third is a Medieval pit (Locus 58) in the south central quads (Trench 130D, quads 2-3). In spite of these disturbances, there is enough evidence that is still *in situ* making it worthwhile to discuss this locus. Locus 24 divides into three sub-loci: 24.1, 24.2 and 24.3

O. Sub-locus 24.1

There are no features in this sub-locus.

1. *Artefacts*

Remains in Sub-locus 24.1 include altar fragments, faunal remains and tools, ceramics, chipped lithic tools, grinding stones, daub of various types and different weight types. Each is analyzed below.

a. *Altar*

This is one of the only loci with digitized altar fragments (n=4). They are very small fragments. Two are located in the northeast corner of the sub-locus (in Trench 150P quad 3) (Fig. 107). One is found in the opposite end of the pit house in the southwest corner (in Trench 130D quad 1). Another small fragment is present north and east from the fragment in the southwest (in Trench 150P quad 22). As all altars are located in the higher stratum, it is likely they were placed within the walls on shelves. There may be altars in deeper strata (Sub-loci 24.2 and 24.3) but Locus 30 has destroyed any evidence.

b. *Figurines*

Figurines are located in the same area as the altar fragments but in the lower strata (see Sub-locus 24.3 figurine discussion-this chapter). This implies that altars were put on shelves. Figurines may have fallen off the shelves as the pit house collapsed.

c. *Bones*

Digitized bone (n=279) is concentrated in the northwest and central part of the locus (in Trench 150P quads 2, 3, 7, 8, 9, 13, 14, 18 and 19) (Fig. 108). Spreadsheet data show the same distribution. This distribution is concentrated and tapers very little. There is very little at the west, south and southeastern quads. This is probably because Locus 30 disturbed the remains.

Bos primigenius (n=8) remains are mostly present in the northeast part of Sub-locus 24.1 (in Trench 150P quads 3, 7, 9, 12 and 13). All the elements present are limb bones except for a horn core and a rib. There are greater quantities of *Bos taurus* bones (n= 55) than *Bos primigenius*. The general distribution is in the northeast and central part spanning Trench 150P quads 2, 7, 8, 12, 14, 18 and 19. Elements are both from the central body and limbs. There are teeth, cranial elements, ribs, vertebrae and limb bones present.

There are only two elements of *Capra hircus*. A humerus and a radius are found a metre and a half apart in the northeast central part of the bone concentration (in Trench 150P quads 2 and 8).

Capreolus capreolus (n=14), *Cervus elaphus* (n=18), *Ovis aries* and *Ovis/Capra* (n=31) remains consist of elements similar to those present for *Bos taurus*. The distribution is the same. These species are concentrated in the northeast bone concentration that spans quads 2, 3, 7, 8, 9, 13 and 14.

Sus scrofa (n=6) remains are mostly located together in the eastern part of the locus within the bone concentration. This distribution is different from the *Bos*, *Capra* and *Ovis* as only elements from the core are present except for an innominate. Out of six *Sus scrofa* elements, three of them are mandible pieces. These are located in Trench 150P quad 14 and are likely fragments of one individual. A single rib lies in the western part of the locus (in Trench 150P quad 16).

This is the only locus where *Equus caballus* (n=2) is present. It is thought to be intrusive from the later deposits and possibly contemporary with the Early Iron-Age deposits (Locus 18 and Feature 3) just a metre to the south. An innominate and a phalange are present. The phalanx is located in the centre of the locus on the periphery of the bone distribution in the northwest part of the locus (in Trench 150P quad 21, cut 5). The innominate is found in the southwestern part closer to the edge (in quad 17, cut 4).

Unidentified large mammal elements (mostly long bone) are in the northern part of the bone concentration. Unidentified medium mammal elements are scattered within the bone concentration.

d. Bone tools

Bone tools (n=8) are in a loose scatter in Sub-locus 24.1 (Fig. 109). There are four tools in the central and northwest part of the locus and two in the south. Awls, pierced tools and spatulas are present. Two awls and two spatulas are found in the northeast part of the locus. The awls are in Trench 150P quads 2 and 13. The spatulas are located in Trench 150P quad 9 and 17. Two pierced bone artefacts are present (in Trench 130D quads 1, and 130D quad 3). An unidentified tool and an ornament are in the south end (in Trench 130D quad 3). The ornament is close to the altars and figurines and is probably associated with religious activity.

e. Ceramics

Ceramics (n=452) are present all over the sub-locus, but tend to cluster in the central part of the locus and in the northeast (in Trench 150P quads 2, 3, 5, 6, 12, 14, 16 and 17) (Fig. 110). They are in a dense cluster within an overall concentration. The denser clusters may be broken vessels. They are located in Trench 150P quads 3, 17 and the centre of quads 8, 9, and 13, and in Trench 130D quad 2. Very few ceramics are in the western quads and in the northwest part of the locus. There tends to be very few ceramics around the edges of this locus.

f. Chipped Lithics

According to the digitized data, there are two chipped stone tools present in the northwest (in Trench 150P quad 1 and 2) (Fig. 111). These are both very close to the edge. They lie about a metre away from each other.

The spreadsheet data show more chipped lithic tools (n=7) in this pit house. All the lithics are located in the northwest part of the pit house. The most common type here is flakes (n=5). Flakes are present in Trench 150P quads 2, 7, 13 and 14. These are within the bone and ceramic concentration in the northwest part of the pit house.

g. Grinding Stones

A grinding stone is found at the very edge of the locus in the western part (in Trench 150P quad 25) (Fig. 111). This is the only grinding stone digitized in this sub-locus. Its presence at the edge indicates that it may have been stored on a wall shelf or hung from the roof. When the pit house collapsed, it came to rest at the edge. There are post holes situated very close to the grinding stone.

Spreadsheet data show the same grinding stone just outside the bone and ceramic concentration in the northeast edge of the pit house. The bone and ceramic concentration appears to curve around this grinding stone towards the centre of the pit house. There are two more grinding stone. One is in Trench 150P quad 8. The other is in Trench 150P quad 21.

h. Daub

A single large piece of floor daub (n=1) is in the central part of the southern half of the locus (in quad 22). The floor daub is found in the middle of the altar fragments and

figurine scatter in the southwest. It may have been part of the altar or related to religious activity. The location of the floor daub is in contrast to numerous small fragments of unidentified daub type (n=111) that are concentrated in the northern in the north-eastern parts of the sub-locus (in Trench 150P quads 1, 2, 3, 6, 7, 8, 9, 12 and 13) (Fig. 112). The pattern appears to curve around the edge leaving the middle and southern part of the locus void of daub. The identified daub at the edge is likely structural support. The daub at the edge may be related to wall or shelf construction.

Oven daub (ceramic bag 2165, 2173 and 3022) is found in Trench 150P quads 2, 13 and 14. This first scatter of daub forms a cluster with oven daub found in Sub-locus 24.2. This is found in the central and eastern parts of the northern part of the pit house.

Spreadsheet data show constructional daub (n=85) in most parts of the locus. It appears mostly clustered in the north half and around the edges in the south. All the quads have constructional daub except for two adjacent quads in Trench 150P quads 19 and 23. This may be collapsed wall support.

i. *Weights*

The spreadsheet data and digitized data show similar distributions of bola weights. Five bola weights (n=6) cluster together in a central part of the locus (in Trench 150P quad 13) (Fig. 113). These were likely stored in a cluster hung from the roof or the posts. There is a sixth bola close to the edge (in Trench 150P quad 20). This one may have been on shelf.

Many loaf weights (n=42) are concentrated in the northwest and western central parts of the locus (in Trench 150P quads 2, 7, 8, 13 and 18) (Fig. 114). It is densest in quad 18. There is a single loaf in the southwest edge (in Trench 150P quad 21).

Loom weights (n=4) are present in the centre and the northwest part of this locus. There are three present in the centre and one at the western edge (Fig. 114). Spreadsheet data show the same distribution but in greater quantities (n=14). Loom weights are clustered in five quads in the northeast part of the locus (in quads 8, 9, 12, 13, 14 and 18). Loom weights overlap a little with the other weight types except for the spindle whorl weights.

A single spindle whorl (n=3) is found on the opposite side from the loom weight cluster in the southwest (in Trench 150P quad 22). The spindle whorl is not associated

with loom weights. Two spindle whorls are located in the southwestern corner (in Trench 130D quad 1).

Spreadsheet data show loaf weights (n=52) clustered in the north part of the locus across 150P quads 1, 2, 7, 8, 9, 11, 12, 13, 14 and 19. Single weights are found in the southwest and northwest corners (in Trenches 150P quads 21 and 24, and 130D quad 3).

Many fish net weights are present. They cluster in three areas. The largest cluster is found in the centre of the locus. The distribution goes right to the edges in the middle of the locus. Other distributions are smaller. One is in the extreme north of the pit house. The other is in the southwest but not at the edges.

An unidentified weight is present at the northwest part of the locus close to the edge. Other unidentified weights are found throughout the locus.

Each of these weight types is found in different locations within the pit house. This indicates different functions for each of these weights. Different types were used for hunting, weaving and perhaps hide processing.

j. *Post holes*

Post holes apparent in this locus are only on the western side (Fig. 115). They are located along the western edge.

P. Sub-locus 24.2

Locus 57 (Eneolithic), cuts into the southwestern part of Locus 24. Sub-locus 30 cuts into the centre. The scant artefacts in Sub-locus 24.2 are due to the intrusive presence of Locus 30 that disturbed the majority of the locus and Locus 57. All the artefacts are in the southwest corner (in Trench 130D quads 1, 2, 3, 6 and 7). These were the only ones not disturbed by Locus 30 or 57.

1. *Features*

It was originally thought that there are no features in Sub-locus 24.2 because Locus 30 destroyed any earlier features. During analysis, it became apparent that a feature was preserved in this sub-locus. However, it had been so disturbed that it took a the digital and spatial analysis to recognize it.

a. *Oven*

During daub analysis of the sub-loci, it became apparent that oven and kiln daub are present in large quantities in this locus. More fragments in Sub-locus 24.2 joined a few fragments of oven daub in Sub-locus 24.1. These fragments form a cluster in the northern central part Sub-locus 24.2 and represent the remains of a destroyed oven feature. However, its remains are still clustered in the general area where it was once situated.

2. *Artefacts*

Bones, ceramics, grinding stones and different daub types are present in this locus. Each is discussed below.

a. Bones

All of the digitized bone (n=25) is located in the southwest corner (in Trench 130D quads 1, 2, 3, 6 and 7). The bone from this locus is not identified to taxon or element except for one mandible in the southwest corner (Fig. 116). All the bone is located away from the edge. The spreadsheet data show bone in the other part of the pit house, Locus 30 has disturbed it extensively.

Bos primigenius (n=8) is present in Trench 150P quads 2 (cervical vertebrae and ulna), 8 (an axis), 12 (a cranial fragment), 13 (another axis), 14 (another axis) and 22 (radius and metacarpal).

Bos taurus (n=65) remains show some still intact clustering. Many elements from the cranial area and central body area are present. There are also limb bones present. A small but varied bone cluster with many different species is present in Trench 150P quad 2. The cattle bones here include a patella, cranial fragments and a metacarpal. A bone cluster spanning Trench 150P quads 13, 14, 17, 18 and 19 includes several phalanges, cranial fragments, femurs, mandibles, loose teeth, innominates, scapulae, carpals and metacarpals. Other species (see below) are found here also. This bone concentration tapers into quads 2, 22, 23 and 24. The frequency of *Bos taurus* remains tapers eastward. A single scapula is present in Trench 150P quad 2. A phalange is located in quad 22. A loose tooth and vertebrae are located in Trench 140P quad 24.

There is a small cluster of *Capra hircus* remains present in Trench 150P quad 13. A radius, scapula, phalange and an innominate are present in this cluster. Another phalange is located by these elements in quad 14. There are few other elements (n=10).

The *Capreolus capreolus* distribution is mostly limb bones. There are four metatarsals (in Trench 150P quads 9, 14 and 17). Three humeri are present in quad 8 with a loose tooth.

Cervus elaphus (n=20) remains appear in Trench 150P quads 8 and 14. Similar to the caprine bones, mostly limb bones are present. This distribution is located in quads 8, 13 and 14. Most of the bones are located in quads 8 and 13.

There are many *Ovis aries* remains in this Sub-locus 24.2 (n=24). The majority of the remains are limb bones except for a mandible and vertebrae in Trench 150P quad 13. Another mandible is present in quad 3. Vertebrae are found with the limb bone clusters. Limb bones are in located in Trench 150P quads 8, 13, 14 and 24. A scapula, a humerus, an ulna, metacarpals, and tarsals are found.

The *Ovis/Capra* distribution has all sorts of elements. Mandibles are present in Trench 150P quads 13 and 19. Vertebrae, ribs, teeth, a scapulae, and hind limb bones are also present. A cluster consisting of an innominate, two metatarsals, vertebrae, a rib, another mandible, cranial fragments and teeth is located in Trench 150P quad 9. A concentration in quad 13 consists of cranial remains, loose teeth, a metatarsal, a femur, a tibia, and a radius. A smaller concentration is in quad 14. This consists of two ribs, a metatarsal, loose teeth and cranial fragments. A femur is by itself (in Trench 150P quad 2).

Fish remains are located in Trench 150P quads 17 and 21.

There are few *Sus scrofa domesticus* in this locus. Domestic pig is found in Trench 150P quads 9 (loose tooth), 12 (cranial fragment), and 19 (radius). Its wild counterpart has only two elements present. A mandible with teeth is located in quad 14. A femur is present in quad 12.

b. Ceramic

There are small fragments of Starčevo ceramics (n=8) in the south part of the sub-locus (Fig. 117). They are located in two clusters. A cluster of three small fragments lies close to the edge (in Trench 130D quad 7). A cluster of five is present in the southern central part slightly removed from the edge (in Trench 130D quad 3).

c. Chipped lithics

The chipped lithics (n=5) in Sub-locus 24.2 are widely scattered. A core for making blades is in the southeast part of the pit house (in Trench 150P quad 19). Stone temper is located central to the locus (in Trench 150P quad 12). It is likely that the temper relates to ceramic production. It is found in the same area in which kiln daub was found. A flake is found close by (in Trench 150P quad 7).

A blade is located in the southwest corner (in Trench 150P quad 21). It is in the same area that has a grinding stone and is likely related to food preparation.

d. Grinding stone

The spreadsheet and digitized data have a grinding stone in this sub-locus. It is located beside the blade (in Trench 130D quad 2). It is very large and saddle shaped. It is likely intrusive from Locus 30. It appears to be Medieval in origin.

e. Daub

Unidentified small daub fragments (n=11) are located in the southwest part of the sub-locus (in Trench 130D quads 1, 2, and 3) (Fig. 118). They are situated away from the edge. The spreadsheet data show daub to be constructional in nature (n=396).

The daub is scattered all over the locus except in some quads at the edge. The daub is centrally distributed. There is no daub in Trench 150P quads 1, 2, 3, and 8. There is also no daub in Trench 130D quads 1, 2 and 4.

An interesting feature was found when the daub from the spreadsheet was analyzed. This is the presence of a possible kiln or oven. Daub described as kiln or oven daub is concentrated in Trench 150P quads 7, 12, 13, 14, and 17 (Fig. 119). There may have been an oven or kiln in this area before Locus 30 was dug. Locus 30 destroyed any solid evidence of any feature here, but some fragments are present. The kiln daub distribution overlaps the Locus 30 intrusion in 150P quads 12, possibly 13 (as only centroid coordinates are given, the daub may have been in Locus 24) and 17. The spreadsheet data shows this daub to be Early Neolithic in origin. As most of the daub is in quads 13 and 14, in Locus 24, it does not seem probable that the oven originated in Locus 30.

f. Weights

The only information about weights in Sub-locus 24.2 comes from spreadsheet data (n=47). None were recorded on maps. Similar to the daub, their original depositional position probably changed because of intrusive deposits.

Eleven net weights are present. There are five located in Trench 150P quads 12 and 13. This is in the centre of the locus. Their presence here may be from being stored or hung from the roof. Two more are located in quads 9 and 14. These are at the edge and the weights here may have been stored on shelves. Another weight is by itself in quad 23.

Loaf weights (n=16) cluster in Trench 150P quads 14, 12 and 13. These are with some fish net weights. These all may have hung from the roof or been stored on shelves.

Loom weights (n=7) have a very similar distribution. Two are present in quads 13 and 22. Single loom weights are located in quads 12, 14 and 18.

A spindle whorl is found in Trench 150P quad 22 (ceramic bag 2617). This is immediately south of a large central post hole. It may have hung from this post.

Unidentified weight (n=11) clusters are present (in Trench 150P quads 7 and 13). Single unidentified weights are located in quads 17 and 19. The majority is located towards the centre of the sub-locus. This indicates that they hung from the roof or were used in this area.

g. Post holes

There is a very large post hole situated in the western central part of the sub-locus in Trench 150P quad 13 (Fig. 120). It may have been a support post. Another smaller post hole is located in the northwest outside the interior of the sub-locus (in Trench 150O quad 5). One more post hole is in the central east part of the sub-locus right at the edge (in Trench 150P quad 25). There are no other artefacts preserved in this sub-locus.

Q. Locus 24.3

The extensive disturbance from Locus 30 continues into the bottom of the Locus 24 pit house. The southwest part of the sub-locus is the only location where artefacts are not disturbed (Fig. 104). These are discussed next.

1. Artefacts

Figurines, bones, ceramics, stone tools, daub and weights appear in this locus. Each is analyzed below.

a. Figurines and altars

This is one of the few loci where several figurines and altars (n=3) are present. Three are present in the southwest corner (Fig. 121), in a cluster spanning Trench 130D quads 1 and 2. A zoomorphic idol is located in quad 2. An altar leg is in quad 1. The figurines are loosely clustered together away from the edge.

b. Bones

There are few faunal remains (n=12) and they are highly fragmented. They are not identified to taxon or element. Bone is present in a loose scatter away from the edges (in Trench 150P quad 21 and Trench 130D quads 1, 2, 3 and 7) (Fig. 122).

The spreadsheet data show bones to be located in the same places as all the other artefacts. All animals present are in much fewer quantities. This is because Locus 30 destroyed much of the rest of the locus.

Bos primigenius (n=3) remains are present (in Trench 130D quads 1 and 3). Two metacarpals and a phalanx are present. This may have been articulated.

Bos taurus (n=4) is present (in Trench 130D quads 1, 2 and 3). An innominate (ischium) and a thoracic vertebra are found in quad 1. Another thoracic vertebra is located in quad 2. A humerus is situated in quad 3.

Only a single *Cervus elaphus* cranial fragment is present (in Trench 130D quad 1).

An *Ovis/Capra* metatarsal and a calcaneus are present (in Trench 130D quad 1).

A few fish bones (n=4) are present. Three elements are in Trench 130D quad 1 and the other is in quad 3.

Large, medium and unidentified mammal fragments are found throughout Trench 130D quads 1, 2 and 3. Most of the fragments are in quad 1 and taper towards the east to quad 3.

c. Ceramics

Some Halstatt ceramics are present in the south central part of the sub-locus (n=26). These are intrusive from Locus 30. Starčevo ceramics (n=44) are not found in the extreme southwest part of the sub-locus but are located around it, away from the edge in the southern half (Trenches 150P quads 21, 22 and 23 and in 130D quads 1, 2 and 2) (Fig.

123). The fragments are small. The fragments partially surround a single large piece of floor daub.

d. Chipped lithics

The spreadsheet data and digitized data show the same lithic distribution (n=1). Both data types show one lithic situated in the northern part of Trench 130D quad 2. The spreadsheet data describes it as a flake with a possible function as a perforator or scraper. This is located in the southwest corner of Locus 24.3 with all other material.

e. Daub

A single large piece of floor daub is digitized (in Trench 130D quad 1). Unidentified daub (n=14) surrounds it and is located away from the edge (Fig. 124). The spreadsheet data identified some of this daub as construction daub (n=3). The construction daub is present in at the edge of the locus (in Trench 130 D quads 1 and 7). The construction daub was likely part of the wall.

f. Weights

The weight information from Sub-locus 24.3 was obtained from spreadsheets (n=7). Two fishing weights are located in the southern part of the sub-locus (in Trench 130D quad 3) with the rest of the artefact clusters. Two loaf weights are present in the same location. Two spindle whorls are found in the extreme southwest corner (in Trench 130D quad 1). An unknown weight type is situated in Trench 130D quad 2.

g. Post holes

Two small post holes are recognized in this sub-locus. They are located in the southwest corner with all other artefacts recognized as part of Sub-locus 24.3. All the other artefacts surround the post holes (Fig. 125).

2. Interpretation

The heavily intrusive influence of Loci 30, 56 and 58 has made interpretation of this locus difficult. The southwest part of Locus 24 is the least disturbed. Only the southwest parts of Sub-loci 24.2 and 24.3 are undisturbed by Locus 30. Most evidence of features such as hearths and ovens is destroyed, leaving only fragments.

During the spatial analysis of daub, an oven feature was undiscovered during excavations and map analysis. The discovery of this ovens means that every major pit house at Foeni-Salaş had both an oven and a hearth.

Sub-locus 24.1 appears to be roof fill and infill. Sub-loci 24.1 and 24.2 have similar artefact distributions. The southwest distributions of Sub-loci 24.2 and 24.3 are continuous.

There is baked clay and burned soil situated in the southeast corner. There may have been a hearth here but it was obliterated by Locus 30. Baked clay and burned soil are also located in the northeast corner of the pit house. This is in the same vicinity where oven and wall daub fragments are found. An oven feature may have been in the area, but was destroyed when Locus 30 was dug (Fig. 119). Bones, weights and Early Neolithic ceramics are concentrated in this area. This lends weight to the argument that some type of feature was once in this location. From other pit house analyses, it is evident that activities tend to occur around features such as hearths and ovens. It is likely that the same pattern occurred here.

3. Activity Areas discussion

Locus 30 intruded and disturbed Locus 24, making interpretation difficult. Locus 24 is too disturbed to find activities beyond that of plant and animal food processing, storage and weaving. The presence of the oven and hearth and its similar size to the other pit houses indicates that similar domestic activities probably occurred.

a. Food preparation

Bone tools are found with the bones in the northeast part of the locus. This may have been a food processing area as evidenced by the bone, the awls and the spatula. The presence of oven fragments in this area lends weight to this possibility. A grinding stone is located at the opposite side of the pit house. A destroyed hearth is in this area. This indicates that butchery and grain food preparation activities were not in the same area. The pit house may have been dividing into meat processing in the northwest and grain processing in the southwest.

b. Hide processing

If butchery took place, it is possible that hide processing occurred in the same place or nearby. The northeast cluster of artefacts may be a hide-processing place. Most of the bone, ceramics and loaf weights are located in the northeast part of the locus. Bone is located with the loaf weights and the bola weight cluster. Loaf weights do not appear to have been part of food preparation activities and may have been to cure hides. The loaf weights are well away from the grinding stones and the bare area in the southeast.

There are a great number of loaf weights in Sub-locus 24.1. Most of the loaf weights occur in the north central and northeast part of the locus. They overlap with the loom weights but are not clearly associated with them. Loom weights are clustered only in a few quads in the northwest part of the locus. This implies different functions. The bolas would be used in hunting and the weights used to stretch the hides.

c. *Weaving*

Loom weights are located central and slightly to the northwest of the pit house. They do not appear associated with the loaf weights though there is some overlap. The loom weight location is in a place that takes advantage of the light coming in from the door. The large posthole situated in the central west part of the locus is even placed slightly west and south of centre. This placement may be so as not to block incoming sunlight.

The presence of many loom weights clustered together makes a strong argument for a weaving area. This is in contrast to Loci 23 and 10 where there are very few. They are not found with spindle whorls.

There are only three spindle whorls in the entire locus and none are associated with the loom weights that cluster in the northwest. The disassociation of loom weights and spindle whorls implies they were for different purposes even though they are found in the same cut. It is more likely that Locus 30 destroyed any evidence of spindle whorl and loom weight association in the northwest part of the locus.

d. *Fishing*

There are many fish net weights in this locus. They are clustered in the north half of the locus in a distribution that spans the width of the pit house. They are found with the dense ceramic, weight and bone cluster and outside of it. They occur in the high stratum of Locus 24. They may have hung from the roof and have fallen to the centre. There are a

couple of net weights in Sub-locus 24.3 indicating that fishing nets were repaired or stored at this location. They are at the edge and were likely stored on shelves.

e. *Ritual*

The Locus 24 pit house probably had an additional religious purpose. This is one of the few loci with altars. As altars are only in Sub-locus 24.1, it is likely that they were placed up on shelves. They may have fallen near the edges as the pit house collapsed. It is unclear whether the altars were used for light or for religion.

This is also one of the few loci with figurines. This locus has the most figurines. The altar fragments in the southwest are immediately associated with figurines. It is likely that the two are related. It is possible that there was a special place for figurines as evidenced by the nearby altars, daub, floor daub, and surrounding postholes. Figurines are located central to the pit house as well as near the bolas. They may have hung from the ceiling. Pierced bone including a tool and an ornament are found in the southwest quads as well. This pit house was not exclusive for cult purposes, as other utilitarian artefact types are present.

f. *Storage*

Three different types of storage are present in Locus 24. There is roof, shelf and exterior storage. The evidence for each is discussed below.

Most weights share the same distribution. The weight and ceramic distribution in the northeast and central area may be representative of the artefacts being hung from roof and falling into the pit house. The cluster of bola weights in the centre may have once been stored in the roof. As the roof collapsed, the bolas came to rest in the centre.

Weights, ceramics and some tools also appear near the pit house edge. Their presence here indicates storage on shelves. When walls and shelves collapse, artefacts come to rest at the edge of the pit house. They may roll towards the centre to overlap with roof storage collapse.

Storage areas appear outside this pit dwelling at the south and east side in Locus 2. An entranceway path is between the storage areas (Fig. 25).

g. *Entrance*

The bare area in the east is likely an entranceway being kept clear of artefacts (Fig. 126). Activity areas opposite this entrance way would make the best use of light from the east and south. A path goes into the pit house between the exterior storage areas.

4. Conclusion

Domestic activities took place in Locus 24. Spatial analysis of the spreadsheet data found a possible oven or hearth feature in the northwest area of the pit house. This feature was unrecognized in the field. This feature has many activities associated in and around it. As it is not intact, determining precise, activity locations in relation to this feature was not possible. It was possible to identify which activities were present based on artefacts. Locus 24 exhibits separate areas for food preparation, secondary butchering, weaving, storage of ceramics, net weights and strong evidence of specific areas for cult activity and hide processing.

Weaving likely took place in this pit house. Many spindle whorls and loom weights are present. However, Locus 30 obscures precise spatial data. From the sheer quantity, it is likely that weaving took place. The many net weights imply that net repair or storage occurred in this locus.

Food preparation likely took place near a destroyed hearth in the southwest part of the locus. This would follow the patterns seen in other pit houses.

It is possible that ceramic production took place here. Near the area of the destroyed oven there is the presence of stone temper for making vessels. If the oven were intact, it would have been possible to discern its nature and whether it was for baking or for ceramic production.

This pit house is interesting because of the association of altars and figurines in the same location. Altars were likely placed in walls on shelves, or in corners and figurines placed on or near them. It is unfortunate that much of it was destroyed.

R. Locus 25

Locus 25 is a small Starčevo-Criş storage pit (see Figs. 12 and 130). Starčevo ceramic storage ceramics were found in a small depression on the border of Trenches 130A quad 5 that touches 130B quad 1. No features are found within this pit.

1. *Artefacts*

Artefacts found within this pit include bones, ceramics, daub and a weight. Each artefact type is analyzed below.

a. *Bones*

A single Ovis/Aries mandible is within the pit (Fig. 127). It is located at the edge (in Trench 130A quad 10). It may have been deposited here when the pit was in use or during its infill.

The spreadsheet data show many unknown species (n=12) in the immediate area of Locus 25. It is possible that all the bones in and around the pit are intrusive from Locus 2. A vertebra from a large mammal is present. The rest of the bone assemblage is so highly fragmented that it cannot be discerned what size mammal it comes from. The fragmented bone is likely spill from Locus 2 that surrounds the storage pit.

b. *Ceramics*

They are many Starčevo ceramic fragments (n=45) found within this storage pit (Fig. 127). Most are located at the bottom of the pit. They are located in Trenches 130A quad 5 and 130B quad 1. Jars were likely stored here.

c. *Daub*

A single large piece of unidentified daub is located towards the bottom edge of the pit (in Trench 130B quad 1) (Fig. 127). It is probably collapse from the pit edges. The spreadsheet data show this to be a piece of floor daub. Spreadsheets show more daub (n=3) located in Trench 130A quad 5. Daub may have reinforced the walls.

d. *Weights*

The spreadsheet data show a single loaf weight in the pit (in Trench 130A quad 5). There are no other artefacts in this storage pit.

2. *Conclusion*

It is likely that this storage pit was reinforced with a small amount of daub to keep it from collapsing. There are ceramics and a loaf weight in the bottom. There are no associated other weight types, tools or small artefacts. There is only the single mandible and fragments that are likely infill. The ceramics present may be to store perishable items

such as deboned meat or plant foods and grains. It is also possible that the pit was storage for ceramics themselves without any interior contents.

S. Locus 41

Locus 41 is mostly located in Trench 129E, but the edges extend a little into the unexcavated parts of Trench 129F to the east and Trench 129I to the south. Halstatt (Locus 44) and Medieval (Loci 8 and 46) pits extensively disturb this area (Fig. 13). Postholes and a central fire pit were noted during excavations. This is the only one of the Early Neolithic Starčevo-Criş pit houses not filled completely with debris. It has no substrata. The southern part of this locus was unexcavated. The eastern most part of this locus was also unexcavated. Locus 41 is only clearly present in cuts four and five, although a deeper sounding was made in the eastern half (until cut 6).

1. Artefacts

Locus 41 contains bone and bone tools, ceramics, stone tools, a grinding stone, various types of daub and different weights. Each artefact type is discussed below.

a. Bones

Bone (n=82 digitized, n=105 digitized) in this locus is concentrated in the eastern and southern part of the excavations (in Trench 129E quads 15, and 25, Trench 129F quads 11, 16 and 21, and Trench 129I quad 5). The spreadsheet and digitized data show the same distributions. Larger fragments are in these areas (Fig. 128). Larger pieces tend to be situated towards the peripheries of the concentration. This is noticed in the eastern central part of the locus. Fragments range from very small to large elements. The very centre of the locus (in Trench 129E quad 20) is void of bone. There is a light scatter of smaller fragments located in the northern and western parts of the locus (in Trench 129E quads 13, 14, 18, 19, 23 and 24). The northern edge only has two pieces within a metre of the edge.

There is a single *Bos primigenius* calcaneus present in the central south part of the locus. It is associated with a *Bos taurus* metatarsal (in Trench 129I quad 5).

There are only three digitized *Bos taurus* elements. A metatarsal, a femur and a large unidentified fragment are present. The metatarsal and femur lie at opposite ends of

the pit house. The humerus is located in the north (in Trench 129E quad 15) and the metatarsal is situated in the south (in Trench 129I quad 5).

Caperolus capreolus (n=3) limb elements are found together, clustered in the south central part of the locus (in Trenches 129E quad 25 and 129I quad 5). A humerus, femur and an unidentified flat bone are present.

Cervus elaphus elements, (n=2) a mandible and a femur are also found together in the west central part of the locus (in Trench 129E quad 19).

The spreadsheet data show an *Ovis aries* (n=1) tibia (in Trench 129F quad 21). It is located at the very bottom of the locus.

A single *Ovis/Capra* astragalus is present in the southwest central part of the locus (in Trench 129E quad 24). An ulna and a metatarsal are located directly to the north about 1.5 m away (in quad 19). A femur and a radius are situated in Trench 129E quad 20.

Two *Sus scrofa domesticus* femurs are located close together. They may be fragments of the same element or from two different individuals. These are both found in the north central part of the locus (in Trench 129E quad 15). A scapula from a wild pig is found in Trench 129F quad 16.

There are few large mammal elements in this locus. One unidentified large mammalian long bone is located just outside the locus to the east. An unidentified medium mammal long bone is located right at the edge of the northern part of the locus. Unidentified bones are located mostly in the central part of the locus. The distribution becomes much less dense and disappears closer towards the edges, especially in the northern part. Fragments range in size from small to larger pieces.

b. *Bone tools*

There are three bone tools in this locus (n=3). All are located at the edges (Fig. 129). An awl, a scoop and an unidentified type are present. The scoop is located in Trench 129I quad 5. The awl is situated in Trench 129F quad 16, and an unidentified tool present in Trench 129E quad 23. These may have been stored on shelves and fell in as the pit house collapsed. If work was done while seated at the edge of the pit house, tools may have been left at this location.

c. *Ceramics*

The majority of Starčevo ceramics (n=316) are concentrated towards the middle of the locus (in Trenches 129E quads 18, 19, 20, 23, 24 and 25, and 129F quads 16 and 21) (Fig. 130). The northern edge of the locus has little to no ceramics. In the northern part of the locus, the ceramic distribution occurs starting a half to one metre from the edge.

There are a large number of Halstatt ceramics (n=227) found within this locus. These are probably a result of mixture from the Medieval ditch (Locus 8), the Halstatt pit (Locus 46), and from the Halstatt pit house (Locus 44) that cuts into Locus 41 from the north.

d. *Chipped lithics*

The chipped lithics (n=6) in Locus 41 are scattered in the central and eastern part of the locus (Fig. 129). There are three lithics present at the edge of excavations. The pattern is the same as faunal tools but the locations are different. An unidentified lithic is located in Trench 129D quad 11 and a flake and a blade are situated just outside the pit house edge within .25 metres (in Trench 129I quad 3). There is a small blade situated in the northern central part of the locus (in Trench 129E quad 20). There is a retouched flake located at the central southern part of the excavation within a ring of postholes (in Trench 129E quad 25). A grinding stone is also located in this location.

e. *Grinding stone*

Spreadsheet data show a single grinding stone (in Trench 129E quad 25). This is present within a circle of postholes (Fig. 132).

f. *Daub*

Floor (n=4) and wall daub (n=9) concentrations are very similar (Fig. 133). All fragments of all daub types are very small. Wall and floor daub is absent from the northwest, north, northeast and central part of the locus. The wall and floor daub located in the southern part of the locus, is in a continuous even scatter from west to east (in Trench 129E quads 19, 20 23, 24 and 25). A bit more wall daub is located in the east (in Trench 129F quads 11 and 21).

Unidentified daub (n=210) is also present in this area (Fig. 134). More unidentified daub is located in the central eastern part of the locus (in Trenches 129E

quads 15, 20 and 25 and 129I quads 11, 16 and 21). There is little in the north edge part of the locus and in the south and at the western edges.

The spreadsheet data show the unidentified daub (n=27) to be construction daub. It is likely from wall and roof collapse.

g. *Weights*

There are few weights in this locus (n=4). None were recorded on maps. All the information on weights comes from spreadsheet data.

A single fish weight is located in the southwest part of the locus (in Trench 129E quad 23). This is at the edge.

Two loaf weights are present. One is situated in the northwest part of the locus in the same quad as the fish net weight (quad 23). The other loaf weight is present in the south centre of the locus within a posthole circle (in Trench 129E quad 25). An unidentified weight type is found in Trench 129I quad 4. There are no other weights in this locus.

h. *Post holes*

The post holes in this locus are well within the perimeter. Post holes form a rough oval shape in the southern half of the locus (Fig. 132). The shape covers an area of about 2.5 m. The northern part of this post hole formation is devoid of artefacts, while the southern part is where the wall and floor daub is located (Fig. 135). Intrusive post holes are associated with Locus 44.

2. *Interpretation*

The absence of a full locus excavation and the three intrusions make activity area interpretation complicated. Despite this, it is possible to identify some activity areas.

3. *Activity Areas*

This is a pit house that has a near random artefact array. Despite the lack of complete spatial data in this locus, some vague patterns become apparent.

a. *General patterns*

The northern and western parts of Locus 41 are almost completely void of artefacts. It is difficult to ascertain what artefacts are present in the extreme eastern and southern parts of the locus as they were unexcavated. Except for bone tools, the majority

of artefacts are well within the perimeters of the locus. The post hole ring is also well within the extent of Locus 41.

There is an absence of clustering indicating many activities. There is no evidence of weaving activities. Very few weights are present. There is clustering between types in the southwest where a loaf weight, a net weight and an unidentified type are present.

Weights do not occur either in enough quantity or in enough clusters to make a strong argument for an activity area. There are no grinding stones or lithics to show evidence for food preparation activities. The lack of clear patterns is likely result from the lack of a full excavation in this area and the many intrusive pits.

b. *Food processing*

There is little evidence for food processing. Only one grinding stone is found in the locus. Instead of plant processing, it may be that meat was the important food being consumed in this pit house.

c. *Secondary Butchering*

There is some vague evidence for this locus being the location for butchery. It may have operated as a secondary butchery area. There are many lithic tools and many limb bones from many species. The lithic tools are located at the edges and were likely stored on shelves. They are tools that would aid in butchery such as retouched flakes and blades.

d. *Storage*

The ring of post holes with the interior lithics, ceramics, floor and wall daub may be a storage area within a larger pit house or support for the pit house. There is an absence of artefacts up to a metre from the edge, in the northern part of the locus. This area may be where people were working, backs to the wall, likely facing towards a heat source, creating a clear space. The exception is bone tools and lithic tools are present from the eastern central part of the pit house to the east edges. The presence of artefacts at the very edges indicates storage on shelves.

4. *Conclusion*

Unfortunately, intrusive pits disturb Locus 41, obscuring its function and activities. Locus 41 does not seem to be a very important pit house. There are few

artefacts, but this is likely because of the intrusive disturbances removing them from their primary context. It is likely that Locus 41 had the same range of domestic activities that took place in the other pit houses (Loci 7, 10, 23 and 24). Food processing, butchery and storage took place within this pit house, but there is no strong evidence for either activity. It may be that this pit house was built towards the end of a short-term occupation so that debris would have had less time to build up and provide evidence for different activities and functions.

T. Locus 50

Locus 50 is the remains of a Starčevo-Criş pit house (Figs. 16 and 138). It was not excavated because it was found on the last day of the final field season during auguring of the area between Loci 10 and 41. Its shape (trapezoidal) (Fig. 138), depth (2 metres), date (Starčevo-Criş), and contents (snail shells, animal bones, and Starčevo-Criş ceramics) were determined through remains and sediments recovered in the auger. Evidence of this locus is from cores only and not from excavations. As it was not excavated, a more detailed activity area analysis is not possible.

IV. Conclusions

Nearly all artefact types, regardless of they came from digitized or spreadsheet data, show intense clustering. Most Z scores are less than 1. Most results reject the null hypothesis at the 99% confidence level. The data is non-random. The results conclude that there are artefact patterns. Digitized and spreadsheet data sometimes showed different results. For example, in contrast to the digitized figurines, the data from the spreadsheet figurines show a non-random clustered pattern. This difference likely stems from differences in the sample size. The spreadsheet data had a larger sample size, is likely more accurate, and it can be said that the figurines show non-random patterns. This difference raises the importance of having a large enough sample size in order to test data.

To ensure that results were correct, both the digitized data and the spreadsheet data for the same artefact type were statistically analyzed using the Average Nearest Neighbor spatial statistic tool wherever possible. In most cases, even though the Z scores were slightly different, the different data types gave similar results (Tables 3, 4 and 5).

Artefact patterns are non-random. This agrees with the visual analysis that identified artefact patterns and relationships between different artefact types.

In the pan-site locus (Table 3), and the pit house loci (Tables 4 and 5), there was a trend for some artefacts to be highly dispersed in higher strata then to become more clustered towards the lower strata. This makes sense, because artefacts high in the strata are more prone to taphonomic effects (ploughing, rodents and pit house collapse). This trend follows within the pit house loci. Artefacts on shelves within pit houses, become dispersed and lose any clustering as shelves, walls and roof collapsed. In the Loci 7 and 23 verifications (Tables 4 and 5), there is a tendency for artefacts to be dispersed in higher strata and then become more clustered towards the basal living floor. This pattern is a product of pit house collapse and infill. Artefacts on the living floor would be less prone to these kinds of effects and would tend to maintain their original position and patterns. Artefacts that fell from shelves, roofs and walls would display a more random pattern than if they were on the living floor. The living floors were less subject to disintegration over time.

The samples of statistical verification of artefacts chosen provide a satisfactory cross-section of patterns in pit houses. They reinforce the visual analysis. The statistical verifications (Tables 3-5) were able to conclude whether the different artefact types were statistically clustered, dispersed or random. This shows that there are spatial patterns in the data. The visual analysis is necessary to show what kind of patterns they are and what artefact(s) make up patterns. It is not able to see patterns of more than one artefact type.

In general, strong statistical clustering is exhibited over the entire site. Artefacts are clustered in and around pit houses. Pit house artefact verifications have slightly different results than the pan site verifications.

Within pit house loci, most artefacts exhibit clustering, and particularly in the basal levels. Weights in particular demonstrate this trend. This is because weights stored on shelves fall as the pit house collapses and form a more random, dispersed array. Somewhat more dispersed patterns are in the higher sub-strata. The visual analysis gave more information as to why this is. While the statistical patterns saw a dispersed pattern higher in the strata, the visual analysis shows that there is often light clustering at pit house edges. The visual analysis tells us that this pattern is a result of roof and wall

collapse that created a more random array. Bone and lithic tools show a more dispersed pattern in basal levels. This is because they were not stored together but were associated in the areas in which they were used to conduct certain activities.

These observations come from the visual analysis results combined with the statistical results. This statistical analysis demonstrates that while the statistical analysis does show patterns in the data, the visual analysis was necessary to show where patterns are and discern their nature.

This chapter has provided a by-locus statistical and visual analysis of what activities there is evidence for and where they are taking place. The next chapter discusses comparisons between loci.

Chapter 7: Inter-locus comparison

I. Introduction

This chapter integrates the results of the visual and statistical analysis. It provides a cohesive inter-locus comparison of the similarities and differences in the distributions of artefacts found during visual and statistical analysis. This determined site-wide spatial patterns of behaviour. First, loci interpretations are offered. Second, general spatial patterns are identified and discussed. Third, data are discussed in terms of activities within pit houses, and those exterior to them. Fourth, different artifact distributions as evidence of activities in pit houses and in the open-air loci are discussed. Fifth, problems both foreseen and unforeseen with the analysis are examined. Sixth, the final part of the chapter provides thoughts on the meaning of the discussed artefact distribution.

II. Loci interpretation and comparison

Many different activities took place during Early Neolithic occupation at Foeni-Salaş. These include food preparation and consumption, secondary butchery, hide processing, fishing, lithic repair, weaving, ceramic production, religious activities, and storage (Table 2). The relationships between these activity areas follow similar patterns at Foeni-Salaş. Many activities occurred in pit houses, such as Loci 7, 23 and 24. Locus 23 seems to be a major activity centre in the settlement with multiple activities carried out in different parts of the pit house.

Exterior loci also have different activities associated with them. Locus 2 is the exterior space between pit houses, storage pits and other large features. Locus 53 appears to be an outdoor work area where hide processing, food preparation and weaving took place. Locus 25 is a storage pit for food. Locus 51 is a later Starčevo surface structure that appears to be a loom location. Locus 52 is an enclosed corral for animals.

General site patterns and pit house patterns are elaborated upon below. Features in different loci are compared. General artefact patterns are provided. Each artefact is discussed in terms of similarities and differences in distributions.

A. General Site layout

A larger pit house structure (Locus 23) and an enclosure (Locus 52) are partially surrounded by smaller sized pit houses (see Fig 16). An outdoor activity area appears east of the corral and pit houses surrounded it. The circular pattern of the pit houses around a central area may be for defense or as an extra enclosure for animals and activities. There is no evidence for corrals or outdoor activity areas beyond the circle of pit houses.

There is no evidence for paths between pit houses. Artefacts are randomly distributed exterior to the pit houses. This may be because the ground around the village would be trampled, or taphonomic processes obscured paths. The site is small enough that it is likely that all the ground was walked upon and no preferential paths were created.

B. General Pit house layout

The layouts of pit houses are roughly similar. They are all circular. If an entrance is identifiable, it is in the east. Storage is usually from the roof, on shelves or at the exterior edges. Ovens and hearths appear towards the edges of the pit houses away from entrances.

These basic repeated patterns support domestic mode of production and that a single nuclear family occupied each house. There are no pit dwellings devoted to one activity. There are no workshops. There is an overall trend of having entrances in the eastern part of the house. This is an important feature of the pit houses, as it appears to dictate the placement of activity areas and features such as hearths and ovens. Activity areas and features have similar patterns throughout the pit house loci. These are discussed below.

1. Entranceways

Entranceways are identifiable by changes in artifact densities as well as the topography of the terrain. In some pit houses, the entrance was identified by an upwards sloping of the horizon (e.g. Locus 7). Entranceways are essentially artefact free compared to the rest of the pit house. They are clear for passage to and from the pit dwellings. This is evident in the area of Locus 7, where there is a path in and out of the pit house at the eastern side of the pit house exterior in Locus 2 (Fig. 25). Ceramics are densely

concentrated on either side of the nearly bare entrance path. This pattern is also seen, although not as clearly, in Loci 23 (Fig. 94) and 24 (Fig. 126).

Many activity areas and features appear directly opposite to the entrance in the east part of the pit house. This implies that certain activities were situated to take advantage of artificial light when natural light was not available. The entrance in the east provides an additional benefit. Early morning light will warm pit houses naturally and efficiently. This spatial arrangement would heat the house faster than an entrance facing a different direction.

2. Ovens and hearths

Each pit house had an oven and a hearth. The only pit house to lack such a feature at the end of the field seasons was Locus 24. The discovery of the oven feature in Locus 24 during the spatial analysis in this thesis meant that every single pit house locus had both an oven and a hearth within.

All pit house ovens and hearths follow similar spatial patterns. Features, such as ovens and hearths, took advantage of the natural draw from the entrance. This allowed light to fall in areas of the pit house where natural light could not normally penetrate. Within pit houses, ovens and hearths are opposite entrances. This suggests that they were light and heat sources. In Locus 23, an oven and hearth are opposite to the entrance with activity areas located between and behind. This placement allows workers to take advantage of the natural light and warmth from the eastern entrance in the morning. As the sun moves across the sky and sets, the fires within provide warmth and light to work by. This same pattern is found within the pit houses with an oven and/or a hearth. Loci 7 and 24 have identical patterns to that found in Locus 23. Locus 10 has a somewhat different pattern. Locus 10 is clear of artefacts to the east and north (where there is a slope). An entrance could be in either or both these locations. The middle of the locus is also clear of artefacts (Fig 99). The clear middle area could be a path through the pit house. An Early Iron-Age pit destroyed Locus 41 and any evidence of an entrance.

C. General artefact patterns

The following discusses each artefact type in terms of general spatial patterns throughout the site. Artefact associations are discussed.

1. *Altars and figurines*

Altars and figurines go hand-in-hand in most places at Foeni-Salaş. In loci where altars are present, figurines are also present. However, they are found apart from each other as well. In Locus 23, both altars and figurines are found within the pit house, but are not spatially clustered together. In Locus 24, the opposite is true: figurines and altars are found in the same location.

Figurines and altars seem to have a special location around the perimeter of pit houses. They were probably stored on shelves with the altars.

Figurines are found in only one area exterior to pit houses. Two figurines are found in Locus 53, an outdoor work area in Trenches 130G and 130H. This gives them importance outside the realm of the dwelling. The two outdoor figurines are associated with weaving (loom weights) and food preparation (grinding stones). The figurines may be spirits related to the domestic realm or perhaps toys to keep children occupied while worked was done.

2. *Bones*

Bone is found everywhere at Foeni-Salaş. It is extremely dense within all pit houses and structural loci. Outside pit houses, there is less bone and it is much more scattered. There are massive amounts of bone within pit houses compared to the comparatively light distribution outside. The utilization of animals resulted in the massive bone build-up inside the pit houses. Not only were residents preparing and cooking food in the same place, they were not very fastidious about keeping the pit houses clean.

Bone concentrations tend to be denser away from entrances. Bone density is also light in the immediate areas of ovens and grinding stones. In contrast, bones are in dense concentrations still adjacent to but somewhat removed from ovens and grinding stones. There are often great quantities of bones within and around hearths. A good example of this is the very large hearth area in Locus 23 (Fig. 82). It is likely that bones were discarded in the hearth after consumption. It is also likely that they were cooked there as well. The bone build up may be from secondary butchery and meat processing. The hearth area in Locus 23 has been interpreted as a butchery and hide processing activity area in addition to consumption. In secondary butchery areas, such as in the northern hearth area of Locus 23, the concentration is very dense. Mostly limb bones are present

throughout different pit house loci. Cranial elements, ribs and vertebrae occur in fewer quantities. This implies that animal slaughter and primary butchery of large animals took place elsewhere.

There is some evidence for butchery in Locus 2. It appears that smaller animals were butchered anywhere. There is no single butchery area, though there is a possibility that the area around the corral was a butchery site. The bone scatter in Locus 2 is greater there than in the north and outside the circle of pit houses. This is particularly evident for the distribution of cattle remains. There is no strong evidence for a primary butchery or slaughter area.

Domestic dogs were present at the site and likely eaten. Canid remains in Locus 23 are associated with the large hearth. An awl made from a canid ulna is present in the same locus. The rest of the dog bones are scattered in Locus 2.

3. *Ceramics*

Ceramics appear in various densities throughout the site. The trend is for ceramic density to be greater within pit houses. Across the site exterior (Locus 2), ceramic spatial distribution is random and much less dense.

Ceramics are often found with bone concentrations inside pit houses. There is a strong correlation between the two different artefact types. This is seen in Loci 7, 10, 23 and 24. The ceramics found with the bone may be eating vessels or cooking vessels. Different food types were eaten in the same places. These areas around the oven and hearth have the greatest concentration of bone and ceramics.

Ceramic density increases in storage areas. Ceramics are used for storage. They are found within storage pits such as Locus 25, with bone and some tools. Ceramics probably held not only foods but tools as well. They hung from the ceiling, were stored on shelves and stored outside pit houses at the edges. Their combined weight outside of pit houses, particularly evident outside Locus 23 and Locus 7, may be extra wall support or to hold down roof covers. It may be that ceramics provide an extra layer of insulation or protection from the rain for the daub packed between the wattle.

4. *Chipped Lithics*

Chipped lithics are found all over Foeni-Salaş. The densest concentrations occur within pit houses. Tools tend to be dispersed within pit house loci with no evidence

spatial clustering with other tools. This is likely because they were not stored together but found with the remains of the activity area context in which they are used. For example, blades are found in butchery areas and awls are found in weaving areas.

Certain lithics are good evidence of particular activities. For example, rubbers and abrasive stones are evidence for ceramic production in Locus 23. Blades are a useful tool, and often found with different artefacts, and used in many activities, particularly weaving. Blades and flakes tend to be located near bone concentrations and food preparation areas. They are also found near grinding stones, implying that they were for food preparation as well as other tasks. It is likely that they were used in butchery and hide processing. They are found in looser scatters outside pit houses and in fewer quantities.

End scrapers are not common at the site. One is found within Locus 23 with bone, blades and a large hearth. The only other lithic identified as an end scraper is in the outdoor work area, Locus 53. These loci may be areas where hides were cured.

Cores are found away from any other artefact. This places them away from other activities. They occur at the extreme edges of pit houses and generally at the edge of the site. Lithic production and repair did not take place with other activities. The debris involved would have been hazardous to people walking in the same area or cooking food. Within pit houses, cores are found on the eastern side near entrances ways. There is very little debitage at Foeni-Salaş. It is likely that rudimentary repair and retouch was the majority of lithic manipulation. If lithic production did occur, it is one of the few instances in which inhabitants were tidy.

5. *Grinding stones*

The majority of grinding stones are within pit houses appearing adjacent to ovens and hearths. They tend to be closer to the pit house edge, behind heat and light giving features. They are usually in the area opposite to entrances. In the pit houses, a loom weight, a figurine, or other artefacts not associated with food preparation, are often located with the grinding stones. There are not enough of these artefacts to constitute another activity area in the same location. Ceramics are often near grinding stones close to the edge of the pit house. These may have been vessels for food storage and thus kept close by.

There are grinding stones and a pestle found in Locus 53. This is with loom weights, and various lithic tools, all constituting an outdoor activity area where many activities took place.

6. *Daub*

Much of the daub at Foeni-Salaş is structural in nature. It reinforced walls created floors. It was also lined outdoor storage pits. Locus 25, a storage pit has a reinforced wall (Fig. 127).

Daub was used to construct ovens and line hearths. There is evidence in Locus 23 that daub walls were erected between ovens or hearths and the pit house wall, protecting the walls from the extreme heat of the fire (Fig. 90). This also may have reflected heat back towards the middle of the dwelling.

7. *Weights*

Different weights were probably used for different purposes. There is little overlap between different weight types. This does not rule out that different weight types may perform the same task. Some types overlap distribution and share storage areas in the roof or walls.

All types of weights are located within pit houses, but in different quantities and spatial patterns. Loaf weights outnumber loom weights, spindle whorls and net weights.

There are no loaf weights or any other weight type on the exterior edges of pit houses. They were weights to hold down roof covers. Dense concentrations of ceramics are often found immediately outside of pit houses. It may be that if a weight was needed to hold down coverings, the storage ceramics might have fulfilled this function. Not all pit dwellings show this pattern. Only the large major pit houses (Loci 7, 10, 23 and, 24) do. Storage ceramics are only densely concentrated on one or two sides of the pit houses.

There are a great number of loaf weights in Loci 23 and 24. In Locus 23, they are central to the pit house but located in a separate part than the grinding stones. The loaf weights are associated with the large hearth in the north part of the pit house. Loaf weights are in places where light from the hearth and entrance could be used to work by. It is possible that in order to heat the pit house, residents strategically placed heated loaf weights. The loaf weights in Locus 23, although associated with the hearth, do not exhibit signs of burning or heating. They had another purpose unassociated with heating the

dwelling. In Locus 7, the loaf weights appear in the northwest of the pit house, heat and fire sources are in the southwest. Loaf weights and heat sources are not associated in Loci 7 or 24. Loaf weights are not for weaving, or to heat or to weight roof covers, but are for some other activity. This activity could be for hide processing where they held down skins for cleaning. Loci 23 and 2 have loaf weights spatially disassociated with loom weights.

Loom weights appear to be stored in pit houses more commonly than they are utilized for weaving within them. In most pit houses, they occur singly and in scattered loose densities of only few. In Locus 23, only one loom weight is present. They occur in quantities of no more than five (in Locus 7) in an entire pit house. There is no dense clustering. There is no evidence of a definite weaving area in a pit house. Though many loom weights occur in the high substratum of Sub-locus 24.1, intrusive disturbances have rendered it impossible to follow any spatial distributions to the pit house floor. Except for one exception of loom weights in Locus 53 (Trenches 130G and 130H), weight types are found within pit houses. Better evidence for weaving comes from outside the pit houses in Loci 53 and 51 where many weight types are located in a small area.

Net weights cluster together within pit houses. This is evidence of storage together. Fish nets may have hung from the ceiling. Fish net weight clusters overlap with other weight types but do not share identical spatial distribution patterns. However, a small net weight cluster may be within a large distribution of many weight types. It is unlikely that net weights had the same function as loom or loaf weights but they did share storage space. All were probably hung from roofs for storage. The majority of net weights are in Loci 23 and 24. There are a few in Loci 7 and 10 and some scattered throughout Locus 2. Their presence in Locus 2 may be a result of net breakage and weights falling randomly.

D. Activity Areas within pit houses

Pit dwellings at Foeni-Salaş had a multitude of activities taking place within a single house. No single activity was confined to one pit, with the exception of storage pits such as Locus 25. There are no ‘workshop’ pits where one activity took place. This supports the theory that these are pit dwellings. Despite the many activities that took place within a single locus, there is a tendency for activities to be somewhat segregated.

For example, at Foeni-Salaş, lithic production takes place always by itself with no overlap with other activity areas. Cooking and ceramic production overlap: they both use the oven. Butchery and hide curation also overlap in Locus 23 and both use the hearth. Any evidence of weaving tends to be near light sources but does not occupy the same immediate area as food preparation artefacts.

The following section discusses each activity identified at Foeni-Salaş and how it relates to the pit house(s) in which it was found.

1. Food preparation

Most food preparation takes place inside pit houses, close to ovens and hearths. The food preparation areas are in these locations in order to be close to the fire and to take advantage of natural light. Grinding stones are found outside of pit houses in the Locus 53 work area in Trenches 130G and 130H. This indicates that some food preparation took place outside as well. The absence of a hearth in this area implies that while a little food preparation was accomplished outside, the cooking was done inside.

Hearths were used for cooking food and generating heat within pit houses. All pit houses have hearths. Only one was large (Locus 23). Most were very small (Loci 7, 10, and 41). The hearth in Locus 24 was destroyed, but some fragments remain at the very bottom beneath the Locus 30 intrusions. Hearths were also used for garbage disposal. Bones frequently appear in dense concentrations in and around hearths.

Grinding stones tend to cluster together in specific food preparation areas. They are found adjacent to ovens and hearths, between them and the entranceways. This location enables workers to use the warmth and light from either source. With few exceptions, grinding stones are found exclusively inside pit houses.

Ceramics are found close to ovens, hearths and grinding stones, but not in the exact same space. This places ceramics within convenient access, but not occupying the same place. This indicates food storage took place within ceramic vessels.

Food storage may also occur outside pit houses as well as inside. This may have aided the preservation of perishable foods. Food would have kept for longer periods outside pit houses in cooler weather. Foods intended for immediate consumption would be stored near the areas where it was processed. This is why ceramics are near grinding stones, hearths and ovens, and outside pit houses.

2. *Consumption*

Specific areas for food consumption are not evident because of the massive quantities of bone. Bones are strewn all over pit houses in dense quantities. There are few patterns. The haphazard bone discard pattern obscures food consumption areas. It is likely that food preparation and consumption are taking place in the same areas. It is probable that special areas only for food consumption do not exist. It is likely that food consumption took place everywhere in the pit house.

3. *Secondary Butchery*

The majority of identified animal bones within pit houses are limb bones from various domesticated species such as cattle, pigs, sheep, and goats. There are wild species, such as wild pig and deer in lesser quantities. The spatial distribution of limb bones from all these species suggests that secondary and tertiary butchering was inside. When the meat was off the bone, the bone is discarded in the fire or onto the floor. All the pit house floors are strewn with massive quantities of bone. Butchery areas may have shared space with hide processing activities as the two are closely related.

4. *Hide processing*

Two hide processing areas are evident at Foeni-Salaş. In both areas, an end scraper is present. End scrapers appear in no other place. The best evidence for hide processing comes from Locus 23. A large hearth was used to dry hides. The numerous loaf weights in the same area likely functioned as weights to stretch the skin. In Locus 23, loaf weights are associated with a retouched flake scraper, blades, flakes and other lithic tools near a large hearth. The end scraper is in this area as well. It would be used to clean animal hides. The loaf weights present can hold down a hide while it is worked on, or help stretch it and hold it to cure near the fire. There is no evidence for a hide stretching structure but it is likely that other activities were taking place in the same area when hides were not worked on. It would not been an efficient use of space to have a large hide stretching rack taking up space where other activities could be taking place. This accounts for the overlap in different activities in Locus 23.

The outdoor work area, Locus 53 in Trenches 130G and 130H, may also have been a location where hides were processed. The other end scraper evidences this. Initially hide cleaning may have taken place outside, as it is messy and smelly work.

Further cleaning and curation may have taken place within the Locus 23 pit house after the worst of the animal material is removed. Locus 23 may have been used solely for hide processing at various times as the process smells so bad no one would want to be living with it.

5. *Lithic production*

There are no great quantities of debitage at Foeni-Salaş. Already made tools came with residents as they settled and were repaired and maintained throughout habitation at Foeni-Salaş.

Cores appear in areas well away from any other activity. There is clear spatial segregation between lithic production and repair and all other activities. Even in Locus 23, cluttered with many artefacts and many activities, cores are by themselves. Cores never overlap with food preparation areas, butchering areas or any other activity. They stand alone in the Foeni-Salaş archaeological record. Within pit houses, cores and some flake debitage are well within corners and tend to be close to entrances. This keeps the majority of lithic debris from flying into other activities. As lithic fragments can be very sharp and so small as to go unnoticed it makes sense to have this activity away from food production, high foot traffic or other activity areas. No one wants to step on something sharp, or have rocks in their food.

6. *Ceramic production*

Ceramic production was occurring on site within Loci 23 and 7. There is some stone temper in Locus 24, but the pit house is so disturbed by intrusive deposits that no other evidence for ceramic production was preserved. No other locus has evidence for ceramic production. Locus 23 has a large oven necessary for firing ceramics. A rubber and an abrasive stone used for polishing are not associated either together or with the oven but are in the same locus. Artefacts associated with the firing and burnishing of ceramics (the oven, rubbers and abrasive stones) are present in Locus 23 and not in Locus 7. Artefacts associated with ceramic formation such as the temper in Sub-locus 7.1 and the stamp in Sub-locus 7.3 are not present in Locus 23. The entire ceramic production may have been split between Locus 7 (ceramic formation) and Locus 23 (firing process). This does not seem to be an efficient way of making ceramic vessels. However, if the residents built only one appropriate hearth, it may have been shared between the residents

of each pit house. If the occupation was short term as speculated it also makes sense to build only one large oven if the site was going to be soon abandoned.

7. *Religion*

Loci 23 and 24 show the best evidence for cult activity though the patterns in each are different. Locus 23 has altars and figurines apart from each other throughout the locus. Locus 24 has altars and figurines in clear spatial associations. They are found in areas that are likely remains of wall shelves. They have a clear function within the sphere of the pit house.

A few figurines occur near grinding stones in outdoor Loci 53. They likely had a domestic function as they are found in the outdoor activity area. These are the only figurines that are not in a pit house.

These spatial relationships relate religious activity to daily activity. Cult figurines may have had certain significance as house protectors or have been associated with particular activities. As fertility icons have a well-known link with food, particularly grain, their association with grinding stones and food preparation areas gives them a fertility function at Foeni-Salaş.

8. *Storage*

Interior storage at Foeni-Salaş occurs in different places. There is spatial evidence of storage at the edges of pit houses in the interior, the exterior edges and in the roofs and on wall shelves.

The majority of interior storage tends to be at the sides of pit houses. This keeps vessels from being underfoot during daily activities while the contents remain easily accessible.

Shelf storage appears in high strata at pit house edges. Weights and ceramics were stored on wall shelves or roofs when not being used.

Weights are often found in clusters in the middle of pit houses in the roof fill. Bolas were found in a cluster in Locus 24. Many weight types are often stored in the ceiling. Ceramics also appear to have hung from the ceiling in all pit house loci. The ceramics fall into the centre and edges of the pit house after abandonment. Keeping ceramics overhead keeps them within very easy access.

The Locus 10 pit house seems mostly for storage. Locus 10 appears to be for food as evidenced by large quantities of bone within the ceramic cluster. There are also lithic tools in this area. There is little evidence of other activities though there is a small hearth present.

9. Empty spaces

Empty spaces are important in pit houses. The presence of a clean entrance way has already been discussed. Other empty places often occur around the pit house edge. These places may be where the occupants themselves slept or sat to conduct activities. Artefacts would be strewn around but not in a sleeping place. There is no good evidence for sleeping areas. There is so much debris, particularly bone, which people may have been sleeping on top of it all. If occupants were sleeping within pit houses, it is likely that some padding (skins or material) was used because of the debris on the floor. It is possible that the pit houses generally empty peripheries are for sleeping. Ceramic storage takes place at the edge. However, there are instances (e.g. the northern parts of Loci 23 and 10) that have a relatively clear and clean edge. Artefacts are no closer than .5 metres, but most are further towards the centre. This would give a person adequate room to lie down or to sit and work.

E. Activity Areas outside pit houses

Activities also took place outside. There is evidence for a corral and an outdoor activity area (Locus 53). Certain places such as storage places are associated with pit houses. These areas are further discussed below.

1. Storage

Storage ceramics were kept outside as well as inside pit houses. Some pit houses show ceramic concentrations at the exterior edge. Fragments in these areas tend to be larger than those in the interior indicating larger vessels were kept at the edges. If they were larger in size, it would make sense to keep them outside of the pit house where they would take up too much space.

Exterior storage occurs outside Locus 23 in Locus 2. Ceramic density increases at the exterior pit house edge. Locus 7 has high ceramic densities along the south and east edges. An entrance path goes between the concentrations at the southeast side. The

exterior of Locus 23 has a high ceramic density along the southern edge. There are very few tools or weights in these areas indicating that perishable foods may be kept outside in ceramic vessels.

2. Outdoor multi-activity area

An outdoor activity area appears in Trenches 130G and 130H as Locus 53. This area has a looser concentration of artefacts than activity areas within pit houses, because it is more open. People can spread out more. This results in a less dense concentration. This varied artefact scatter is the result of people coming together to work on different tasks and socialize. Its proximity to the corral also enables the inhabitants to keep an eye on their animals. There are loom weights towards the east indicating weaving activities. There is also evidence for butchery as evidenced by the many cattle bones and other species. Food preparation occurred. Grinding stones and a pestle are in this area.

3. Outdoor food preparation

Food preparation activities also took place in Locus 53. There is a grinding stone and a few lithics. There is less evidence for food preparation outside than there is inside pit houses. This may be because all the hearths and ovens that would cook the food are within the pit houses. It would be easier to prepare food in proximity to the location where cooking takes place.

4. Outdoor lithic production

There is evidence for lithic production at the northwest and the southeast part of Locus 2. There is little debitage in these areas. This implies that only a little repair and maintenance was done to existing tools. Lithic repair occurs within pit houses more often than outside. This may keep debitage away from high traffic areas where it is not likely to be stepped on. Like the lithic production areas within pit houses, there are virtually no other artefacts around the cores in Locus 2. They appear in areas where artefact scatter is less dense.

Production of new tools is taking place off site, perhaps at a lithic source. The reason for this is that it is more convenient to make tools at the source. Sharp debitage is produced that could injure humans or animals. It makes sense to have these areas

somewhat removed from the main part of the village and located at peripheries of pit house. Cores are only found at site and pit house peripheries.

5. *Outdoor weaving*

Locus 53 has the best evidence for a major weaving activity area. This area has a large number of loom weights. Weaving may occur outside more often than inside. This takes advantage of natural light and a larger space in which to operate. Using the full natural light may have made this task easier than working within a darker pit house. There is no good evidence for weaving within pit houses. There are few loom weights within them.

Locus 51 also has many loom weights in a confined area. This area is a surface structure, not a pit house. It may be a later Starčevo structure. It may have been a large loom. As it is not a pit, it does not seem likely that it was for storing weights. There are no spindle whorls, which is unexpected for a weaving area. Only loom weights and spindle whorls may have been used to weave.

III. Problems with analysis

One problem found during analysis is the debris and garbage that people were leaving within pit houses. This obscured activity areas and this background 'noise' needed removal. Often bone and ceramics constituted background noise. This problem gave insight as how people were dealing with garbage. Essentially, people were not disposing of their trash. Garbage was left everywhere (!). There is no clear garbage disposal area or midden. This made it difficult to discern between garbage and activity area clusters. Activity areas needed separating from background garbage noise. It may be that all the artefacts are garbage and none of it left in primary activity areas. Activity areas can be separated by looking for location and concentration of identical or similar artefacts, artefact associations, and increased or decreased densities.

A problem was anticipated because of the sheer number of artefacts in a single locus. It is impossible to look at all the artefacts in a single locus and distinguish between them (Fig. 137). Even looking at two or three artefact types is very difficult if massive quantities are present. This was overcome by using the GIS to examine only one or a few at a time and in different combinations.

IV. Thoughts on meaning of distribution of artefacts

During analysis, the question was raised as to why almost all artefacts are in the pits. Why are people discarding all the artefacts in the pits in which they were living? All artefact types are at their densest within the pits. Clearly, the pits are pit houses given the presence of various architectural features such as the hearths and ovens. They were not simply garbage dumps. There is no evidence for surface structures associated with them (with the possible exception of Locus 51).

Clearly, these were very sloppy people. They spent a lot of time in the pits and simply discarded wherever they happened to be. They were not concerned with long-term build-up of debris. If they were to be moving very soon, there was no point in being tidy.

This is a different issue than the snail shells, which are interpreted to have come into the site after occupation. Only pit houses are filled with shells. There are very few snails' shells in the outdoor loci. If the snails were contemporary with occupation, residents would be walking on a bed of snail shells and these would be crushed. This is not the case. The shells are intact.

The problem with the caprine seasonality data is that it is in three large temporal chunks: 0-2 months (Feb-March), 2-6 months (March-August) and 6-12 months (August-January). The problem is with the nature of the zooarchaeological technique for ageing based on tooth eruption and wear. It is not clear if all the mandibles are clustered in the cold weather months (October-March). Dr. Greenfield has been on the site in both October and March and found it is still cold, windy and bitter at those times.

Seasonality information indicates that the site (and others, such as Blagotin) is not a seasonal campsite. They were probably used year-round, but occupied for very brief spans of time (a year or few years at most). Given the climate, it is strange that almost all remains are found within the pits. As remains are all in the pits it is possible that the accumulation occurred during the cold months. The climate is warm for half the year and modern villagers perform many activities outside. The climate during the occupation of the site was relatively similar to that of today. It was the first half of the Atlantic climatic optimum.

The structure of the pit houses is fitting for a cold winter. Entrances are in the east where the rising sun strikes first. This lights and warms the pit house early in the

morning. Heat sources, such as ovens and hearths are opposite to entrances. This arrangement provides efficient heat and light at all times. Even when the sun has moved away from the east and begun to set, the oven and hearth have warmed the pit house. By night, the dwellings have heated throughout the day. Even if fires went out, residual heat will last throughout the night being contained in the daub structure of ovens, hearths and in the floor and walls.

There is no evidence for grain at all at Foeni-Salaş. This may be an indication of seasonality. There would be very few plant resources in the winter. It is also a possibility that the inhabitants of this site were hunter-gatherers who were beginning to adopt trappings of a sedentary culture. They stayed in one place for a few months and had a meat-based diet but did not grow crops. This would account for the lack of botanical remains in the site.

V. Conclusion

This chapter has demonstrated that activity areas exist at Foeni-Salaş. Activity areas occur both inside and outside of pit houses. Within pit houses, activity areas tend to be placed in relation to major features such as ovens and hearths. The ovens and hearths themselves are placed in relation to the pit house structure. Ovens tend to be opposite entrances and hearths slightly to the side of centre. Entrances to pit houses tend to be in the east. This is an efficient way of heating and lighting the interior of the pit dwellings. This pattern shows that pit houses themselves were constructed to a pre-conceived plan and knowledge of what activities were needed to ensure survival.

Activities mostly took place inside although there is evidence for much of the same activities to be conducted outside. There are outdoor areas where food preparation, lithic production and weaving took place.

The next chapter discusses the results of the analysis in terms of significance and how it fits into current knowledge of the Early Neolithic.

Chapter 8: Conclusions

I. Introduction

This chapter summarizes and discusses the significance of the analyses described in the previous chapter. First, a summary of results obtained in this research and their significance are discussed. Second, thoughts on observations concerning functional differences between the pit houses and their effect upon social organization interpretations of the site are discussed. Third, the spatial patterns and information generated from this study are compared to spatial patterns in other Early Neolithic Balkan sites in order to discern any general patterns for the time and region. This elaborates on how the results obtained here fit into current knowledge of the Early Neolithic of Europe. Lastly, ideas and suggestions for additional or related research are included for future consideration.

II. Objectives

Little research has occurred on the types and locations of activities within Early Neolithic structures and settlements in southeast Europe. Most previous analyses focused on artefact description, single artefact categories, or general presence/absence of artefact categories within pit houses. In order to identify where activities took place it is necessary to look at the spatial distribution of the different types of material remains. In this analysis, the relationship between the different artefacts and features were spatially examined. In particular, the objective of this thesis has been to define the types and locations of activity areas within pit houses. From these data, we may be able to answer why activities took place where they did.

The data from Foeni-Salaş (in southwest Romania), were chosen for this type of analysis because the excavations were done in a manner that renders a detailed spatial analysis possible. Whenever possible, precise artefact locations were recorded instead of gross grid locations.

III. Method and technique

The goal of the research in this thesis was to conduct a spatial analysis using Geographic Information Systems in order to find activity areas. The data from Foeni-Salaş were analyzed in two ways. One way was to use spreadsheets with complete

artefact lists including corresponding locus and cut information. Artefacts had only the centre coordinates for the quad in which they were found for an artefact location. The spreadsheets were more complete than the digitized maps as they had artefacts recovered in sieves. The second way was with digitized maps. The digitized maps were not as complete as the spreadsheets but each artefact's location was precisely recorded.

The spreadsheet data were organized through a database into meaningful artefact categories. It was compared with digitized data created from hand drawn maps created in the field. The combined spreadsheet and digitized map data from Foeni-Salaş were combined in a GIS format and analyzed visually and statistically to determine the locations of different activity areas. The data show variances between different artefact and feature types, and artefact and feature locations. Artefact and feature placement and proportion were used to assess for activity areas. The same activity often took place in different localities.

Patterns were visually identified at first. A visual analysis is necessary to discern the nature of the pattern. These were tested by statistical analysis that discerned its basic nature (clustered, random or dispersed).

A statistical tool, Average Nearest Neighbor, was used to verify the patterns visually identified. Both techniques agreed that non-random patterns occur in the spatial data from Foeni-Salaş. It also verified that a large enough sample produces a meaningful statistical result. Both digitized and spreadsheet data give similar results when the same statistical tool was applied. This means that both digitized precise data and spreadsheet center coordinate data can be used to look for patterns. The Nearest Neighbor tool was chosen because it could be used on all the data types that made up the analysis including digitized point form and shaped data, spreadsheet and database tables.

A. Some technical considerations

This study was useful as a comparative test of the value of doing detailed field maps over creating spreadsheet data based on quad coordinates. Ultimately, the results are very similar. It is still worthwhile doing detailed field maps. They generate finer resolution data than could be recovered in the spreadsheets. This is an issue of scale. On a general or macro-scale, they are similar. They diverge on a micro-scale. In the spreadsheets, one cannot see how close a cluster is to a feature or another cluster since the

generalized X, Y coordinates are identical if they are located in the same quad. Artefact points are evenly spaced when comparing different quads since the quads are the same size.

Digitized maps with precise spatial data were not without problems. The problem with the digitized maps is that data were often missing, particularly when it recovered only in the sieves (e.g. figurines). Both types of analyses were useful, but at different scales of analysis.

The statistical data show that an artefact within a specific loci exhibits a pattern (clustered, random or dispersed); but how closely and the type of cluster(s) can only be seen in the digitized data (e.g. open spaces for doors and paths). For example, in Figure 23, a clear pathway is visually observed. The statistical analysis did not identify this feature. The statistical verification of the artefacts in Locus 7 would only state what kind of pattern daub, ceramics, bone and other artefacts taken for analysis have. The entrance way would have gone unnoticed without the visual analysis.

IV. Results of analysis

It had been previously determined that differences in activity nature and intensity exist between different loci (Senior 2004; Zita 2005). However, these two studies did not agree on the nature of the distribution. Senior (2004) argued that Loci 7, 23 and 24 were primary activity loci and smaller loci (Loci 10 and 41) were secondary work areas. In contrast, Zita (2005) argues that Loci 10 and 23 is one household, Loci 24 and 7 another household and Loci 41 associated with Locus 23 or another unexcavated pit dwelling to form a third household. This study tested and refined their conclusion. Not all houses at Foeni-Salaş held identical activities, or identical numbers or sets of activities. The same activities are found at different pit houses (see Table 2). The results of the analysis performed in this thesis change and refine these conclusions dramatically. These changes are elaborated upon below.

A. Inside pit houses

The general trend at Foeni-Salaş is for the majority of activities to take place within pit houses. Specific patterns within loci are discussed in the previous chapter. Each pit house had many different domestic activities that took place. This occurs across all pit houses. Within pit houses, different activity areas are located in relation to larger features

(hearths, ovens and entrances). There is some overlap between different activities. However, in general, they have their own places within the dwelling. The nature of the pit house provides efficient heat and light from the oven, hearth and entrance to the inhabitants within.

There is a relationship between activity areas and the pit houses containing them. This shows that activity areas were being organized within pit houses, and the pit houses themselves were being constructed in order to facilitate the activities. The layout and constructional characteristics of pit houses show that they were erected in response to what activities will be inside them. Pit houses were constructed with the needs of certain activities (weaving, food preparation and so on), taken into account. Pit house construction is of a type that enables activities within to be conducted comfortably. Larger pit houses (e.g. Locus 23) had many more activities take place within them. It is clear that the smaller the pit house, the fewer were the activities. For example, Locus 10 is the smallest pit house and has the fewest types of activities within it.

Within pit houses, activities are located in relationship to features. For example, food preparation artefacts are near ovens. Anything to do with food, its preparation or cooking, tends to be located closest to heat sources. Weaving activities are located between the light from ovens and hearths and the entrances. This location makes the most efficient use of light from several sources.

B. Outside pit houses

There are few patterns found outside of pit houses, except for a few hot spots designated as new loci (i.e. Loci 51, 52 and 53). Locus 52 and 53 are treated as outdoor activity areas since they do not appear to be associated with postholes or any other evidence for architecture. These are areas where the same activities that took place within pit houses, i.e. food preparation, weaving and other domestic activities, occurred outside. Locus 53 has evidence for butchery, weaving and food preparation. Locus 51 does have post holes, and appears to be a surface structure for weaving.

C. New loci and features

Artefact clustering can determine where and what activities took place. both inside and outside of dwellings. This spatial analysis found, some unidentified features inside and outside pit loci as well as new loci.

New loci were created because the digital analyses demonstrated that field designations of loci and their associations were sometimes incorrect. For example, in the field notes, the feature called “Locus 23 hearth” was not a hearth. By the end of its excavation, it was recognized as an Early Iron Age pit. However, it was too late to change the name in the field records. However, it is now relabeled as Locus 56. Another new internal locus is the Medieval pit, Locus 58, that cuts into Loci 24 and 30. This was recognized only during this spatial analysis.

New outdoor loci, such as the outdoor work areas, were defined in the post-field phase of analysis. A good example is Locus 53 that was identified by Jongsma (1997), based on the daub distributions. This thesis has demonstrated that the daub cluster is associated with other artifact types and that this is a valid exterior activity area.

An oven feature in Locus 24 was not recognized in the field and was not on the digitized maps. The spreadsheet analysis showed oven daub in an area of four quads in the northeast corner of the pit house. This evidence for an oven is an important discovery as it meant that every large pit house had both a hearth and oven emphasizing their function as a pit dwelling where domestic activities took place.

In addition to discovering new features and loci, this study was able to determine not only what activities were taking place within Foeni-Salaş pit houses but also their placement and potentially why locations were chosen. Activity area locations were selected based on what was needed in terms of heat and light, space, access to material necessary and associated activities.

V. Comparison with other Early Neolithic sites in the region

The following section compares the spatial patterns and activities at Foeni-Salaş with other Early Neolithic sites (e.g. Lepenski Vir, Divostin, Karanovo, Achilleion, and Blagotin) in the Balkans region, and places the results of the analysis within a larger cultural and temporal context. The spatial dynamics of different activities are compared across several Early Neolithic Balkan sites and Foeni-Salaş.

A. Village organization

The spatial patterns at Foeni-Salaş show a circle of small pit houses distributed around a larger central pit house. Similar structures and distributions are located at Blagotin and Vinča (Jongsma 1997; Jongsma and Greenfield 2001; Jongsma and

Greenfield in press). This pattern is very different from central Europe where there are square long houses ordered in rows (Bogucki 1988). The circular pattern keeps communication and line-of-site intact between all pit dwellings.

B. Mobility

The activity areas and features at the Early Neolithic sites of Zadubravlje, Lepenski Vir, Blagotin, Divostin and Achilleion tend to shift in location over time. This is evidence of longer-term occupations. At Foeni-Salaş and Blagotin, there is no evidence for shifting or movement of activity areas. This is indicative of a short-term occupation. It has been suggested that people occupied these sites with high mobility, likely living a pastoral economy (Jongsma 1997; Greenfield and Jongsma 2001; Greenfield and Jongsma in press). A wide range of wild and domestic resources was available. Most of the animals were cattle and sheep, and most of the plants were wild. This is not the type of food spectrum characteristic of a sedentary agricultural community. The people at Foeni-Salaş should be viewed more as pastoralists than as sedentary farmers.

C. Pit houses

The excavations from Foeni-Salaş clearly demonstrate that Early Neolithic structures in this region were in the form of pit houses. This supports the assertion by Jongsma (1997).

The fact that pit houses are at Foeni-Salaş, Blagotin, Divostin I, Lepenski Vir, and other central Balkan sites, makes this cultural region different from most other Early Neolithic sites in Europe to the north and south. At Foeni-Salaş, there was no need to build the permanent timber buildings found in Western and Central Europe, or the mud-brick structures of the Aegean littoral. The occupation was short term. They are easy to build, thermally efficient, taking advantage of insulating properties of the soil. Because of this, cultures that are relatively mobile use them— not settling permanently in one location.

D. Activities within pit houses

Pit houses are clearly domestic in function at Foeni-Salaş. Regardless of dwelling type many activities occurred within dwellings in the Early Neolithic. All types of activities including food preparation, butchery, ceramic production, weaving, lithic

production, storage and religious activities were conducted. Similar ranges of activities were conducted at other Early Neolithic villages such as at Zadubravlje, Lepenski Vir, Blagotin, Divostin and Achilleion (McPherron and Srejović 1988; Gimbutas, Winn and Shimabuku 1989; Dimitrijević 2000; Greenfield 2000; Nikolić and Zečević 2001). There are no pit houses used solely for one activity at Foeni-Salaş.

E. Internal architectural features associated with pit houses

The spatial organization within Early Neolithic dwellings is remarkably similar when feature location is examined.

1. Post holes

Post holes were used for support in pit dwellings both in the center and around the periphery. There is evidence for this from several sites (e.g. Divostin, Foeni-Salaş, and Lepenski Vir). Both appear to have hard earth floors with some floor daub.

2. Ovens

Ovens are well constructed. In most examples, ovens are placed directly opposite the entrances. This is the case at Foeni-Salaş, Divostin, Lepenski Vir, Karanovo, Blagotin and other Early Neolithic sites in the Balkans (McPherron and Srejović 1988; Gimbutas, Winn and Shimabuku 1989; Dimitrijević 2000; Greenfield 2000; Nikolić and Zečević 2001). Foeni-Salaş follows this pattern.

3. Hearths

Hearths also have patterns that exist across Foeni-Salaş and other Early Neolithic sites. Hearths tend to be central to pit dwellings or slightly to one side. If they are not central, they tend to be away from the oven and entrance. This is the case at Divostin and Lepenski Vir and all other sites examined (McPherron and Srejović 1988; Radovanović 2000). This placement of hearths frees up areas for activities and allows heat and light to penetrate into the whole of the dwelling.

4. Shelves

Shelves may be built for interior storage at many Early Neolithic sites (e.g. Achilleion, Divostin I and Foeni-Salaş). These were of wattle and daub construction. These were often associated with figurines, especially at Achilleion (Gimbutas, Winn and Shimabuku 1989). Shelves may have had an altar function at some sites.

5. *Entrances*

Earthen ramp entrances are found at Foeni-Salaş, and in the early Divostin I pit houses. These would have been easiest to construct and to maintain. The entrances at Foeni-Salaş are interesting as they are almost always oriented exiting east. Locus 23 may have an entrance facing north as exhibited by a shallow upwards slope. The eastern entrances may be to catch the early morning light and heat of the rising sun. Other sites have entrances that orient in a specific direction. For example, At Lepenski Vir, they are oriented facing the nearby Danube to the north (Dimitrijević 2000; Radovanović 2000).

F. Lighting and heat

The spatial distribution of artefacts shows that pit house construction made the most efficient use of natural heat and light. Eastern entrances allow early light to shine through and heat the pit house in the morning. Major features within pit houses, including ovens and hearths, are located in relation to the entrance. The placement of ovens and hearths at Foeni-Salaş is remarkably similar between other Early Neolithic sites, Lepenski Vir, Divostin and Blagotin. In these sites, heat sources tend to be opposite entrances in both surface and pit houses. Hearth and ovens are opposite entrances or to one side. They are never central to the dwelling. They heat and light opposite ends of the pit house. The features that provide heat and light are placed so that the entrance way creates a natural draft. They are situated in a manner that allows areas far from the entrance to be lit and warm. A hearth or oven will be placed where the light from a door does not reach. This ensures a steady light and source of warmth.

The inhabitants at Foeni-Salaş clearly choose the locations of activity area by looking at what location will make it easiest for work to be accomplished. At Foeni-Salaş, all large pit dwellings have an oven and hearth. Activity areas are centred on important architectural features.

G. Activity areas

Activity areas at Foeni-Salaş are placed in relation to the pit house structure and features relating to that structure. This is similar to the late Mesolithic pattern at Lepenski Vir where household goods and animal bones are concentrated on one side of hearths (Srejović 1972: 47). At Foeni-Salaş, work areas take advantage of the natural light the pit house allows inside and the locations of hearths and ovens. At Lepenski Vir, Divostin,

Karanovo, Achilleion, Blagotin and Foeni-Salaş, activity areas are placed in relation to ovens and hearths.

Within pit houses, different activities have separate areas though some overlap exists. There tends to be less overlap if there is greater space. Overlap may be a result of space restraint or shared tools. In all cases, activities are placed in order to make them easy to do.

1. Plant food preparation

Major activity areas, particularly those involved in plant food preparation take advantage of natural light from the east in the morning, and in the later hours, use the light from the oven and hearth. Plant food preparation appears to be in the best place to function, as it is necessary for daily survival. It does not make sense to have such a necessary activity in a location that makes the activity difficult to perform.

Similar cooking and food preparation patterns are found at Divostin, Blagotin, Karanovo, Achilleion and Foeni-Salaş (Gimbutas, Winn and Shimabuku 1989; McPherron and Srejović 1988; Nikolić and Zečević 2001). Bones litter house floors. At all sites, cooking and plant food preparation are always near ovens and hearths.

Within pit houses, plant food preparation, as evidenced by grinding stones, tends to be behind (in relation to the door) the hearth. If there is an oven present, grinding stones and other tools related to food processing are located between the hearth and oven.

There is no evidence for long-term plant food storage or specific consumption area in the data from Foeni-Salaş. Part of the reason for this lack, is the absence of the ceramic analysis.

2. Animal husbandry

a. Animal enclosures

Pit houses surround the animal enclosure (Locus 52). This may have served to protect animals and to make it easier look after them. It would be more difficult to lose an animal if it had to pass between pit houses increasing the chance that someone would see it and prevent its escape. Early Neolithic corrals and enclosure are often near houses for reasons of security. There are few other sites in the Early Neolithic with an identified corral.

b. *Slaughtering and primary butchering of animals*

At Blagotin, Foeni-Salaş and Lepenski Vir, faunal remains are concentrated within pit houses. However, there is no evidence of slaughtering and primary butchering (gutting and dismemberment) within Foeni-Salaş pit dwellings. If primary butchering had taken place inside the structures, low quality remains would be concentrated in this area. In addition, it does not make sense that one would slaughter and then do primary butchering of an animal such as a cow or sheep in such a small space. This same pattern is at Blagotin and Lepenski Vir (Dimitrijević 2000; Radovanović 2000). Primary butchery and killing took place outside. Unfortunately, there is no evidence for primary butchery outside of the pit houses. Killing animals and primary butchering may be in an unexcavated location outside the Foeni-Salaş common area. However, given the extent of the excavations, this is unlikely. It is more likely that the animal slaughtering and primary butchery took place in the exterior locus, but left no traces since remains were brought inside the pit houses for secondary butchering (disarticulation) and consumption.

This has implications for seasonality of occupation and suggests that the site was primarily occupied during the colder parts of the year. While the analysis of the tooth eruption and wear data suggests year-round occupation, the dominance of winterkilled animals is clear (e.g. Arnold and Greenfield 2006: 72, table 8.52).

c. *Secondary butchering of animals*

The pit houses show evidence for secondary butchering. Bones litter house floors. Secondary butchering is located adjacent to hearths and cooking areas. As butchering relates to cooking, it makes sense that it occur close to the cooking area. Evidence of hide processing often overlaps butchery places and is near hearths.

d. *Disposal of animal remains*

Disposal of animal remains of more or less randomly placed within and throughout pit houses. There are so many animal bones within pit houses that it appears that they were simply processed and then tossed around the structure.

3. *Ceramic production*

There is evidence of ceramic production only in Loci 7 and 23. There are small concentrations of debris related to ceramic production (ceramic rubbers and temper). It is

likely that ceramic production took place in each pit house given the presence of ovens and/or hearths in each. Both can be used for ceramic firing, food, heating, etc. The best evidence would come from the presence of ceramic wasters, but these data are unavailable at present. No other sites in the region have been analyzed with this issue in mind.

4. *Weaving*

Weaving appears to take place mostly outside at Foeni-Salaş. The greatest concentration of loom weights occurs outside pit houses at Foeni-Salaş. Inside pit houses, they occur singly and in small quantities. Loom weights on floors at Foeni-Salaş tend to be in areas that receive light from ovens, hearths and entranceways. This may be coincidental, as it appears much weight storage occurred on wall shelves. They may have fallen in towards the centre of the pit dwelling. It appears that weaving was mainly an outdoor activity. The tools needed for it were stored within pit houses.

This pattern is similar to that at other sites where many loom weights are present, e.g. the outdoor courtyards at Zadabravljje in Serbia (Minichreiter 2001: 204) and Achilleion (Gimbutas, Winn and Shimabuku 1989). If the theory that Foeni-Salaş was inhabited during colder weather is correct, it is strange that there is stronger evidence for weaving exterior to pit houses. This may be because there was better light or more space that facilitated this activity. Weaving may have taken place outside in the spring but it would be difficult to do in the bitter cold winter months. It is likely that the outdoor activity areas were utilized in periods of milder winter weather or in the warmer months.

5. *Lithic production*

Lithic production occurs separately from most other activities. At a Starčevo site called Zadubravljje in Serbia, there is a possible workshop for lithic production, further segregating it from other activities (Minichreiter 2001). At Foeni-Salaş, there is less activity area segregation. Lithic work is in the corners of pit houses or at the edges of the site. This concentrates lithic debitage, making it possible to discern where production occurred. In general, there is little debitage at Foeni-Salaş, probably because tools were brought to the site from elsewhere more or less finished and were for the most part simply repaired or maintained on the site. There is no evidence of a midden or debitage

pile within pit houses or on site. It is interesting to note that lithic repair areas are tidier compared to the rest of the activity areas in the pit houses.

6. *Storage*

Storage occurs both in and out of the Foeni-Salaş pit houses. Inside pit houses, storage is often on either side of an entrance into a pit house. Even walls and roofs are utilized for storage. Weights of various types, particularly spindle whorls and bolas, were hung from ceilings. The concentrations of weights and ceramics at the interior edges of the pit houses indicate that storage also occurred on shelves along the periphery of the pit houses. Shelving and hanging increases the maximum storage area a pit house has. Ceramic storage at the exterior edge further increases the useable living space in the center of a pit house.

When storage is outside pit houses, it is still close by and convenient. The best example is the Locus 25 storage pit, which is the only storage pit exterior to the pit houses. In other Early Neolithic site, such as Achilleion, storage pits occur outside structures (Gimbutas, Winn and Shimabuku 1989). However, at Starčevo sites, such as Divostin and Lepenski Vir, exterior storage pits are not common (McPherron and Srejović 1988; Radovanović 2000). The lack of exterior pits at Starčevo sites would indicate short-term occupation, as suggested by Greenfield and Jongsma (1996, in press). There would be no point putting anything into storage if the group would be moving on shortly. Storage pits may have been better for longer-term stays.

7. *Ritual*

Foeni-Salaş and almost all other Early Neolithic settlements have figurines and altars associated with them. The placement of figurines at Foeni-Salaş is similar to what is happening at Achilleion, Karanovo and the later phases at Divostin I. At Achilleion, figurines are associated with architectural features and in activity areas inside and outside of houses (Gimbutas 1989: 213, 254). At Divostin I and Blagotin, they appear in and nearby dwellings. Blagotin also has a single central pit house with very large figurines (Greenfield 2000; Nikolić and Zečević 2001). Unlike Blagotin, the central pit house at Foeni-Salaş has no concentration of figurines. There is no clear special place with religious meaning. Figurines may be associated with pit houses as household deities or spirits. Their association with pit houses would indicate a domestic character.

The type and distribution of religious paraphernalia at Foeni-Salaş is similar to that found at other sites in the region. Figurines are not associated with clearly marked religious areas, but are widely distributed within domestic activity areas. Figurines may have been toys to amuse children and not have had a ritual function at all.

8. *Specialized structures*

Specialized structures did not appear until much later in the European Neolithic. This supports the domestic mode of production at Foeni-Salaş proposed by Senior (2004). This economic diversification seems to be the norm in Early Neolithic sites such as Starčevo and Divostin (McPherron and Srejović 1988).

Strong spatial evidence for specialization does not exist at Foeni-Salaş. Specialization for pottery production and green stone exists at Early Neolithic sites in Belgium and South Korea.

VI. Suggestions for future research

Future excavations of Early Neolithic pits should look for features such as ovens and hearths that would mean that the pits are pit dwellings. It would be interesting to see if some Early Neolithic sites had pits used specifically for one activity. This would show evidence for specialization or at least specialized structures. This is not apparent at Foeni-Salaş, though known in the Early Neolithic in other places such as Amsa-dong in South Korea and in many sites in the Middle East (Bale and Ko 2006). Specialization occurs in many Neolithic sites in later periods. In any case, possible pit houses should be carefully excavated. A good excavation can recognize fine activity areas in the field (Fagan 1999: 205).

There are further avenues of research that would clarify aspects of the spatial analysis and give further insight to Early Neolithic communities in the Balkans. It will be possible to compare activity areas within the same region and time to determine if there are differences and why. This study gives more insight to behavioural spatial relations and patterns in the Early Neolithic Balkans. The larger relationships between archaeological and natural space have been examined in the past (Gaffney, Stančić, Watson 1996: 135) and now more detailed examinations of particular, localized space and archaeological patterns can begin. An understanding of what activities and where they occur can give rise to economical studies.

The archaeological evidence documents communities, economic activities and cultural patterns. This spatial analysis contributes to a more complete understanding and use of complex social models and helps to clarify the social history of the earliest Balkan communities.

The results of this spatial analysis generally agreed with Senior's (2004) conclusion that the Foeni-Salaş socio-economic organization is based upon a nuclear household unit. Many activities areas repeat themselves suggesting more than one family is present. If Locus 23 signified a structure for a leader, this would support Zita's argument (2006) that Foeni-Salaş had a big man type of leadership.

Other avenues for further research are for evidence of social differentiation at the site and what form do households take (nuclear or extended families)? This issue has been addressed for other early farming sites (e.g. Ndongonwane, in South Africa- Singer 2007).

Further analysis can refine the results of this study. A bone butchering analysis would be particularly useful. Is butchered bone found in certain areas? Does certain species show cut marks? Further analysis will give insight to butchery activity locations. More information about seasonality would help answer the question of how long Foeni-Salaş was inhabited.

A ceramic analysis of the types, forms and functionality of ceramic remains will give insight to additional storage areas and will help identify areas used for consumption if specific vessels were eaten from. A comparison between ceramics from this site and a contemporary site known to be sedentary would be interesting. It would be informative to see if the ceramics at Foeni-Salaş were lighter in weight and temper in comparison to those of a sedentary society. It is expected that a mobile society would want lighter ceramics for ease of mobility, but it is also possible that tough thick durable ones would be wanted.

A lithic use/wear analysis and a refined weight analyses would benefit the spatial analysis. If activity and use categories are refined, it will help pinpoint specific activity areas that may have not been apparent with the general lithic data that currently exists.

VII. Conclusion

The information gathered from Foeni-Salaş shows fundamental differences and similarities in site structure and nature when compared to other Early Neolithic sites in the Balkans and elsewhere in Europe and the world. This could stem from behavioural differences and similarities.

This spatial analysis may help to better understand the nature of increasing social complexity in the Balkans. The results of the spatial analysis show an ordered community with each family in its own pit house. In a small community such as Foeni-Salaş, family and kin ties would be of great importance. Households interacted on a daily basis and it is likely that there were familial ties between households.

This analysis shows that it is important for archaeologists not to rely solely on statistical methods to conduct spatial analysis. Statistics serve as a way of stating whether a pattern is present, but a visual analysis is needed to determine the patterns' nature and to deduce what produced it. The more detailed the map is, the more true to life the *in situ* patterns are preserved. It is important to examine archaeological remains in different ways.

This GIS study develops a stronger understanding of how human behaviour can influence site formation processes. Activity area analysis can give insight to the origins of specialization. A better understanding of the activities at Foeni-Salaş is achieved through a micro-scale GIS analysis. By identifying clusters of like artefacts and related artefacts, it is possible to identify activity areas. It was even possible to locate features not recognized in the field. It defined the location of specific activities and demonstrated what processes were active in their formation. It also demonstrates how archaeologists can think more carefully and in different ways about the interpretation of multiple component sites. It demonstrated that objects and activities carried out within the domestic domain serve as a link to understanding social practices and behaviour. The utility of examining archaeological sites at the micro-scale to determine activities is demonstrated.

This study also demonstrates the importance of preserving records in more than one form. Incorporating these data into a spatial analysis program renders the records accessible despite deteriorating originals. Finer level investigations are possible. A useful

side effect was the digital preservation of the records making it easier to share and to store. The conservation of old and new archaeological data will be important for future research that can build on current anthropological thought and theory.

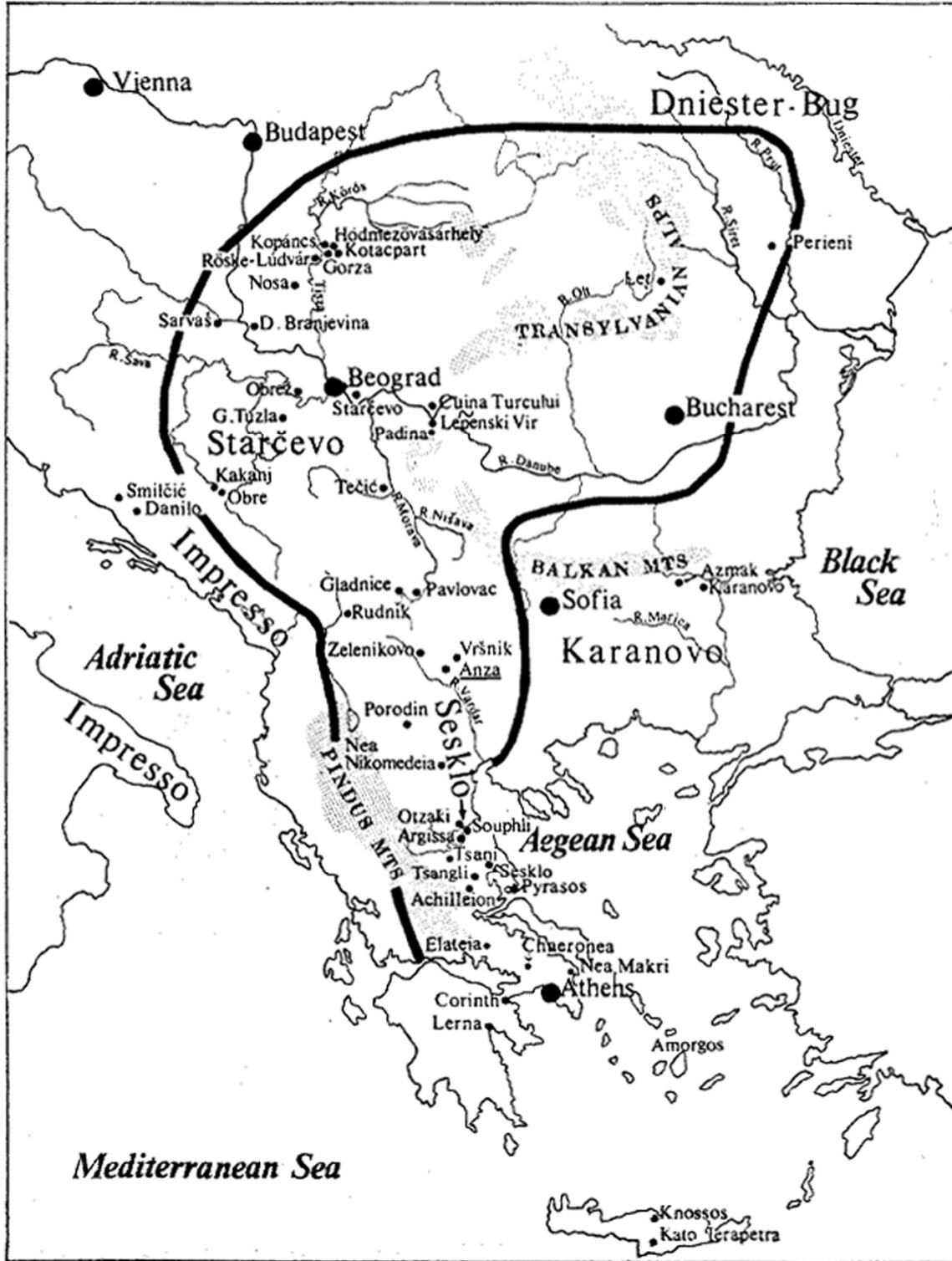
This study is another step towards a clear understanding of Early Neolithic behavioural and spatial patterns in the Balkans. As the use of GIS expands in micro-scale archaeological research, it is hoped that more information concerning the Early Neolithic in the Balkans will be obtained.

Figures



Early Neolithic Culture Groups of Southeastern Europe

Figure 1: Early Neolithic culture groups of southeastern Europe
(Used with permission by Haskel Greenfield on September 19th, 2007.)



Starcevo distribution in the Balkans ca. 6300-5300 B.C.

Figure 2: Starcevo distributions in the Balkans (Gimbutas 1974:26). Modified from Gimbutas (1974: figure 1); Reproduced from the Journal of Field Archaeology with permission of the Trustees of Boston University. All rights reserved

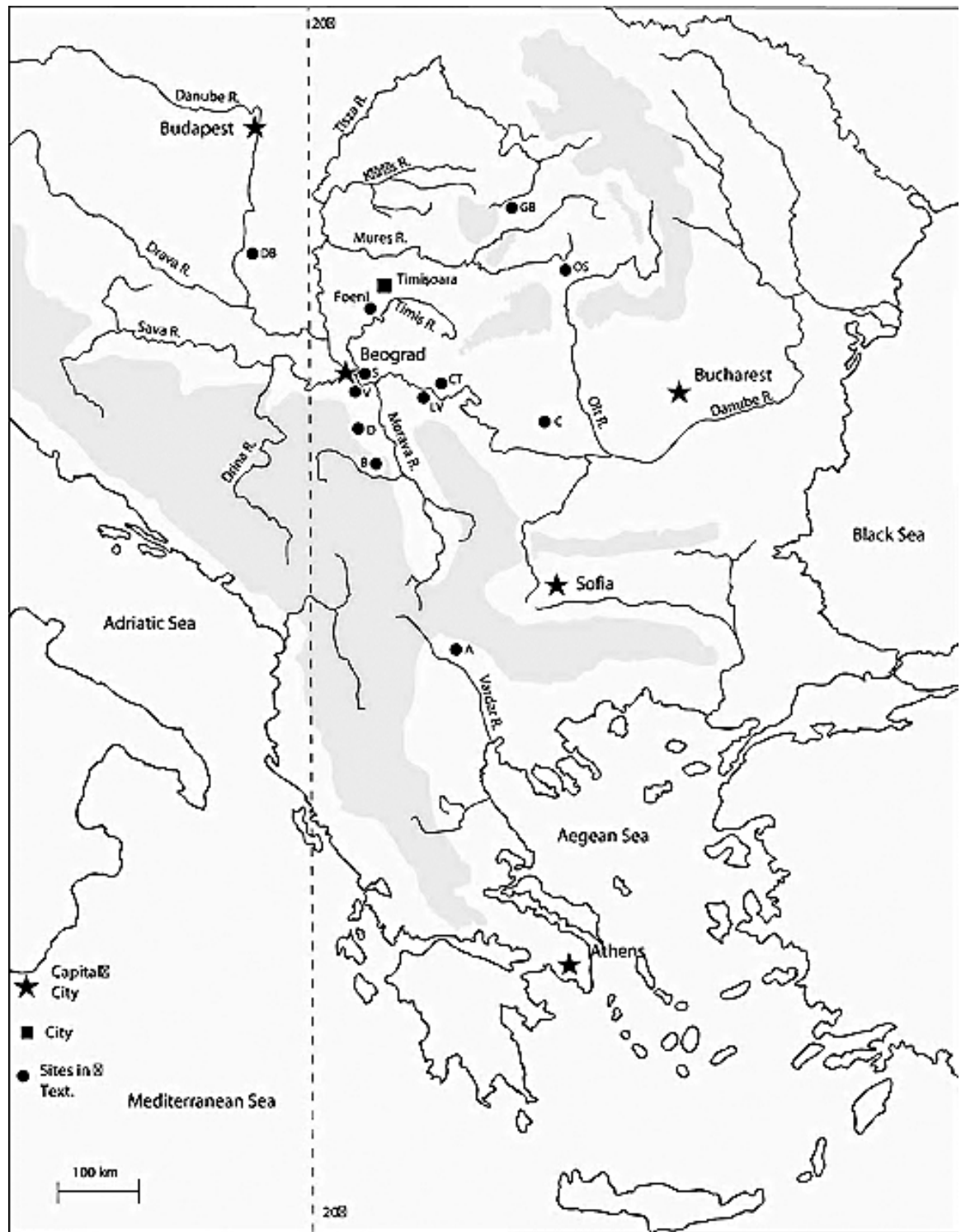
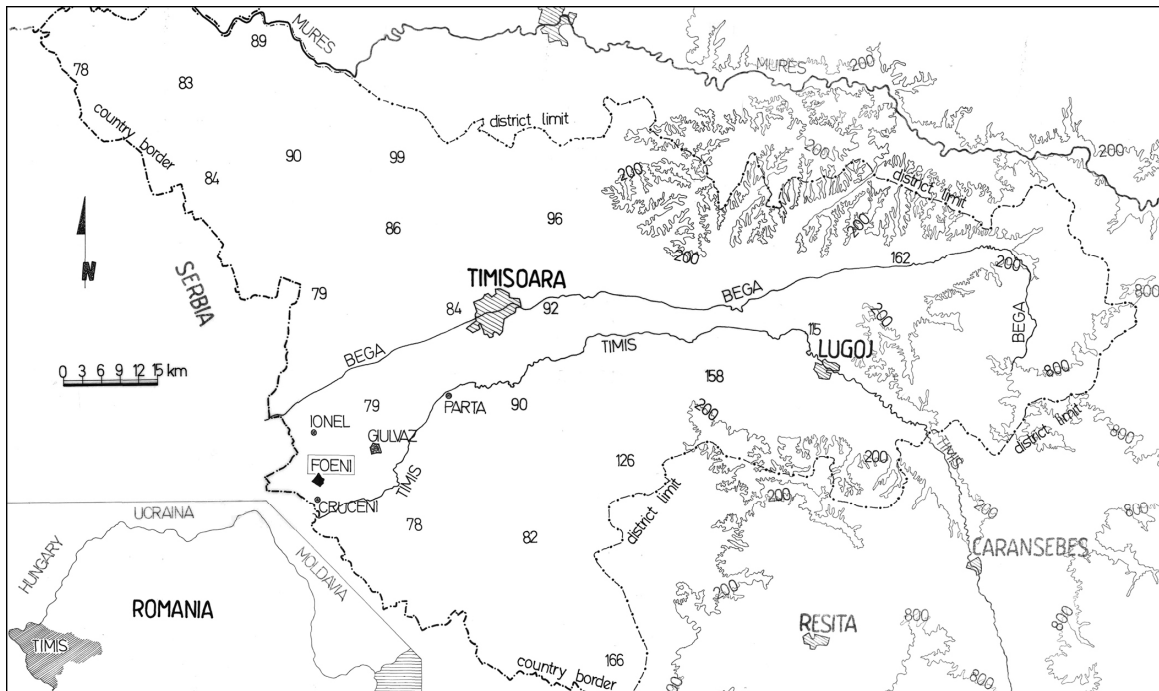


Figure 3: Starčevo sites in the Balkans. A= Anzabegovo, B= Blagotin, CT= Cuina Turcului, D= Divostin, DB=Donja Branjevina, GB= Gura Baciului, LV= Lepenski Vir, OS=Ocna-Sibiu, S= Starčevo, V=Vinča
 (Used with permission by Haskel Greenfield on September 19th, 2007.)

(Used with permission by Haskel Greenfield on September 19th, 2007.)



Map of Timis District

Figure 4: Map of Timis district



Banat Region and Foeni Location

Figure 5: Banat Region with location of Foeni

(Used with permission by Haskel Greenfield on September 19th, 2007.)

(Used with permission by Haskel Greenfield on September 19th, 2007.)

Topography of the Balkans

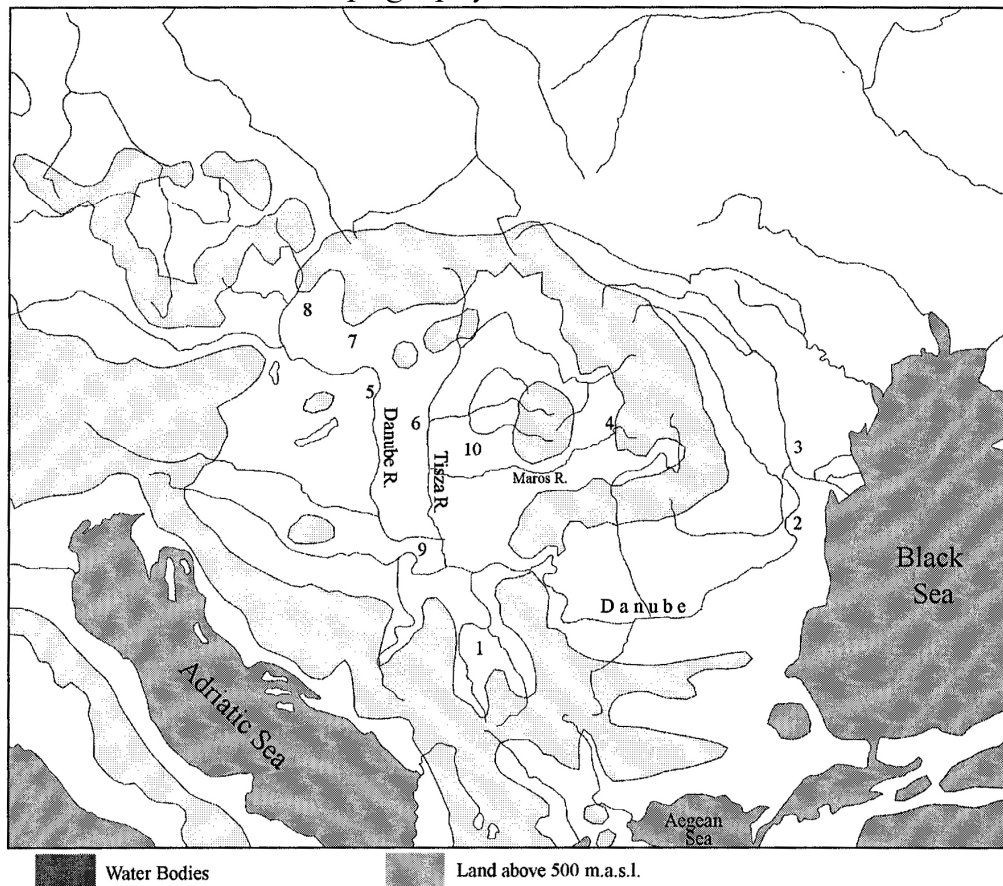


Figure 6: Topography of the Balkans

Foeni-Salas Grid System

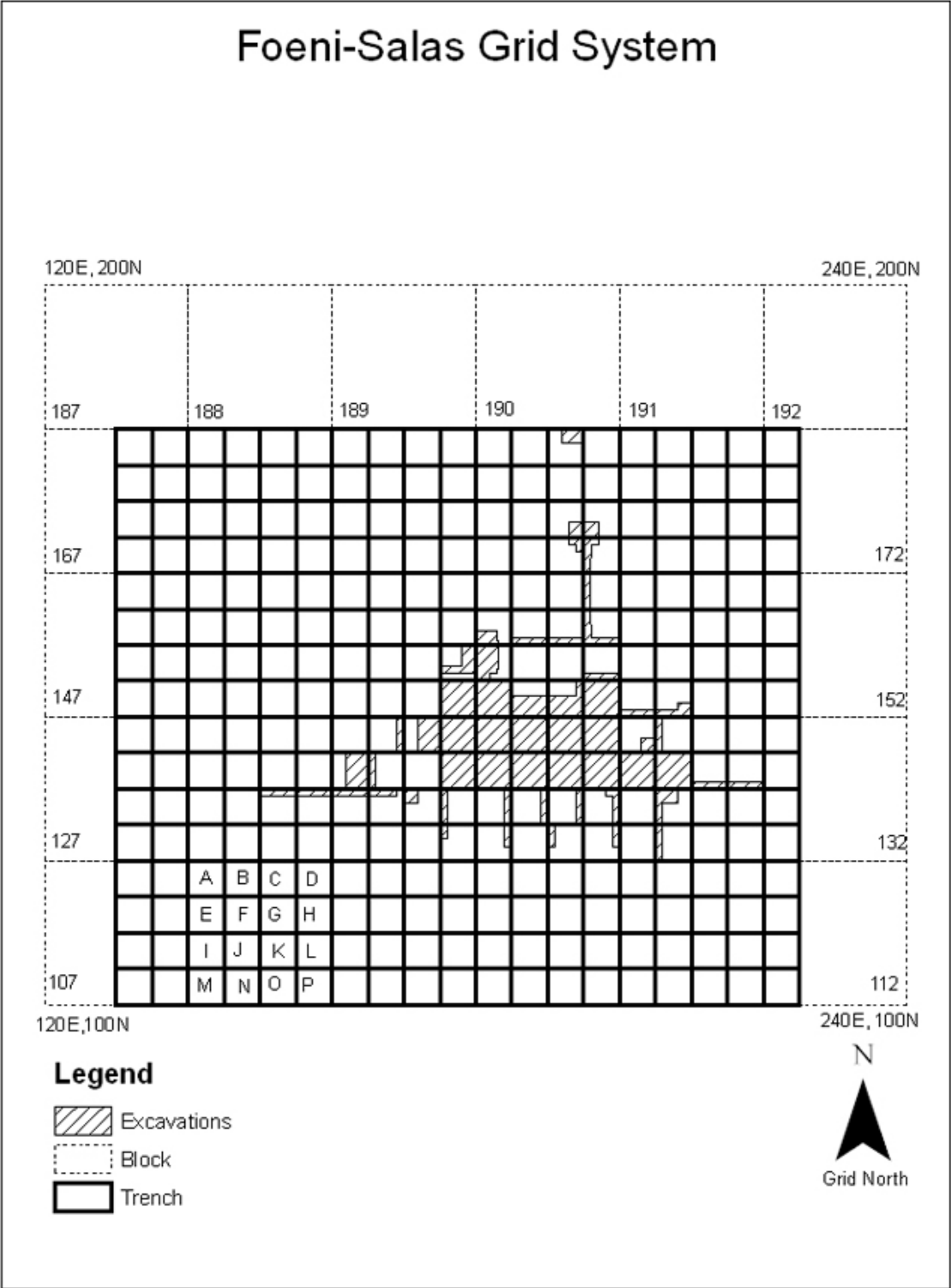


Figure 7: Grid system at Foeni-Salaş

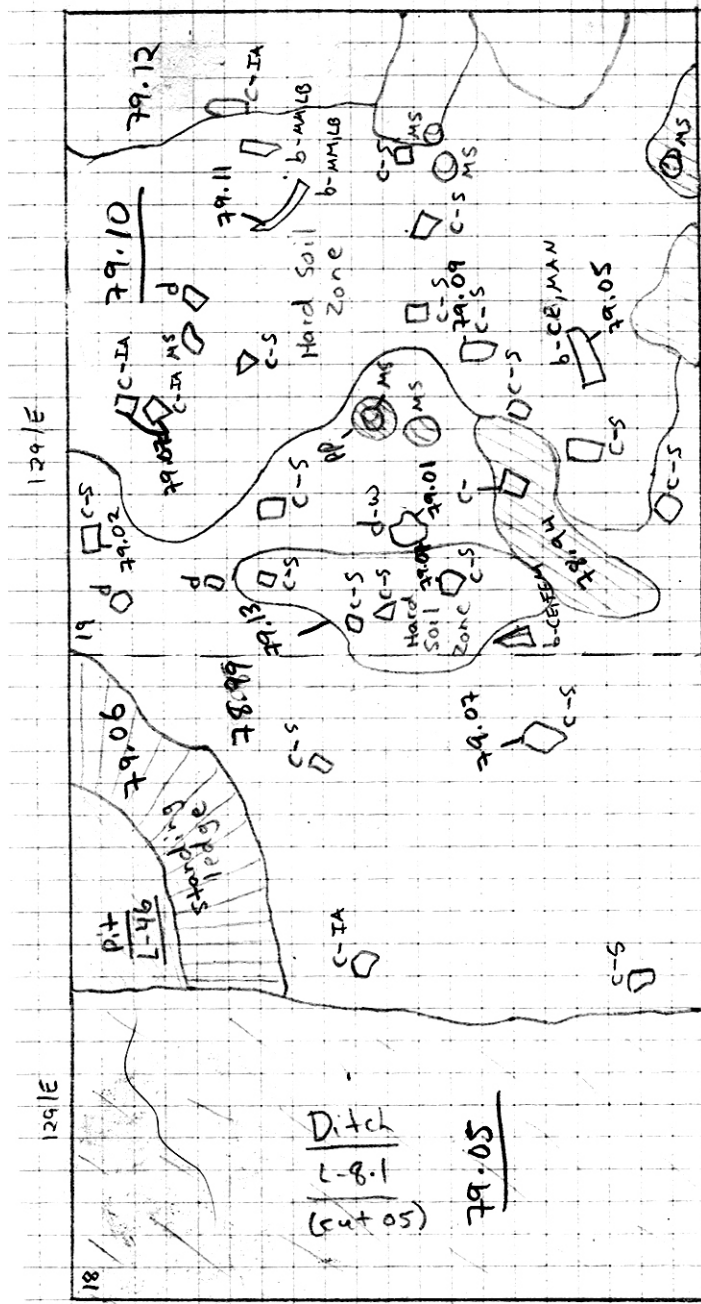


Figure 8: Detailed hand drawn map
 (Used with permission by Haskel Greenfield on September 19th, 2007.)

Medieval Loci

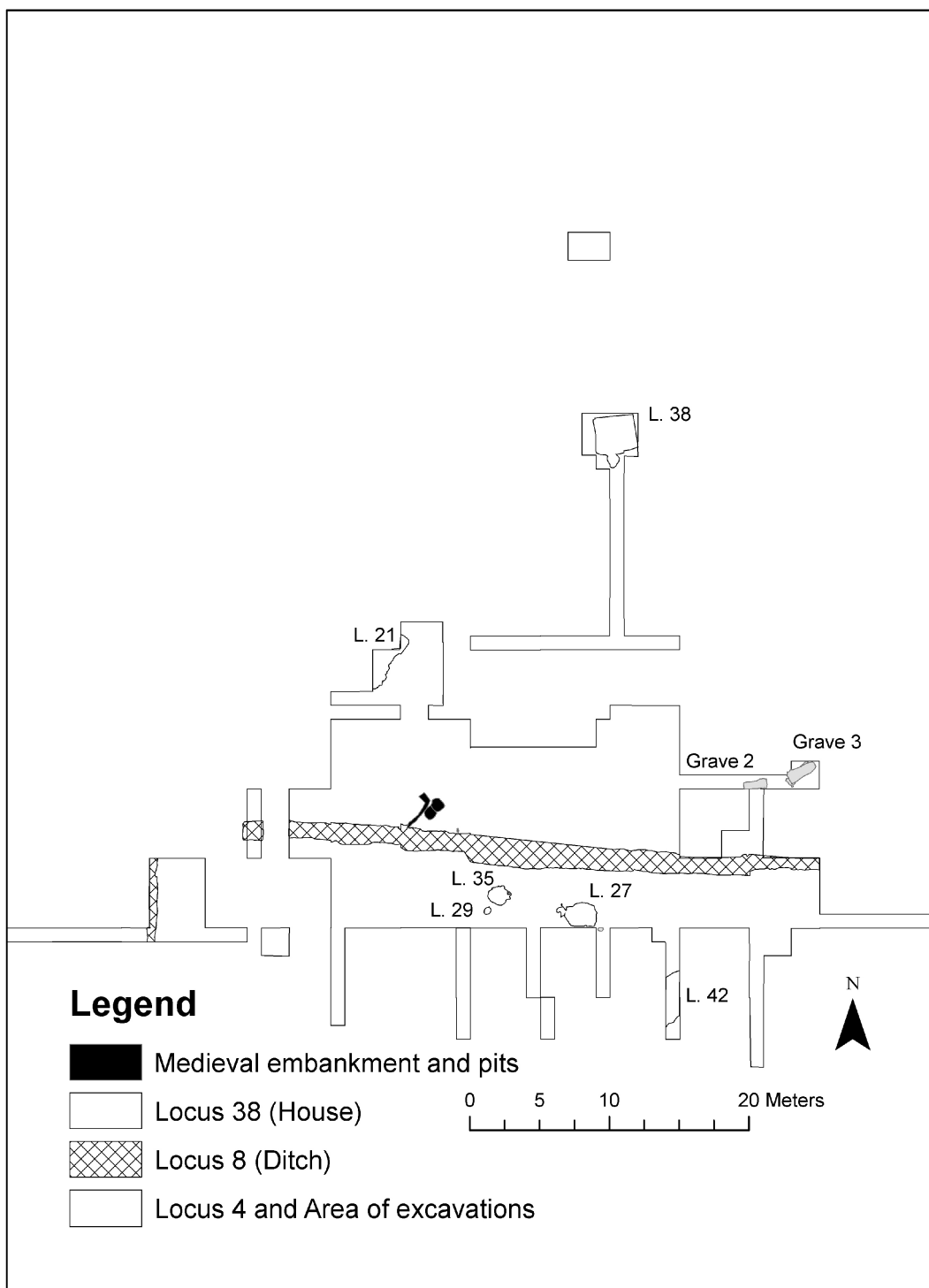


Figure 9: Medieval Loci

Iron Age Loci

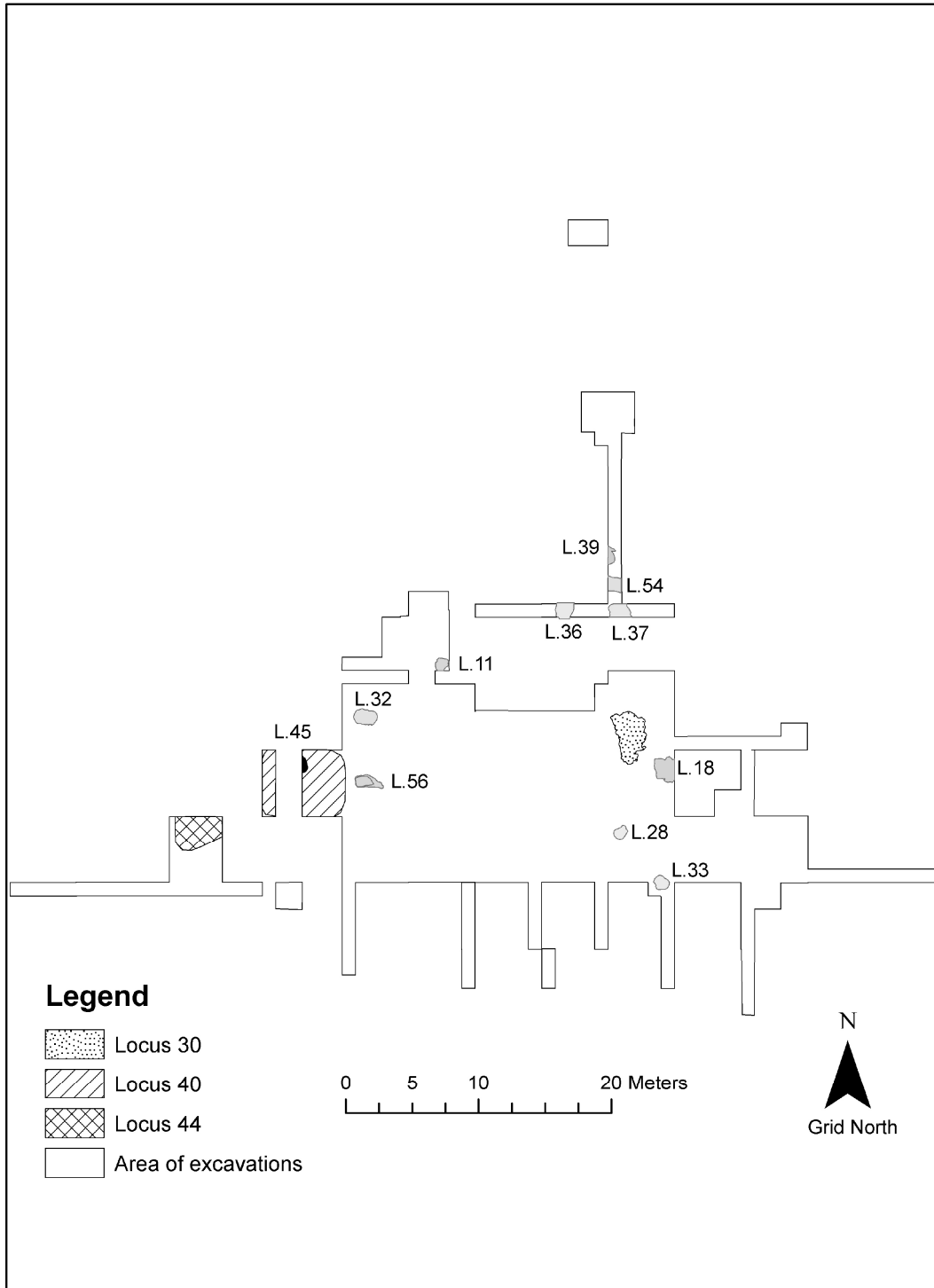


Figure 10: Iron Age Loci

Fig

Bronze Age loci

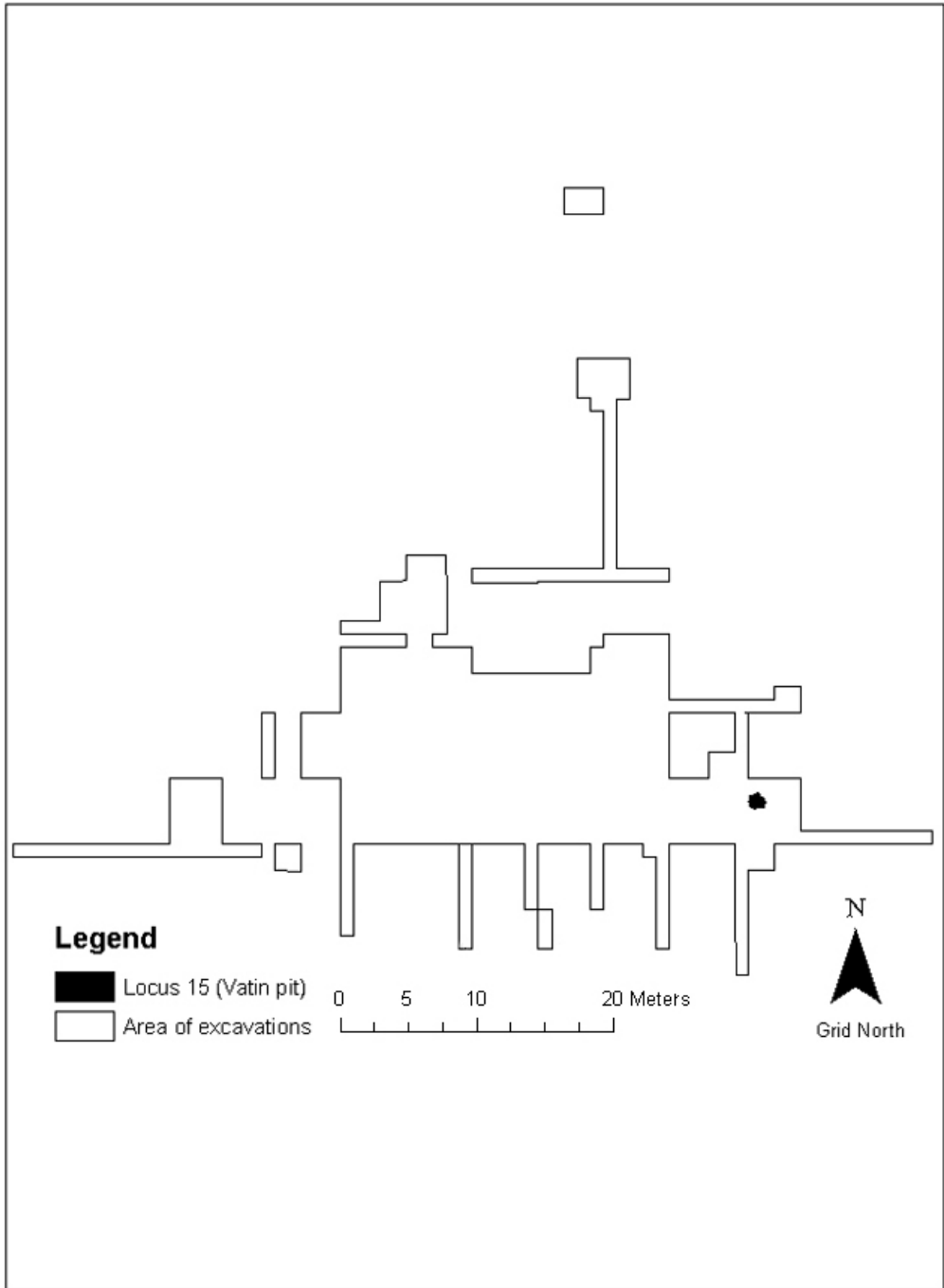


Figure 11: Bronze-Age Loci at Foeni-Salaş

Location of Locus 25- storage pit

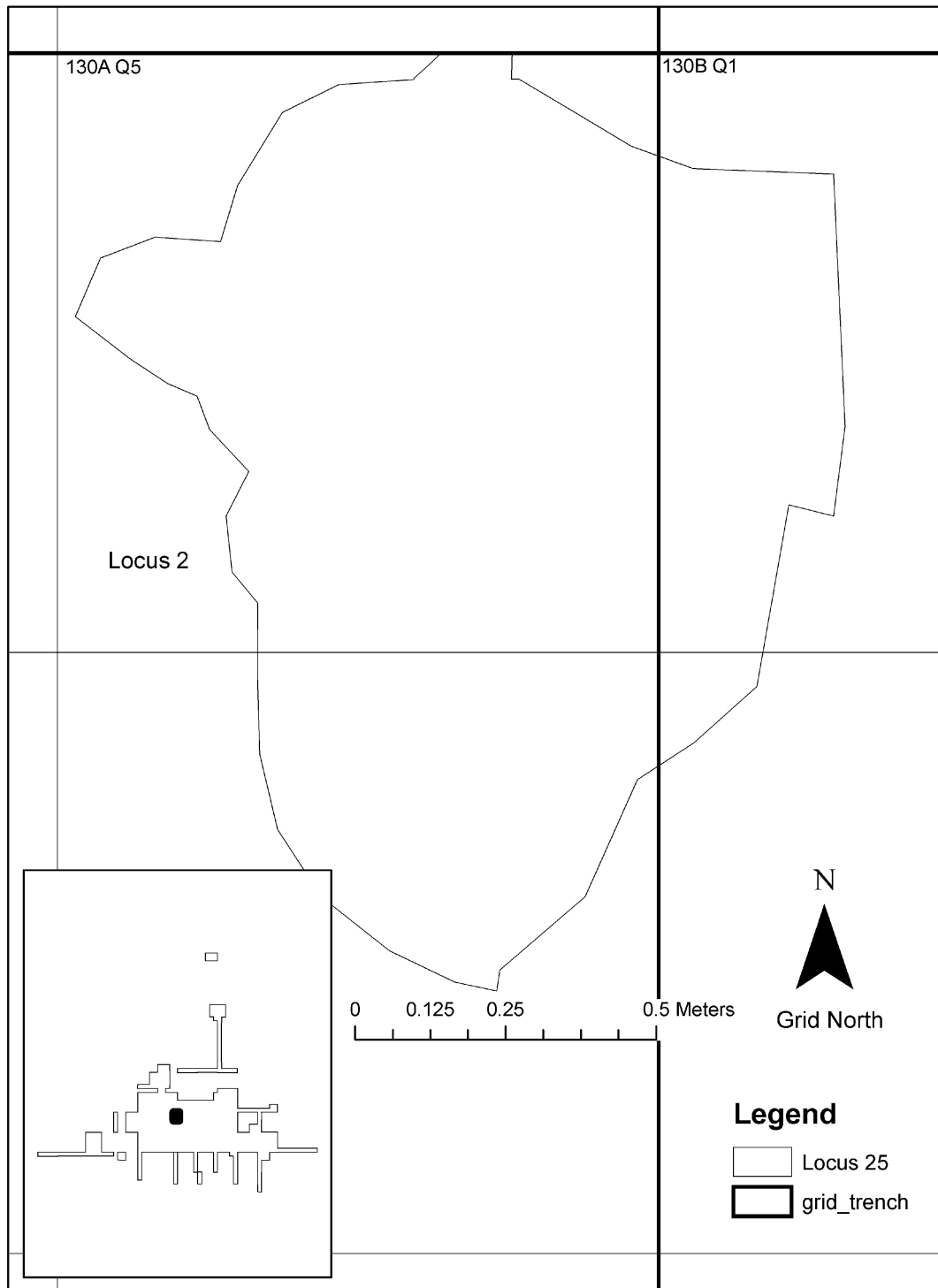


Figure 12: Locus 25 storage pit

Location of Locus 41

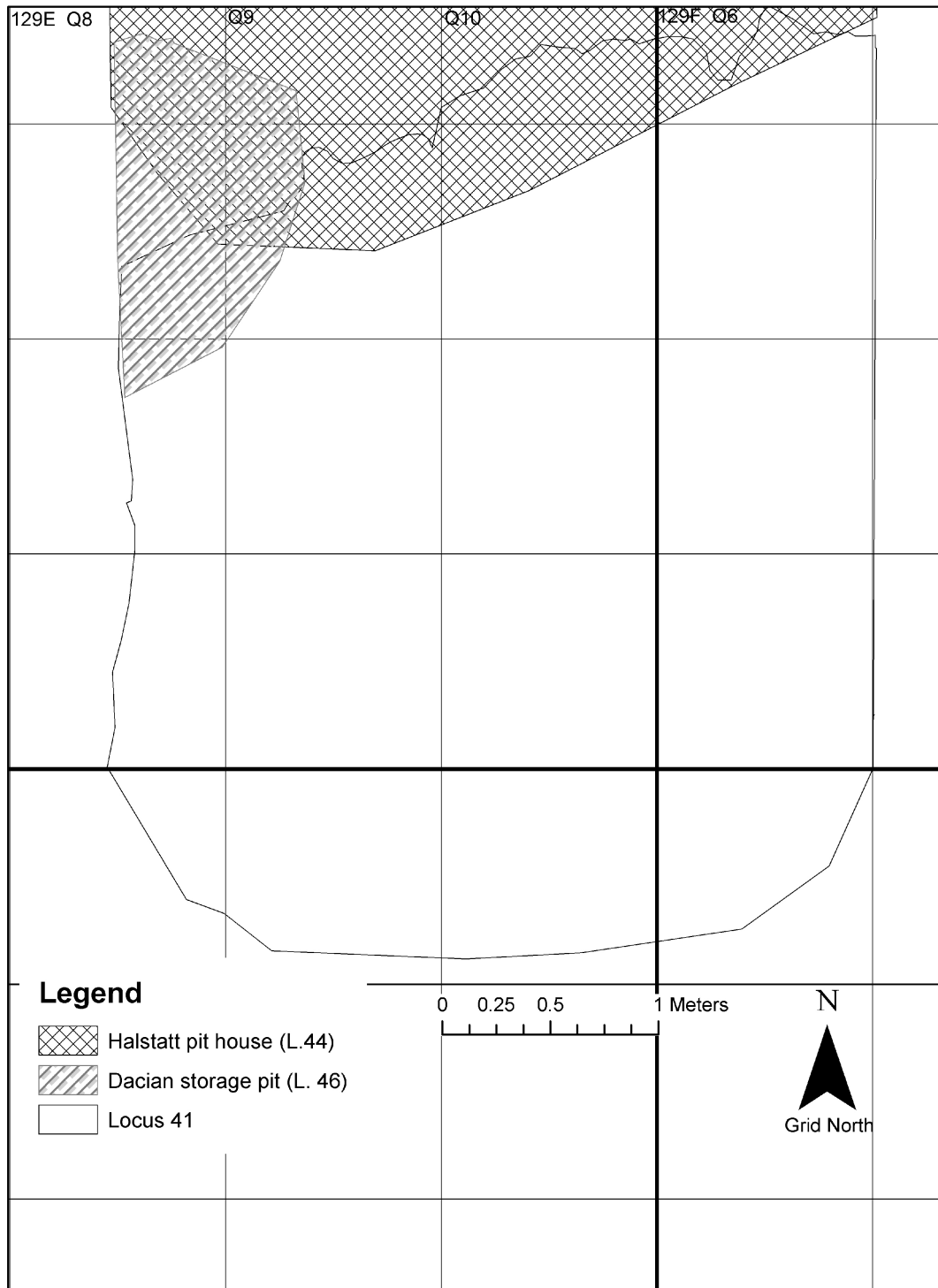


Figure 13: Location of Locus 41

Locus 52

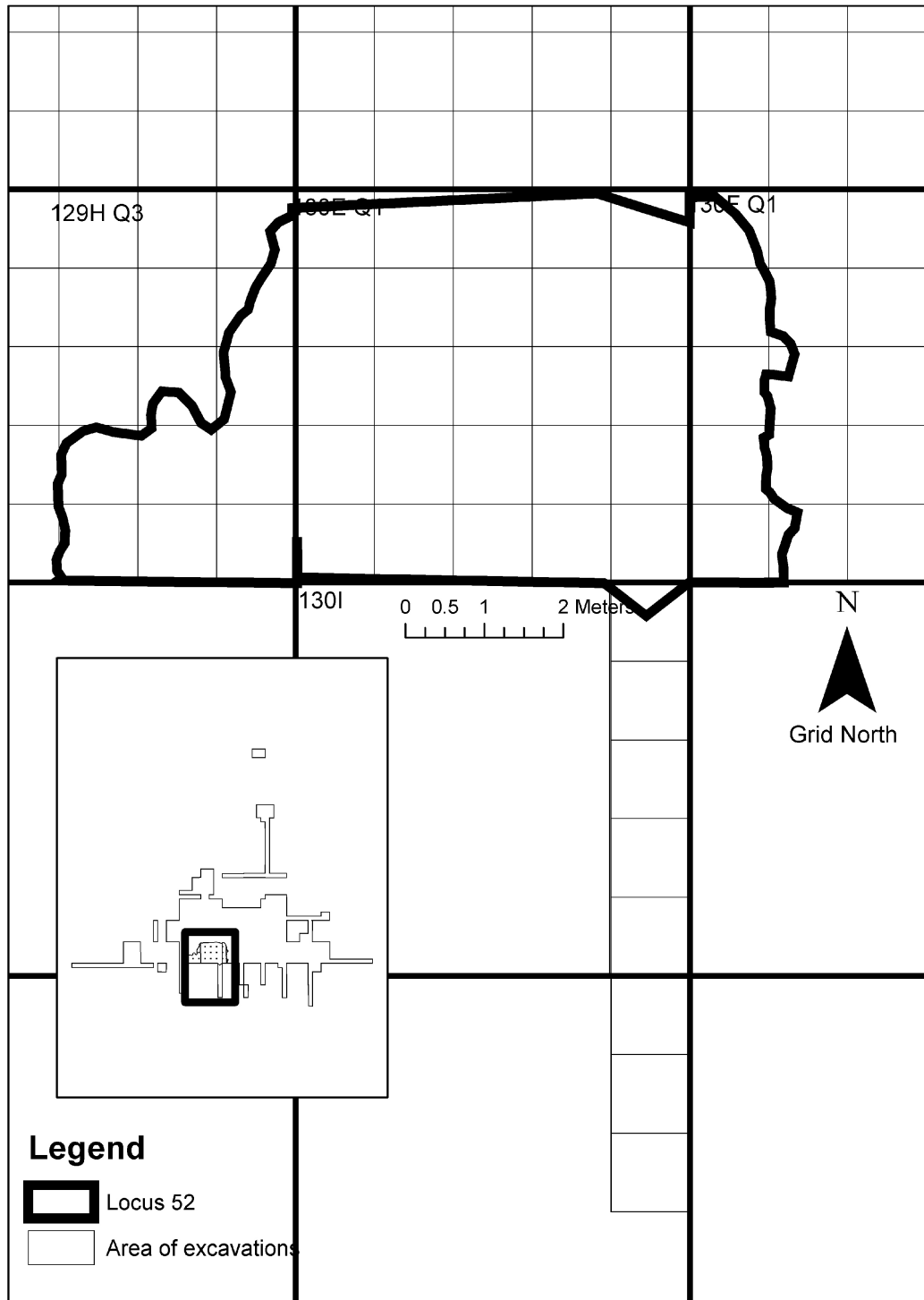


Figure 14: Location of Locus 52

Location of Locus 53

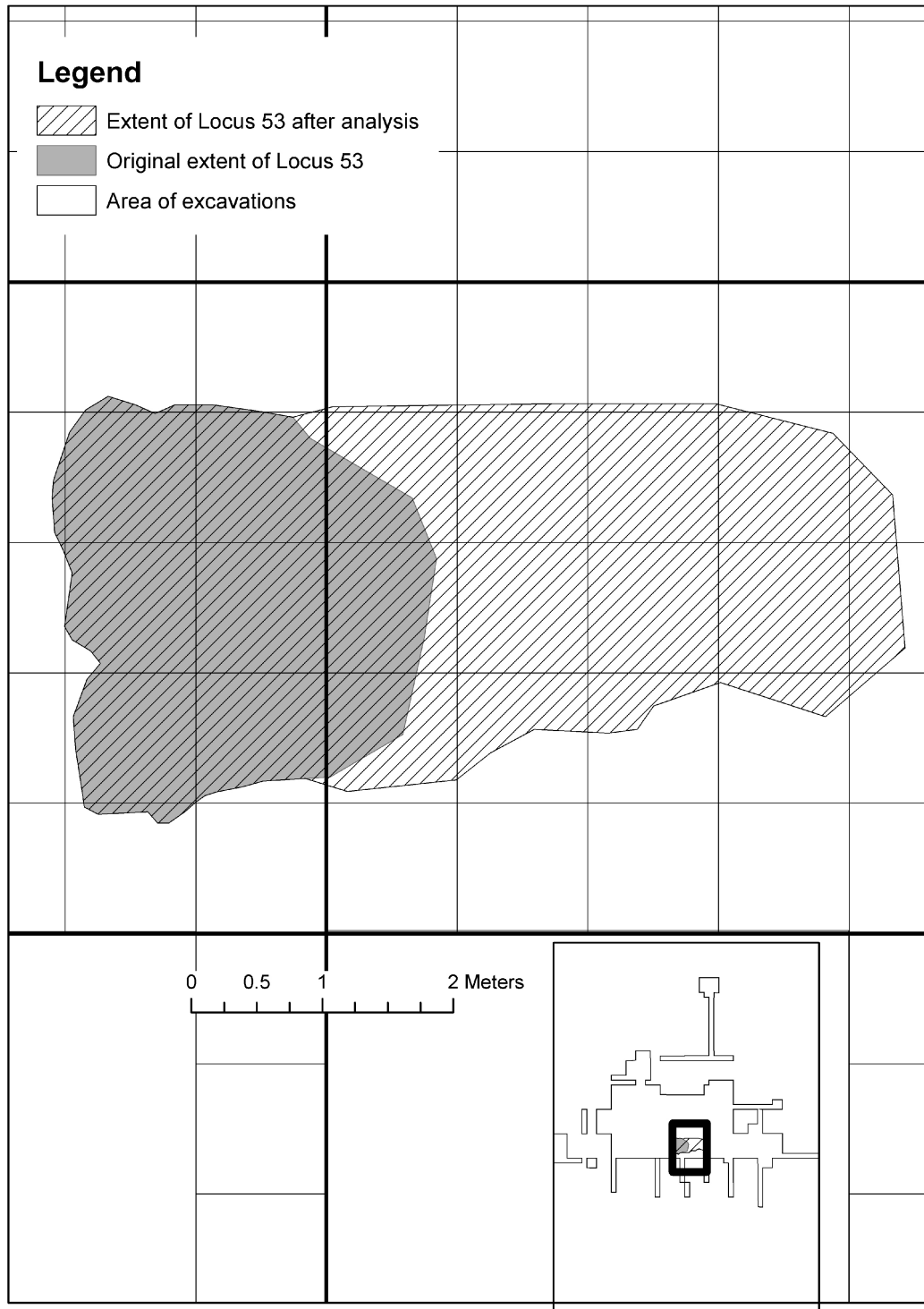


Figure 15: Location of Locus 53

Starcevo loci

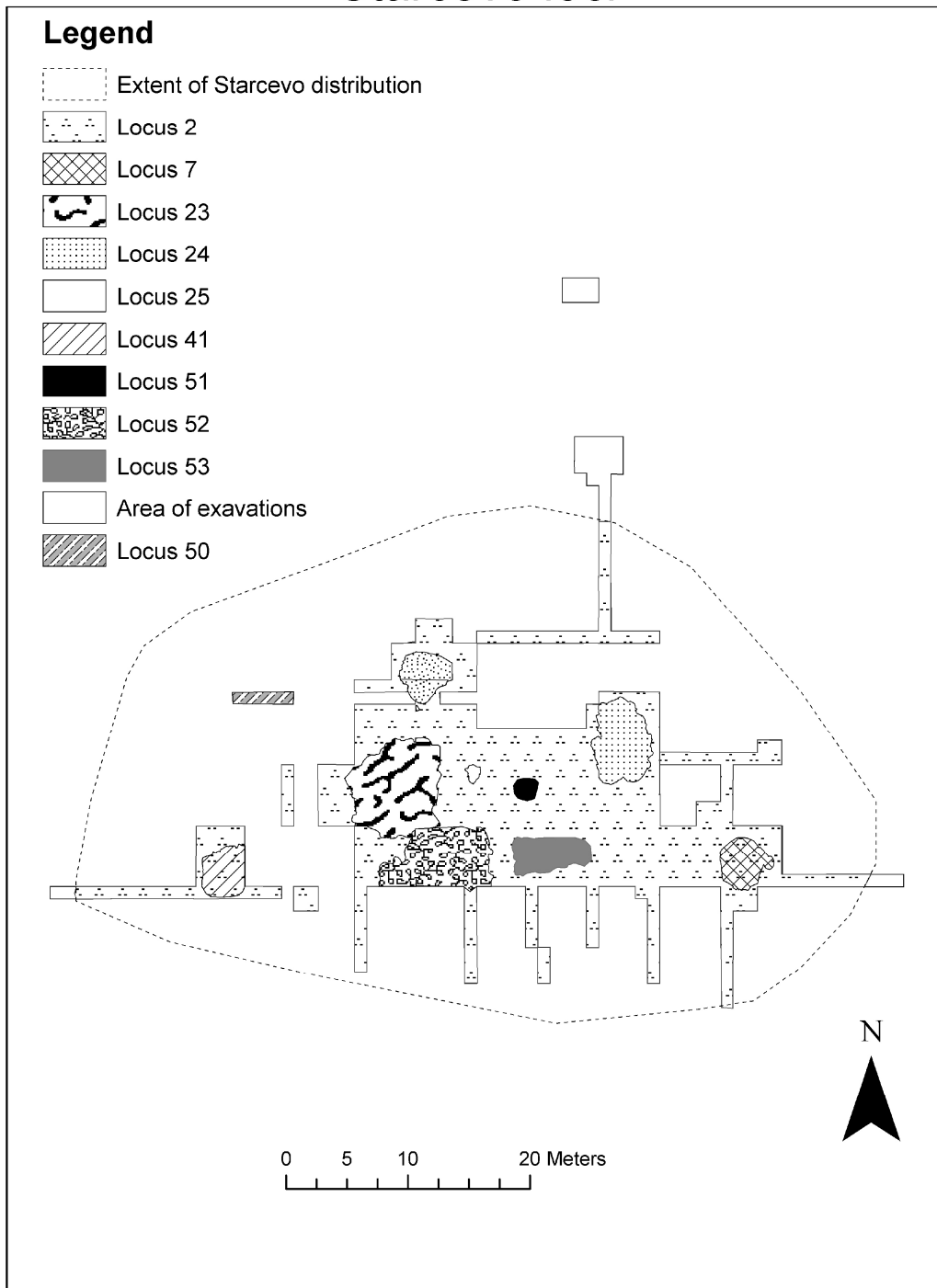


Figure 16: Starčevo Loci

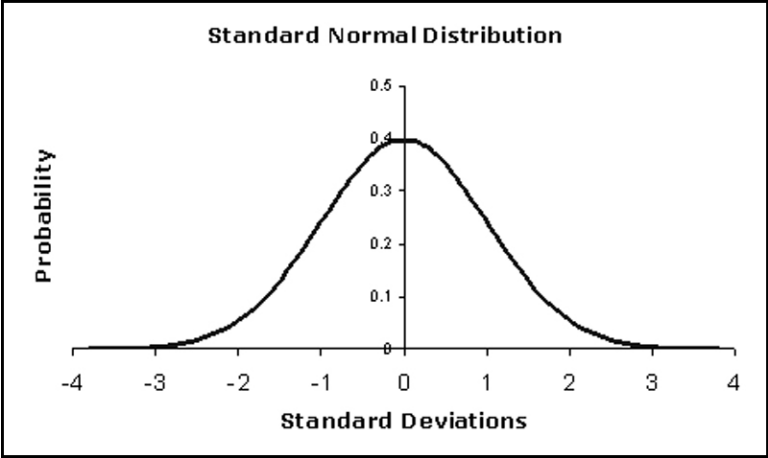


Figure 17: Standard normal distribution

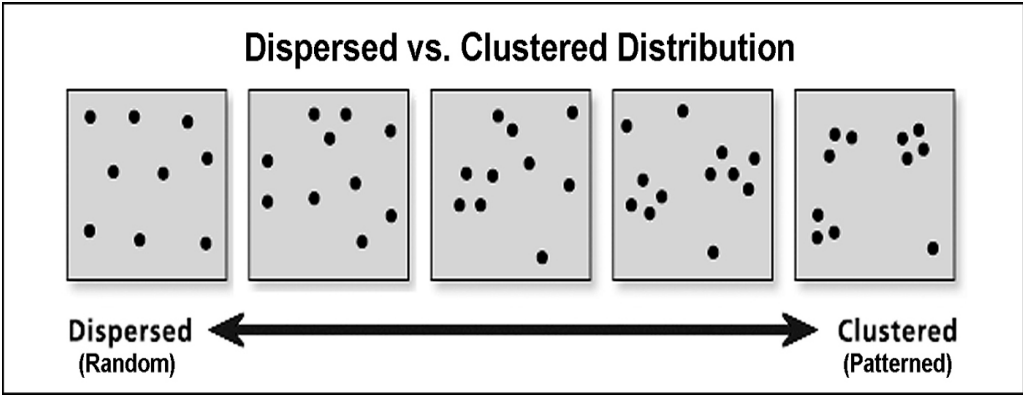
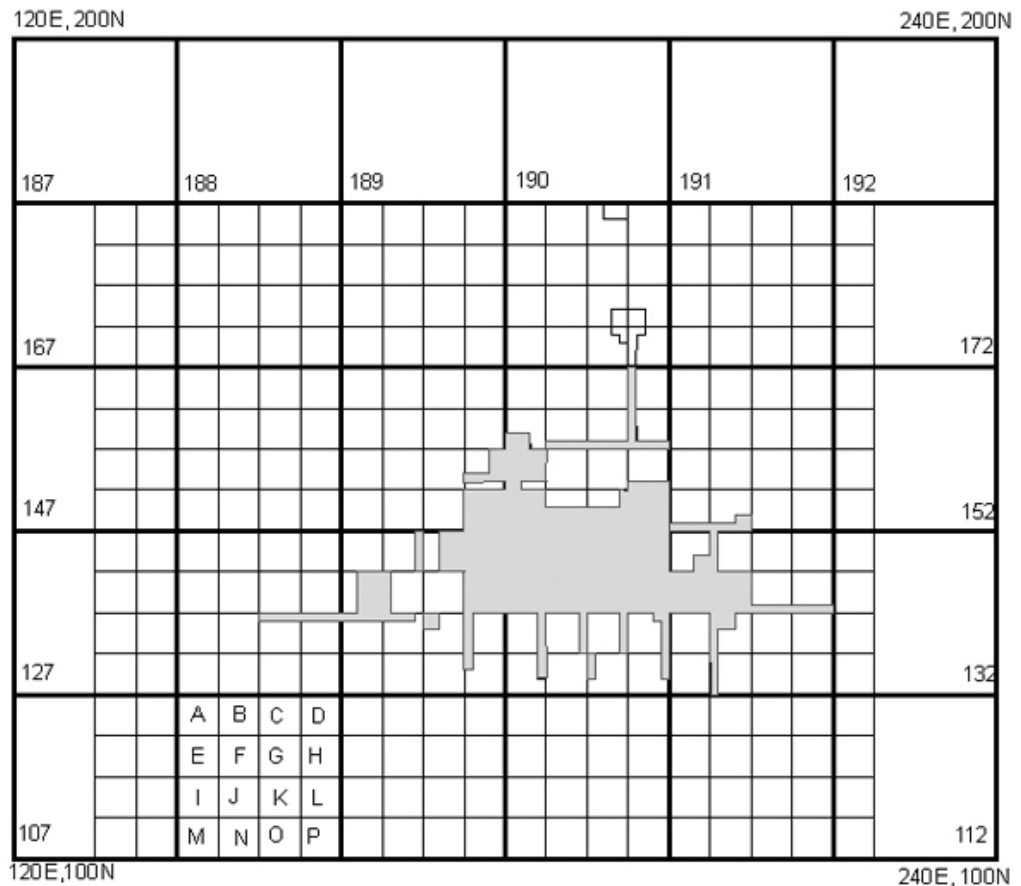


Figure 18: Clustered versus random distribution

Location of Locus 2



Note: Due to map scale, grid quads are not shown. Each trench contains 5x5 1 metre quads.

Legend

- Locus 2
- Excavation extent
- Grid blocks
- Grid Trenches

Figure 19: Location of Locus 2

Digitized bone locations in Locus 2

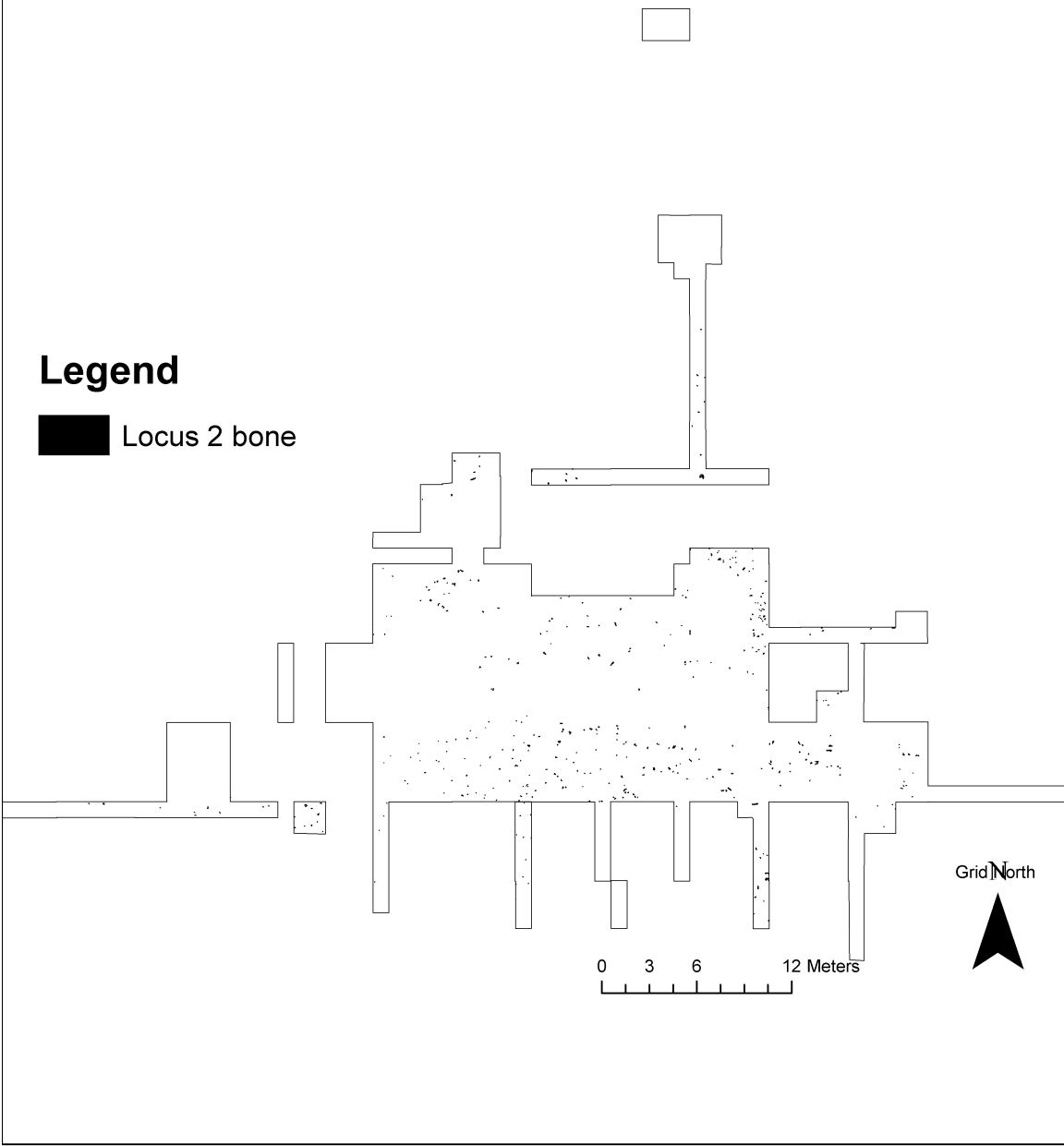


Figure 20: Digitized bone in Locus 2

Centroid Bos taurus locations in Locus 2

Legend

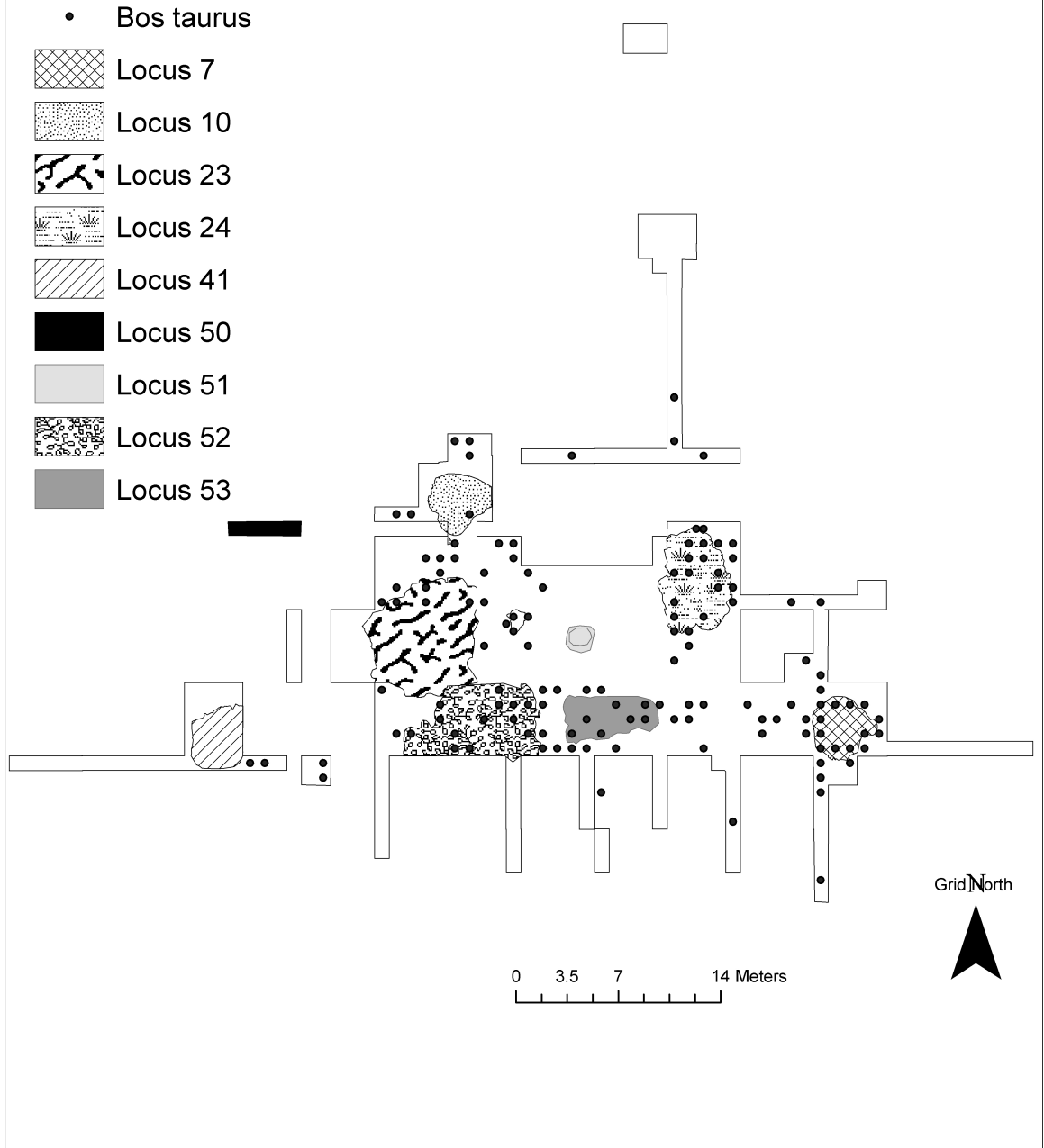









Figure 21: Location of Bos taurus based on centroid

Early Neolithic ceramic locations in Locus 2

Legend

-  Starcevo ceramic
-  Locus 10
-  Locus 14
-  Locus 23
-  Locus 24
-  Locus 28
-  Locus 52

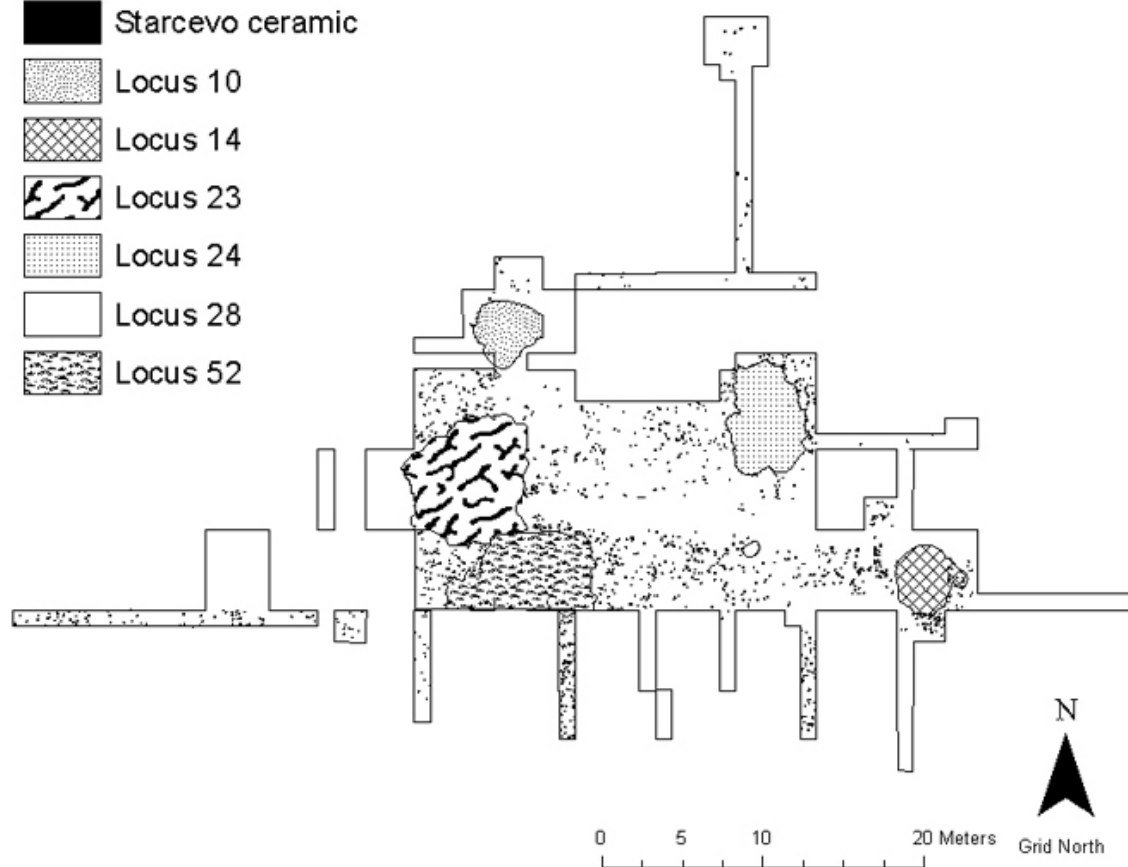


Figure 22: Digitized Early Neolithic ceramics in Locus 2

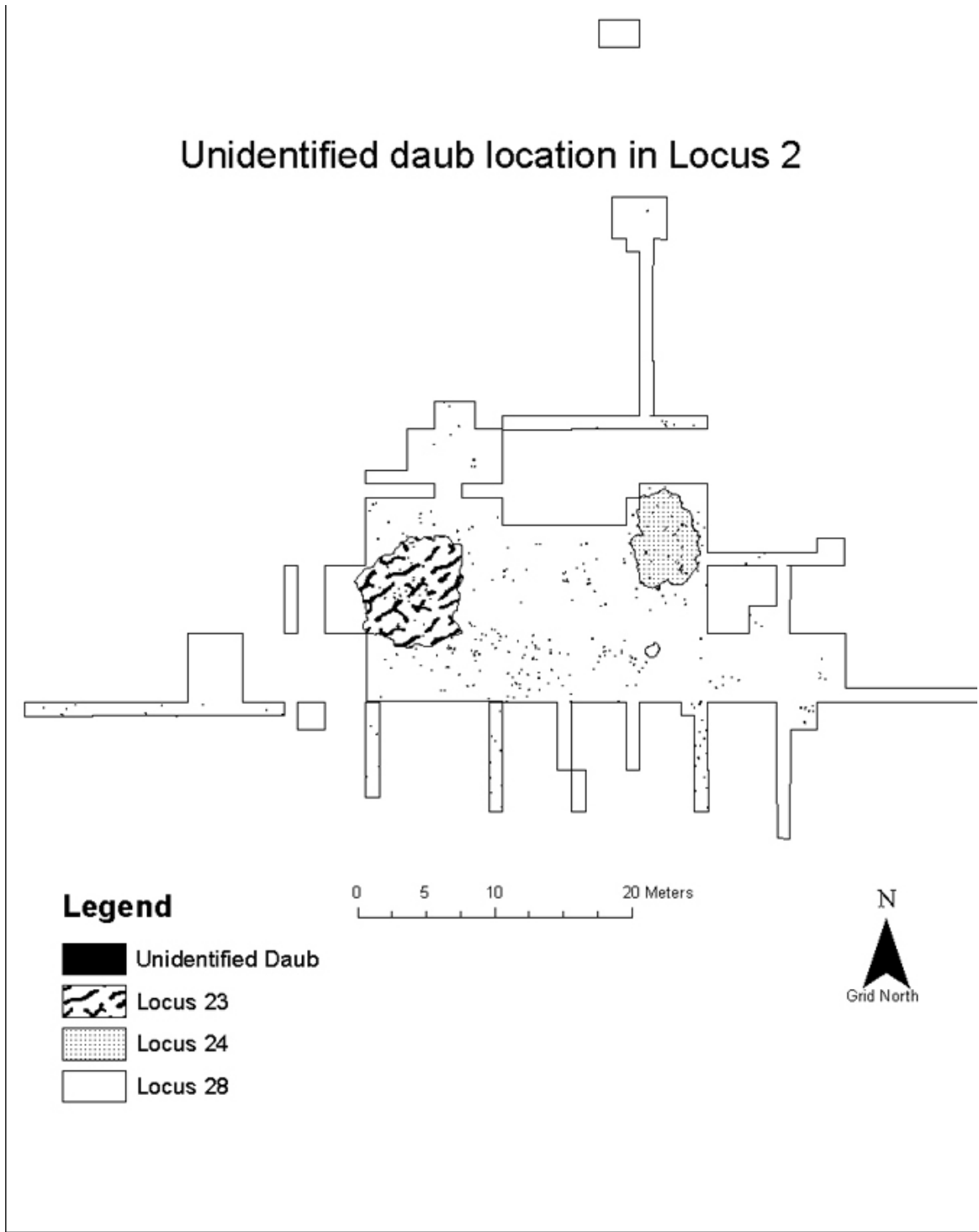


Figure 23: Digitized daub in Locus 2

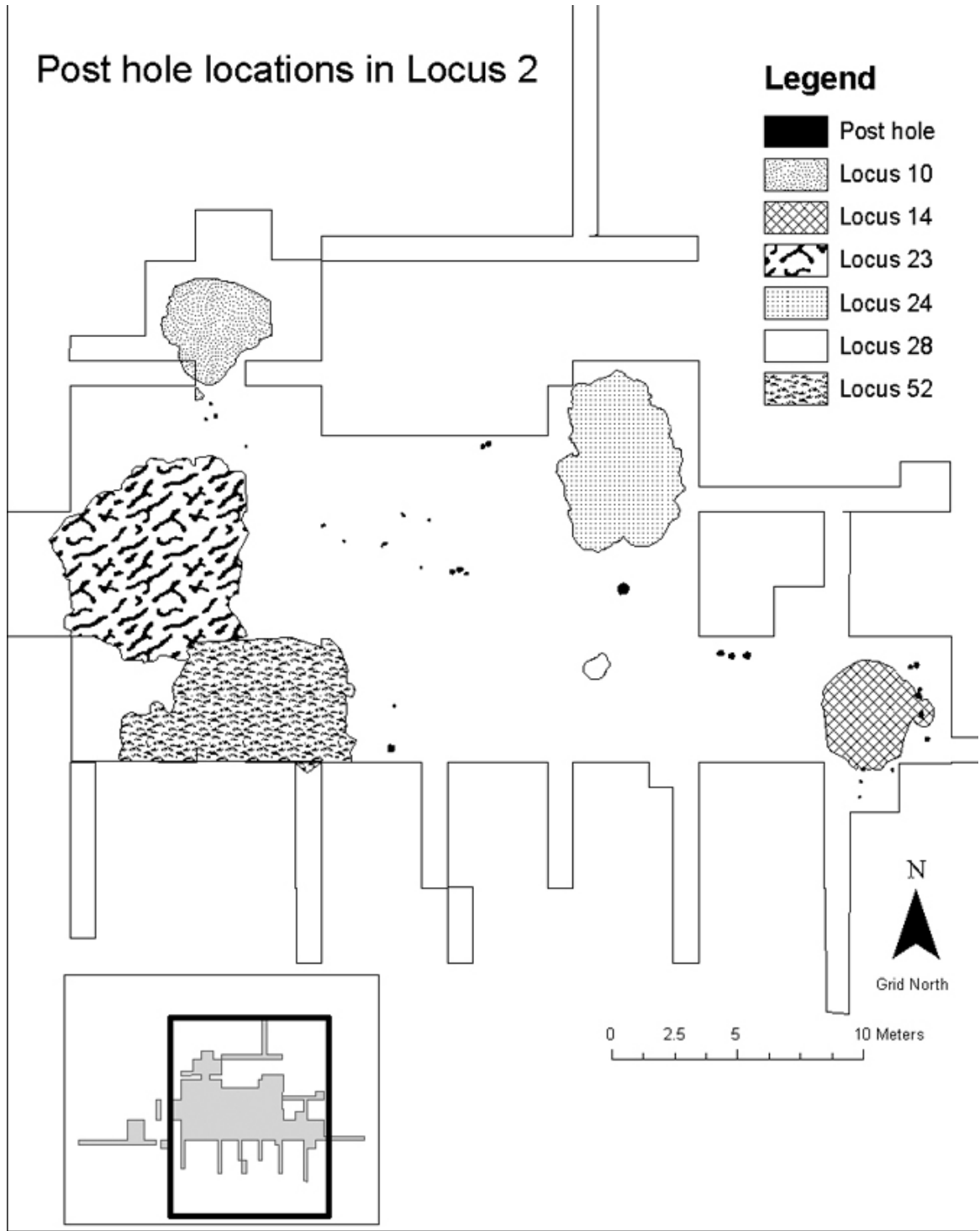


Figure 24: Post hole locations in Locus 2

Entrance way Path in Sublocus 7.3

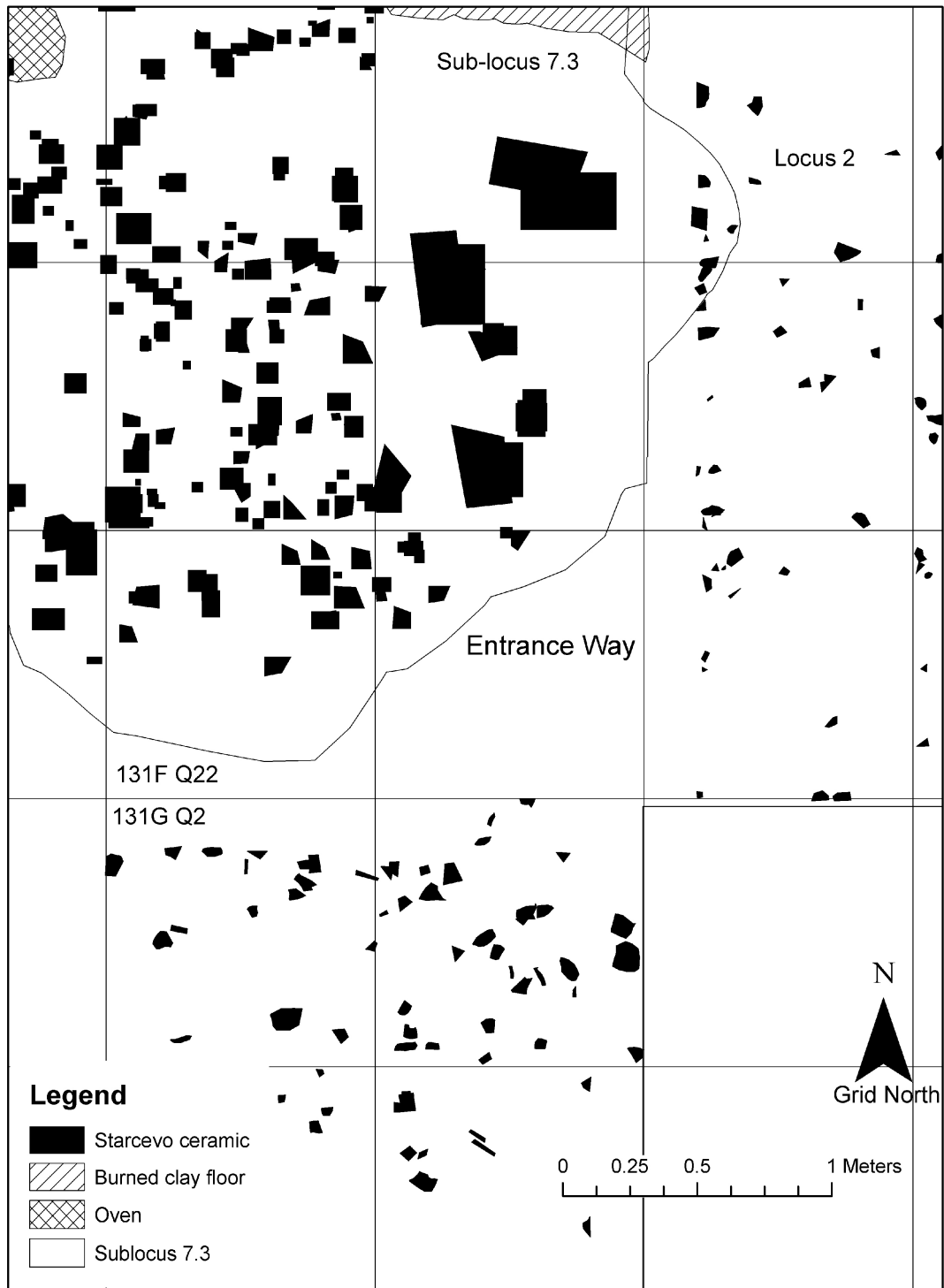


Figure 25: Entrance way path in Sub-locus 7.3

Locus 51

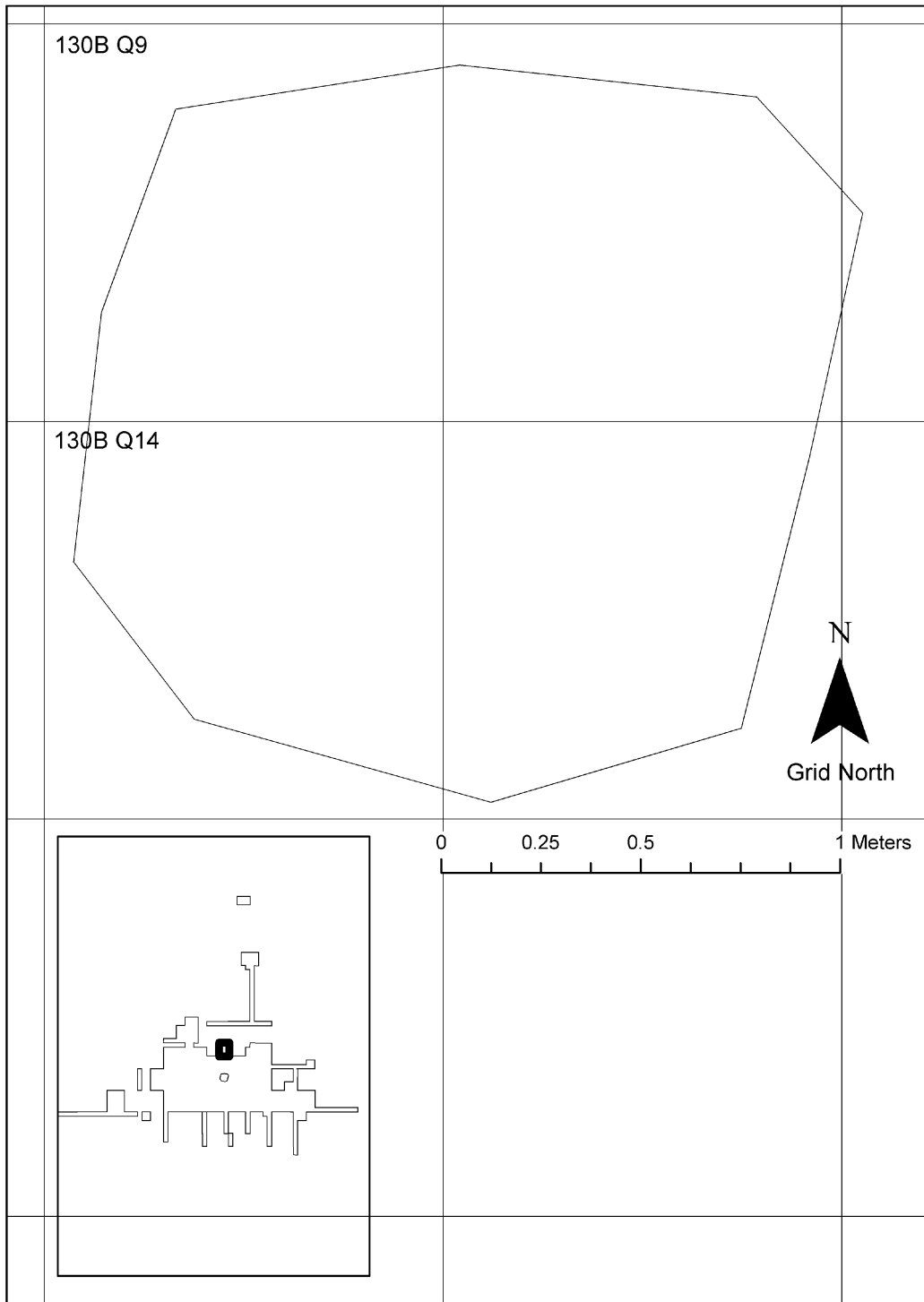


Figure 26: Location of Locus 51

Digitized Early Neolithic ceramic location in Locus 51

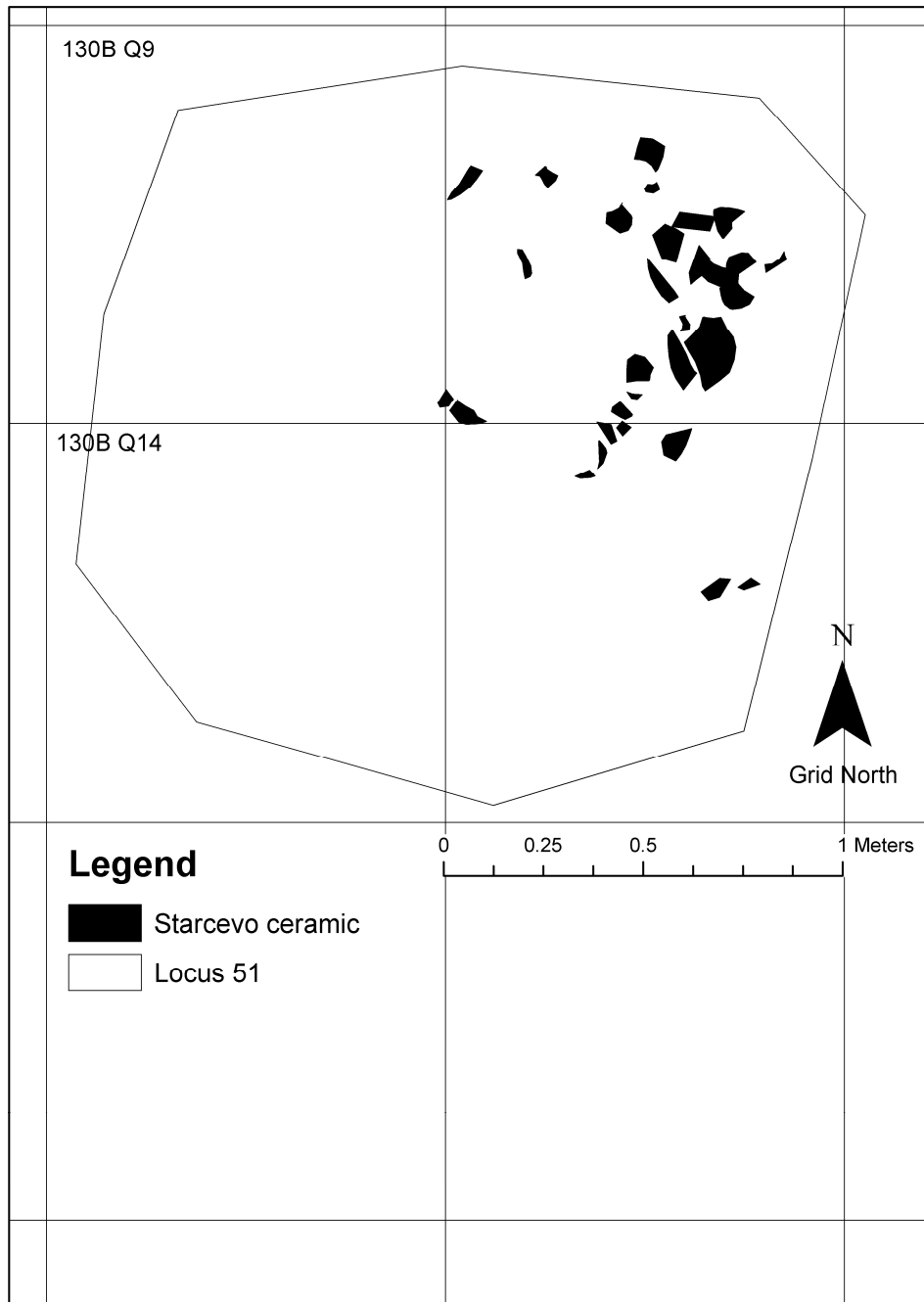


Figure 27: Digitized Early Neolithic ceramics in Locus 51

Digitized chipped lithic location in Locus 51

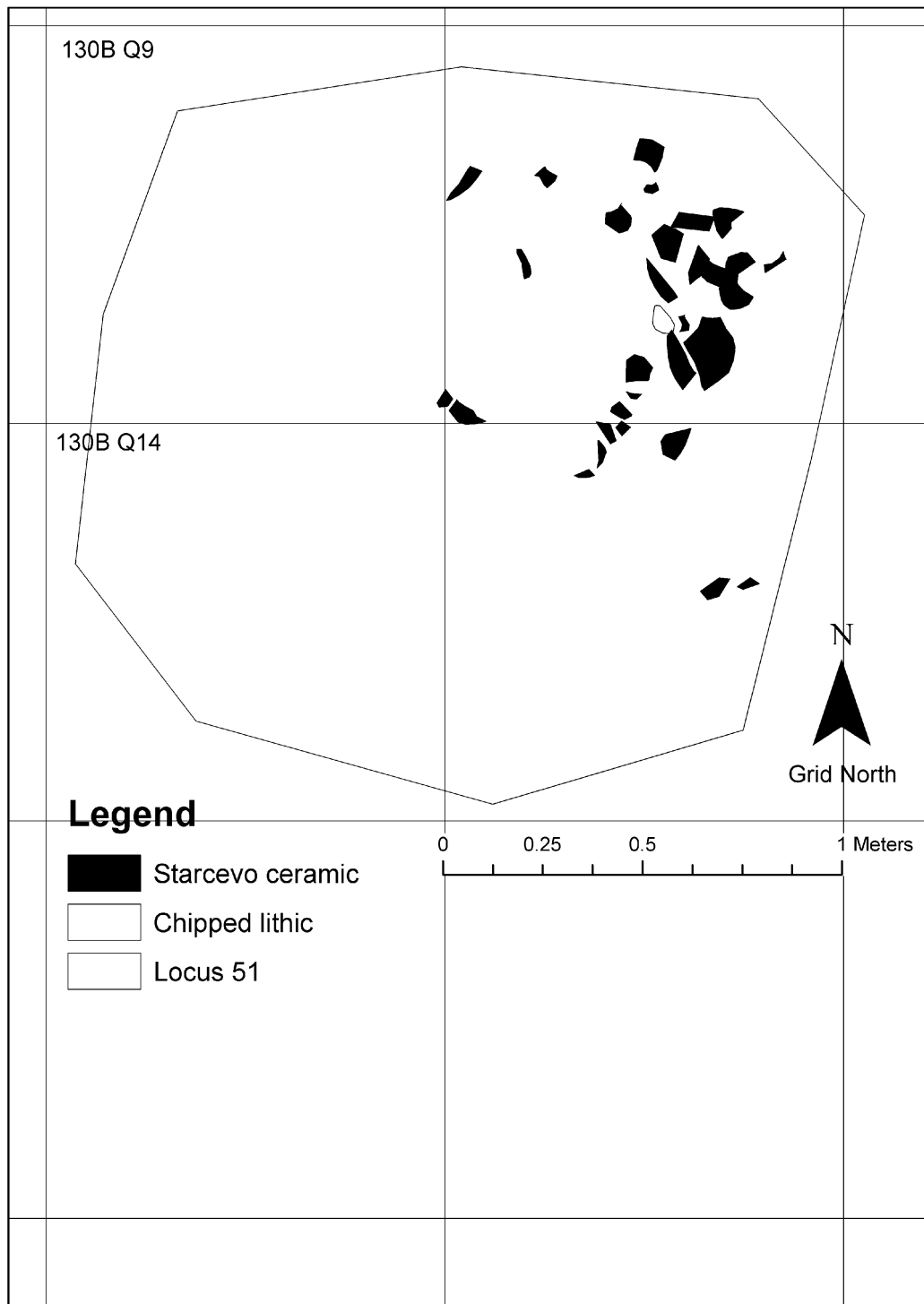


Figure 28: Digitized lithics and ceramics in Locus 51

Digitized unidentified daub locations in Locus 51

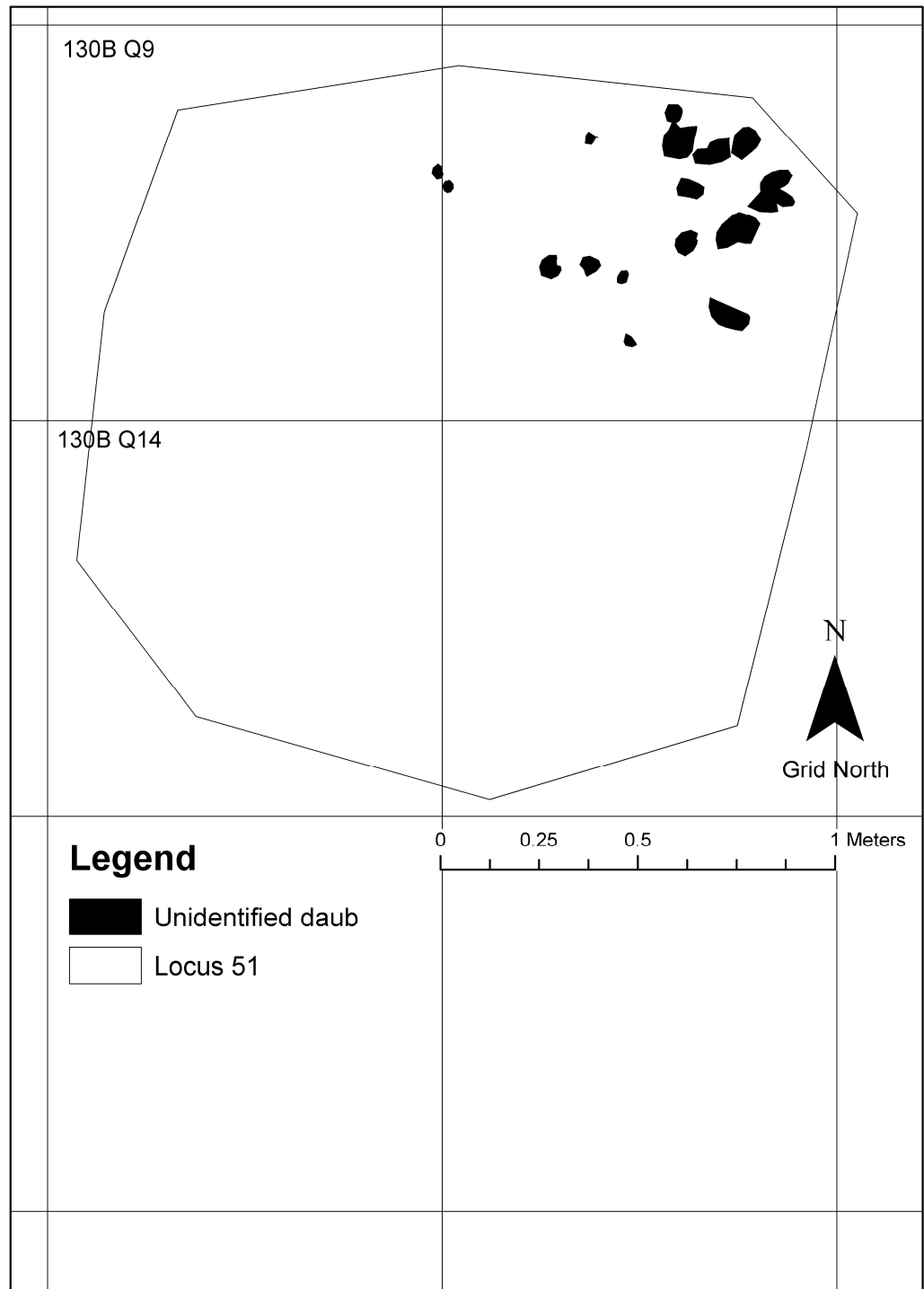


Figure 29: Digitized unidentified daub in Locus 51

Post holes in Locus 52

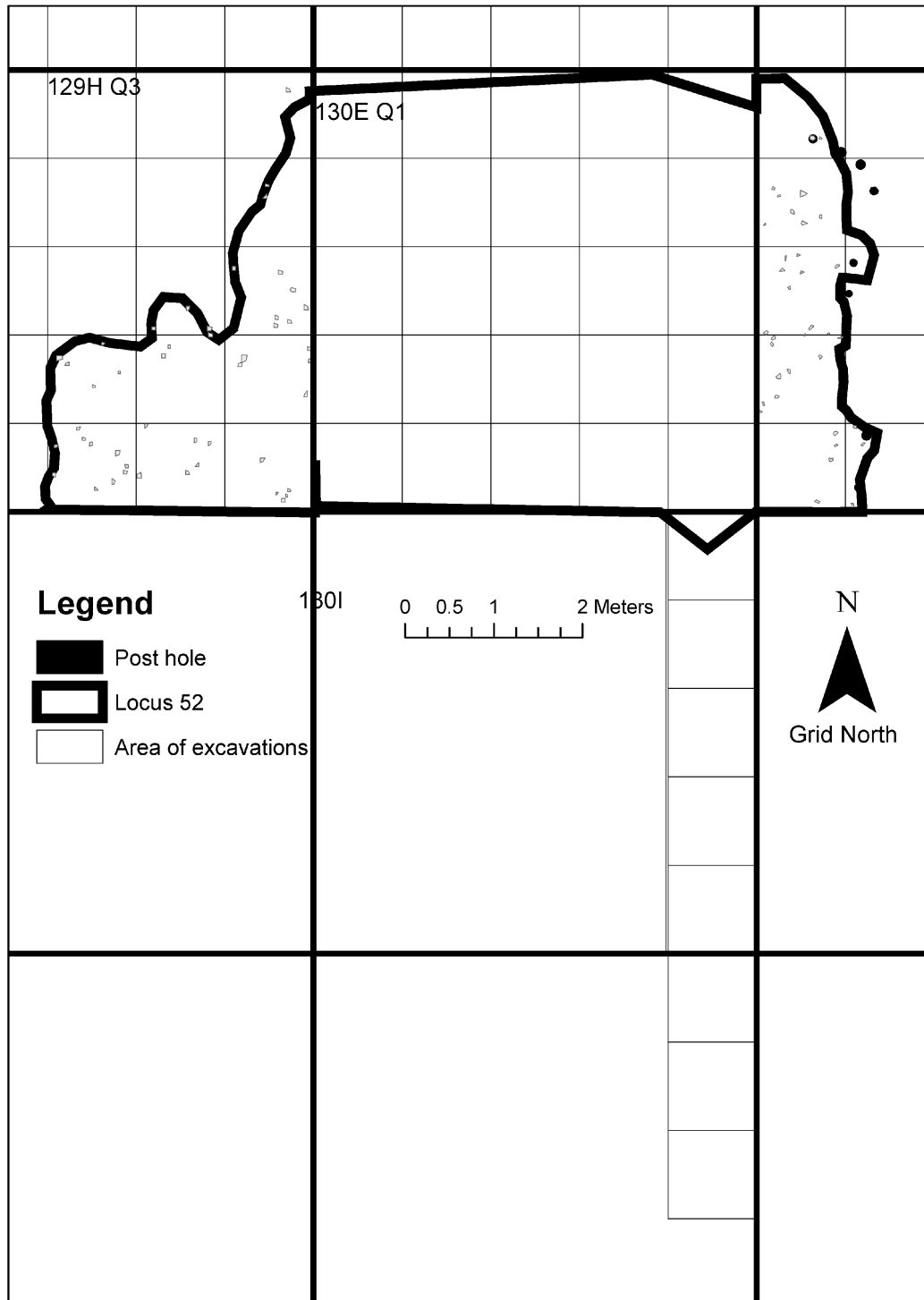


Figure 30: Post holes in Locus 52

Post holes in Locus 52

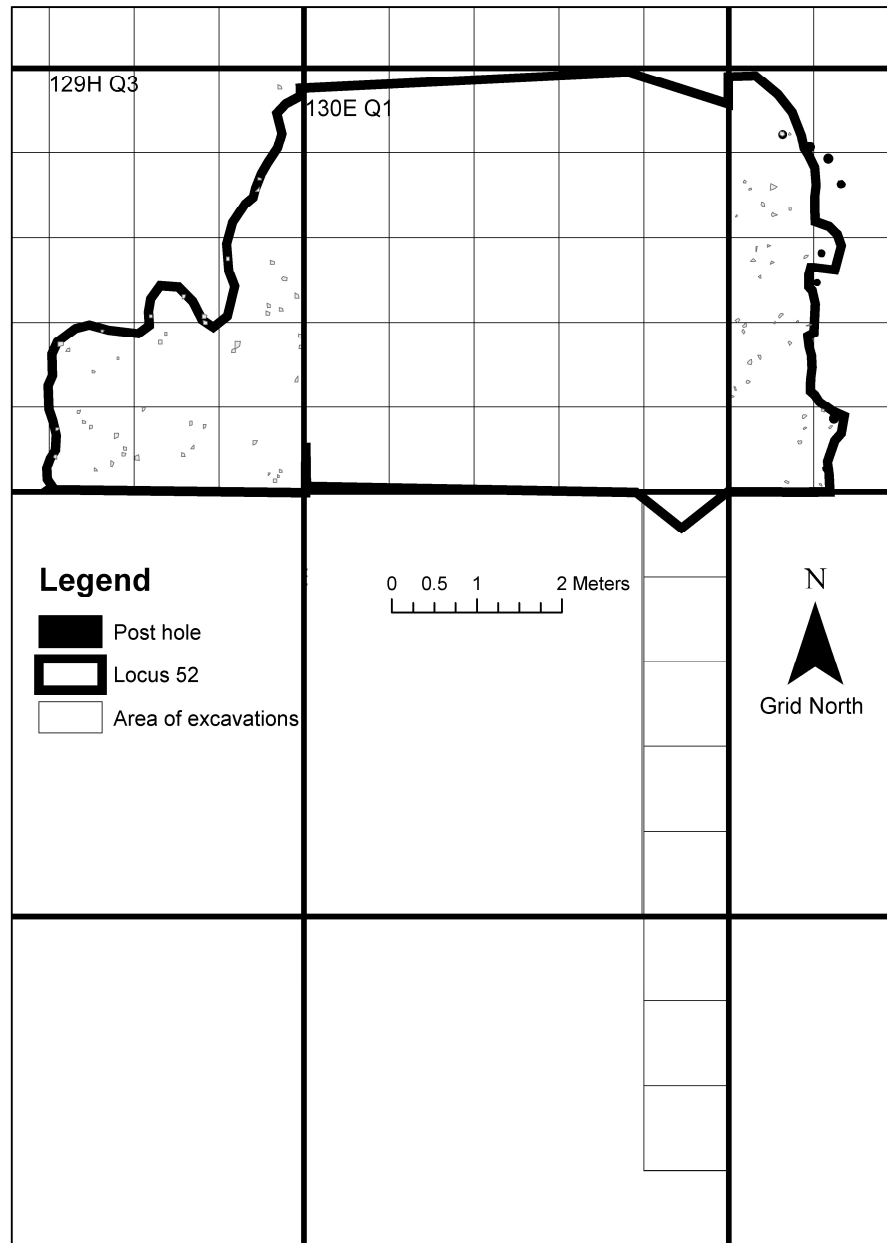


Figure 31: Post holes in Locus 52

Digitized unidentified daub and wall daub in Locus 52

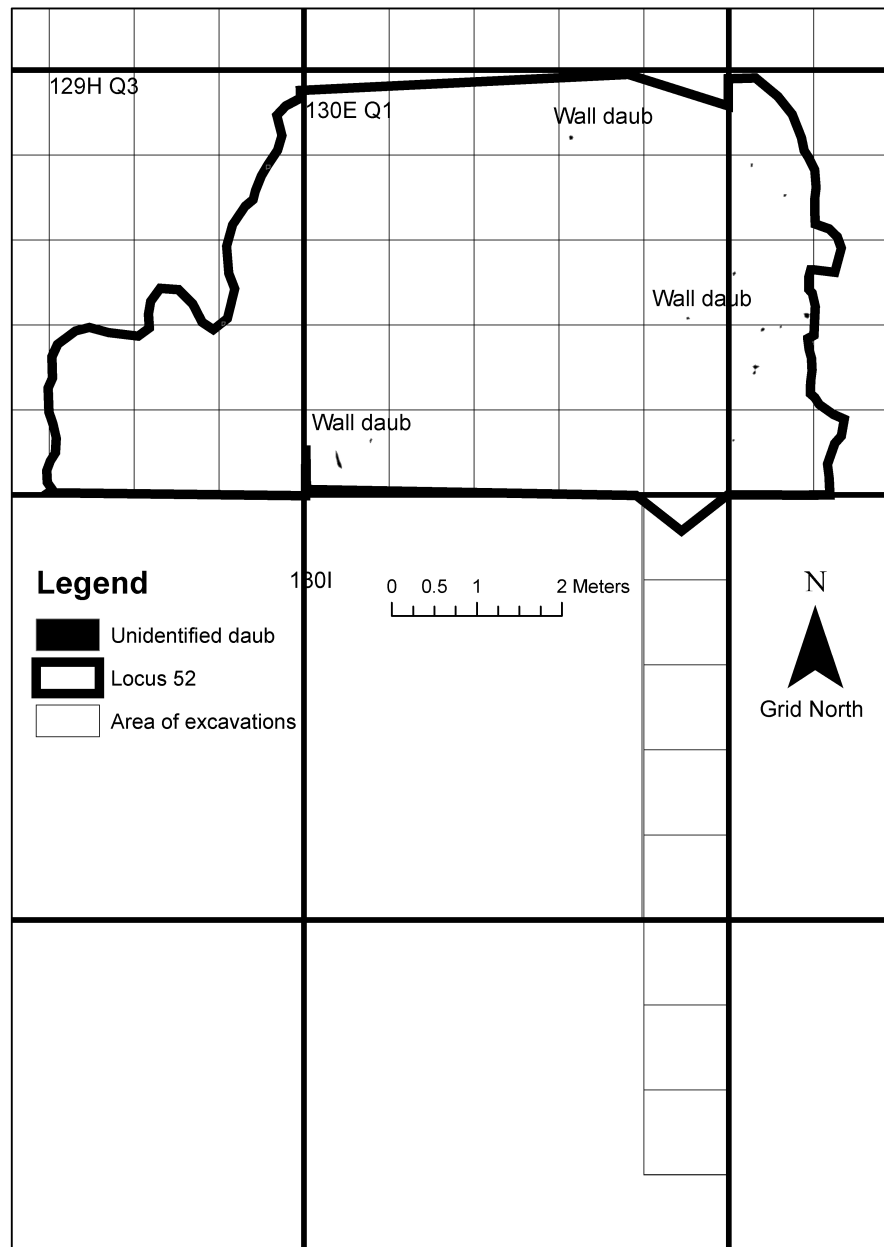


Figure 32: Digitized daub in Locus 52

Digitized bone in and around Locus 53



Figure 33: Digitized bone in Locus 53

Digitized Early Neolithic ceramics in and around Locus 53

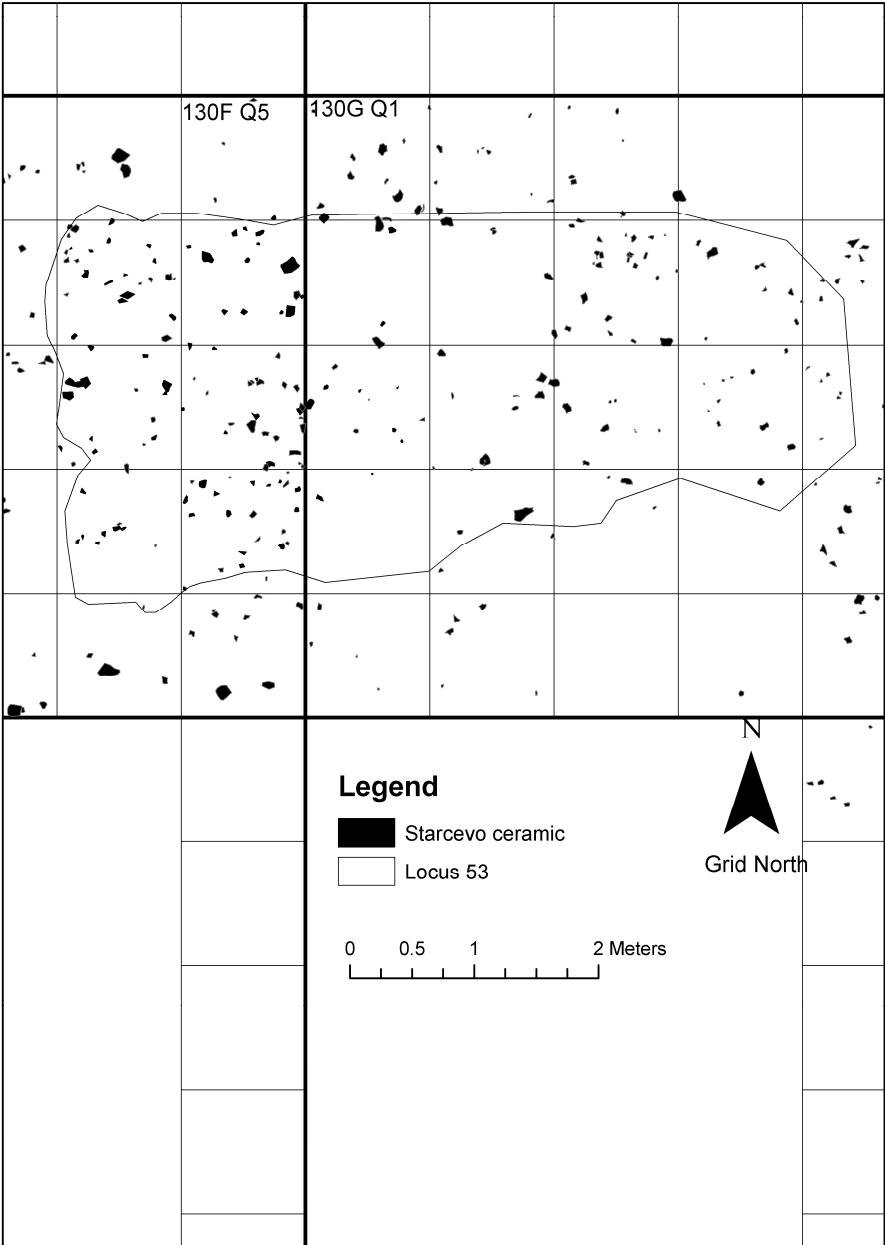


Figure 34: Digitized Early Neolithic ceramics in Locus 53

Digitized unidentified daub in and around Locus 53

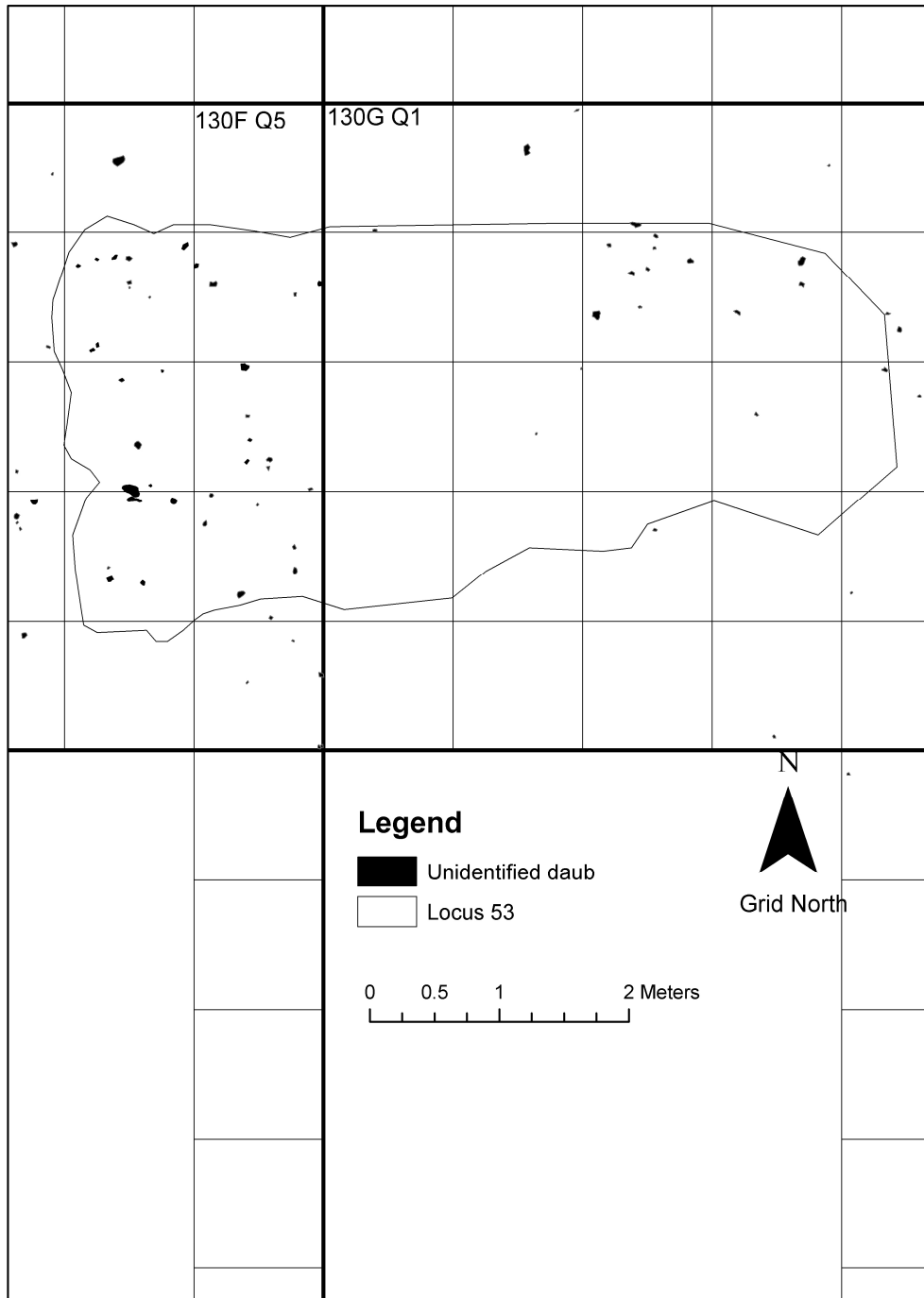


Figure 35: Digitized unidentified daub in Locus 53

Digitized loom weights in and around Locus 53



Figure 36: Digitized loom weights in Locus 53

Digitized altar and Early Neolithic ceramic in Sub-locus 7.1

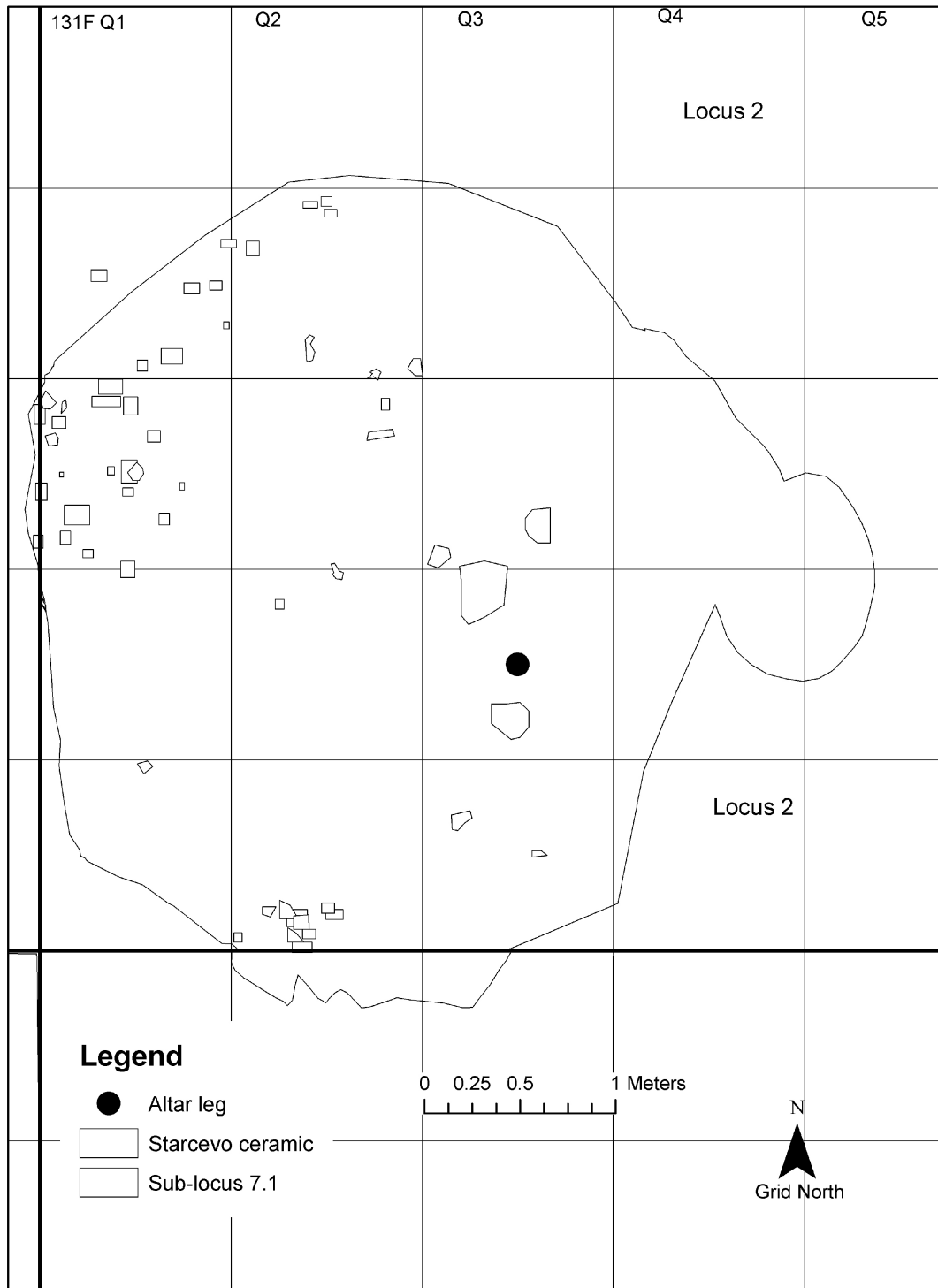


Figure 37: Digitized altar and Early Neolithic ceramics in Sub-locus 7.1

Digitized bone locations in Sub-locus 7.1

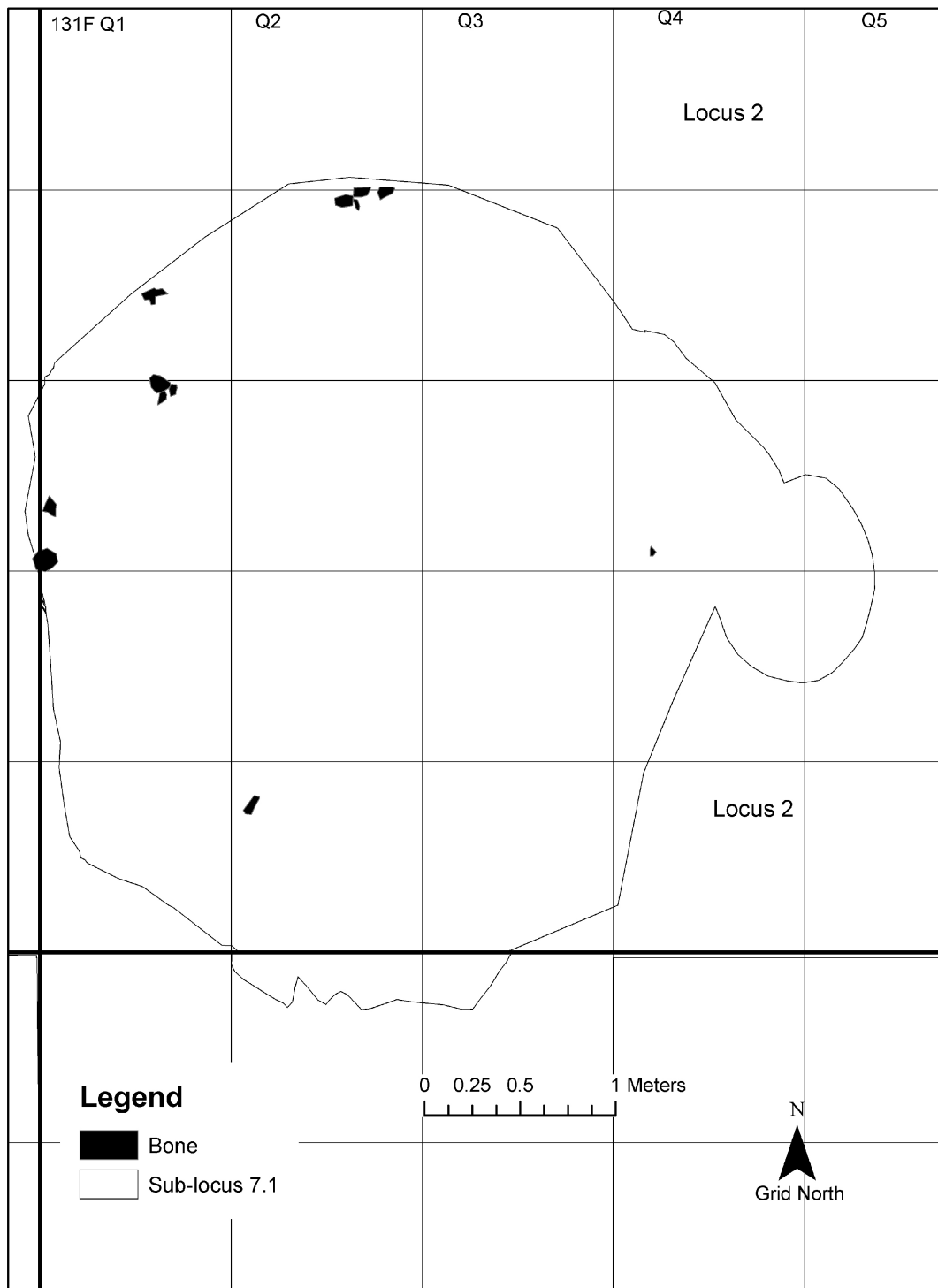


Figure 38: Digitized bone in Sub-locus 7.1

Centroid bone tool locations in Sub-locus 7.1

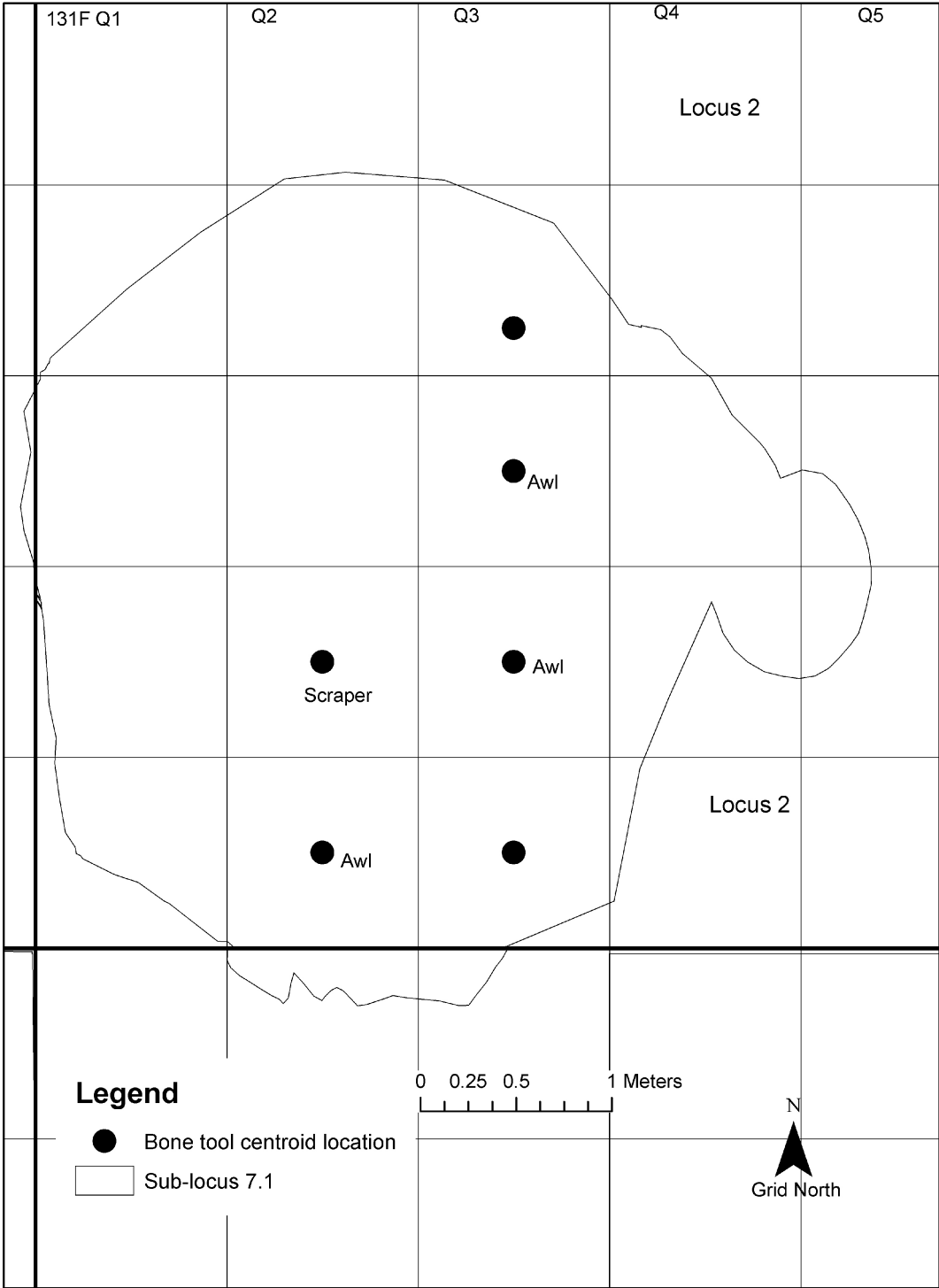


Figure 39: Centroid bone tool locations in Sub-locus 7.1

Digitized Early Neolithic ceramic locations in Sub-locus 7.1

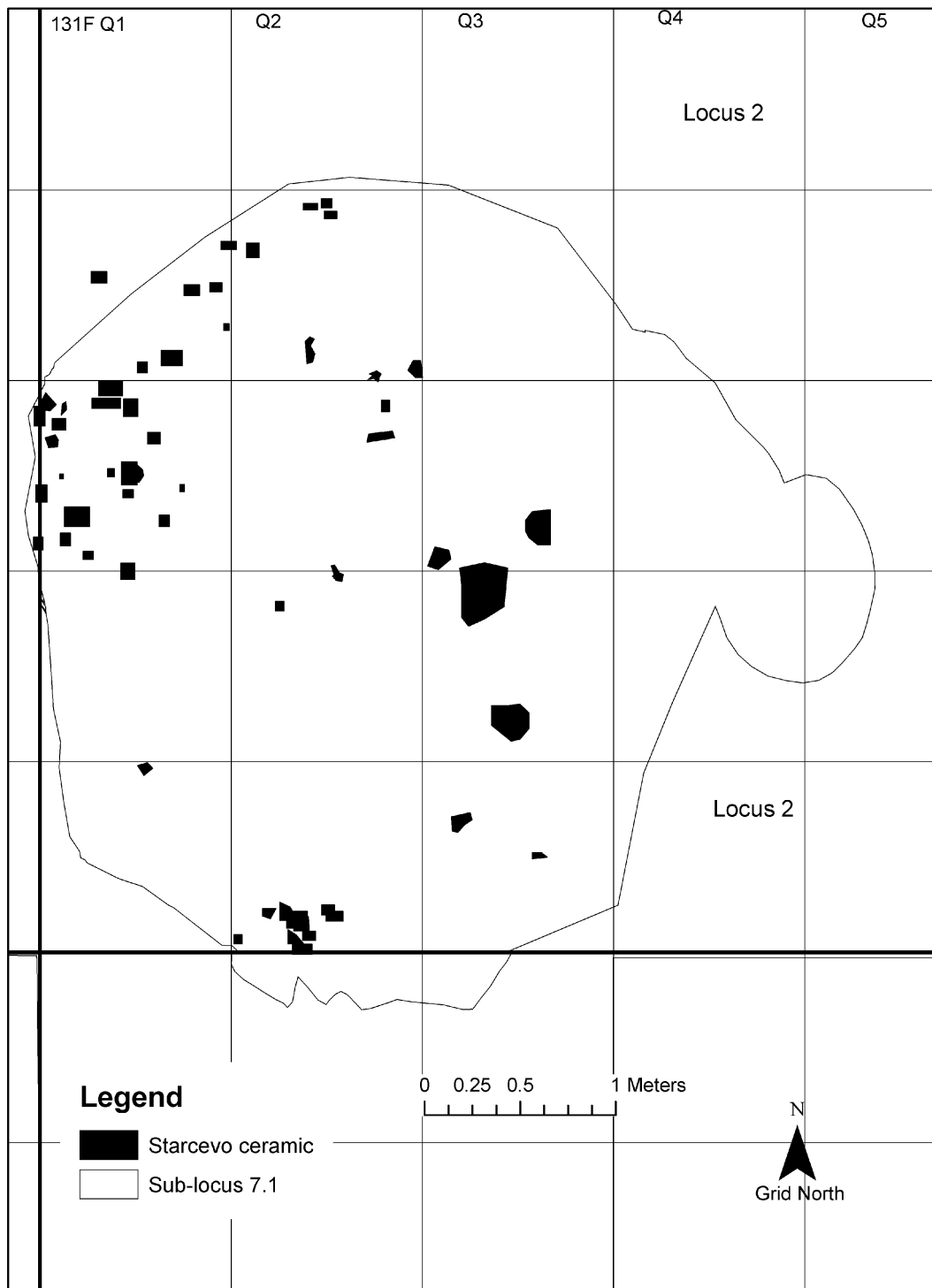


Figure 40: Digitized Early Neolithic ceramic locations in Sub-locus 7.1

Digitized unidentified daub locations in Sub-locus 7.1

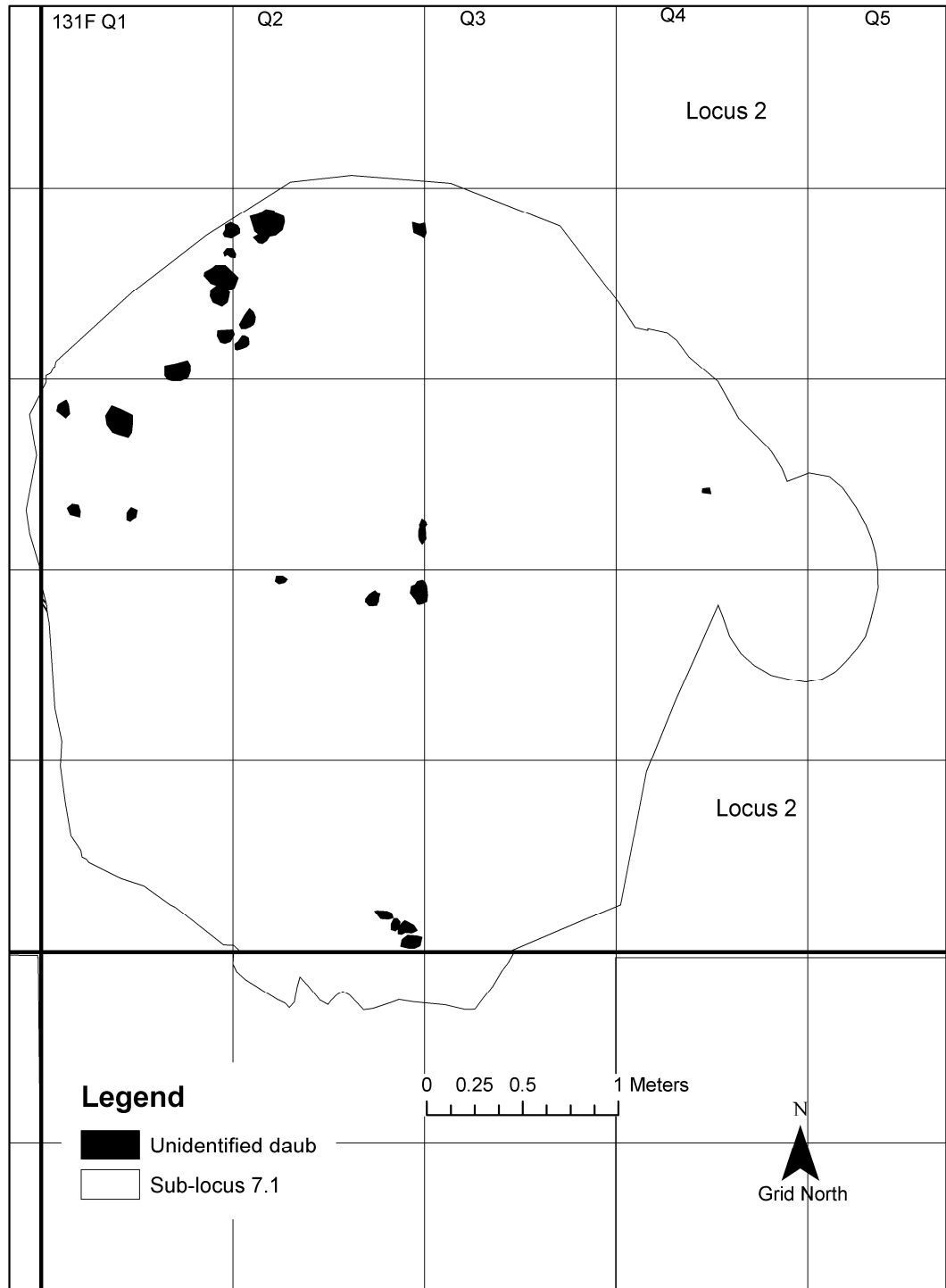


Figure 41: Digitized unidentified daub locations in Sub-locus 7.1

Digitized weights in Sub-locus 7.1

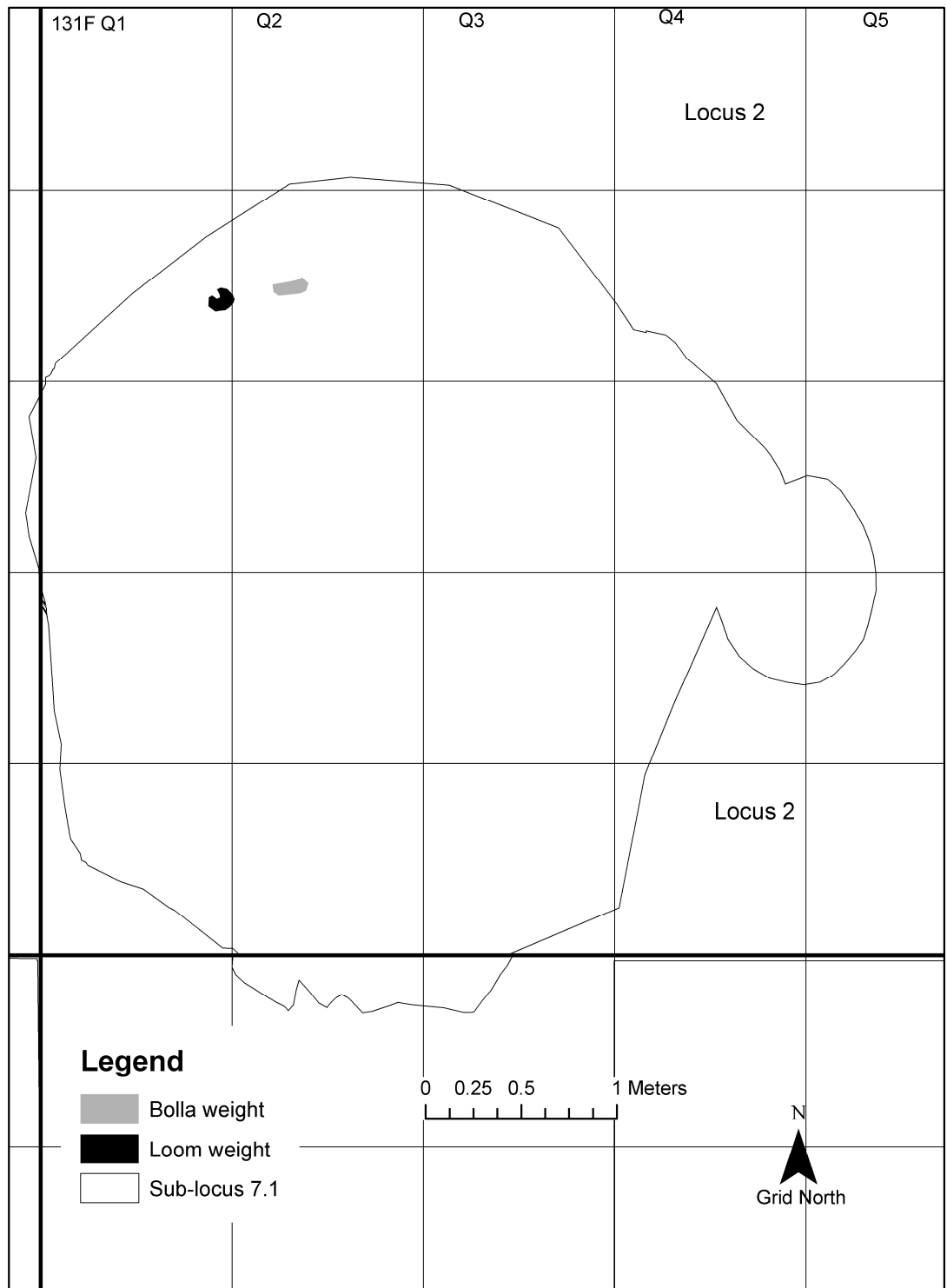


Figure 42: Digitized weights in Sub-locus 7.1

Digitized bone in Sublocus 7.2

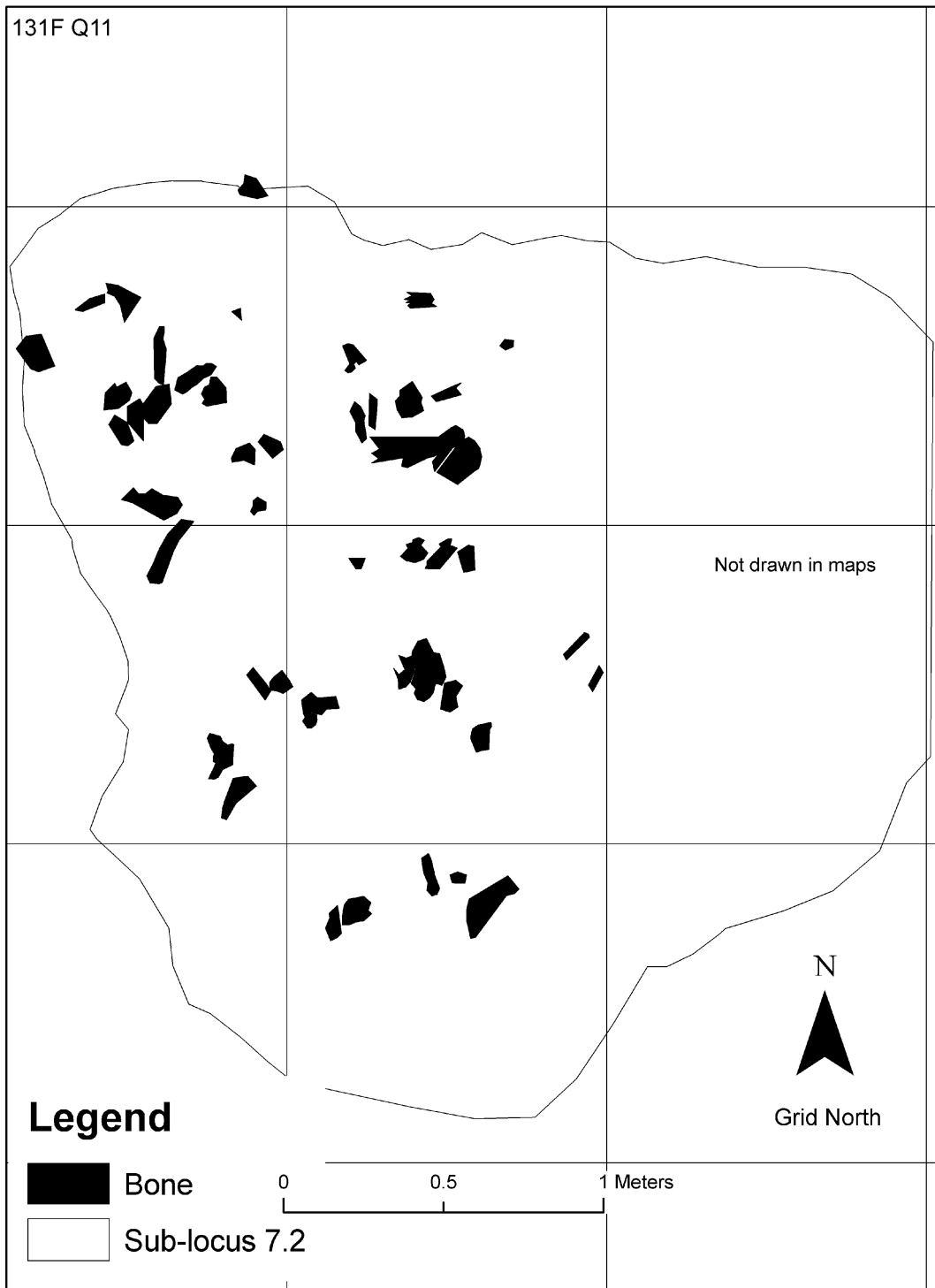


Figure 43: Digitized bone in Sub-locus 7.2

Centroid bone tool locations in Sub-locus 7.2

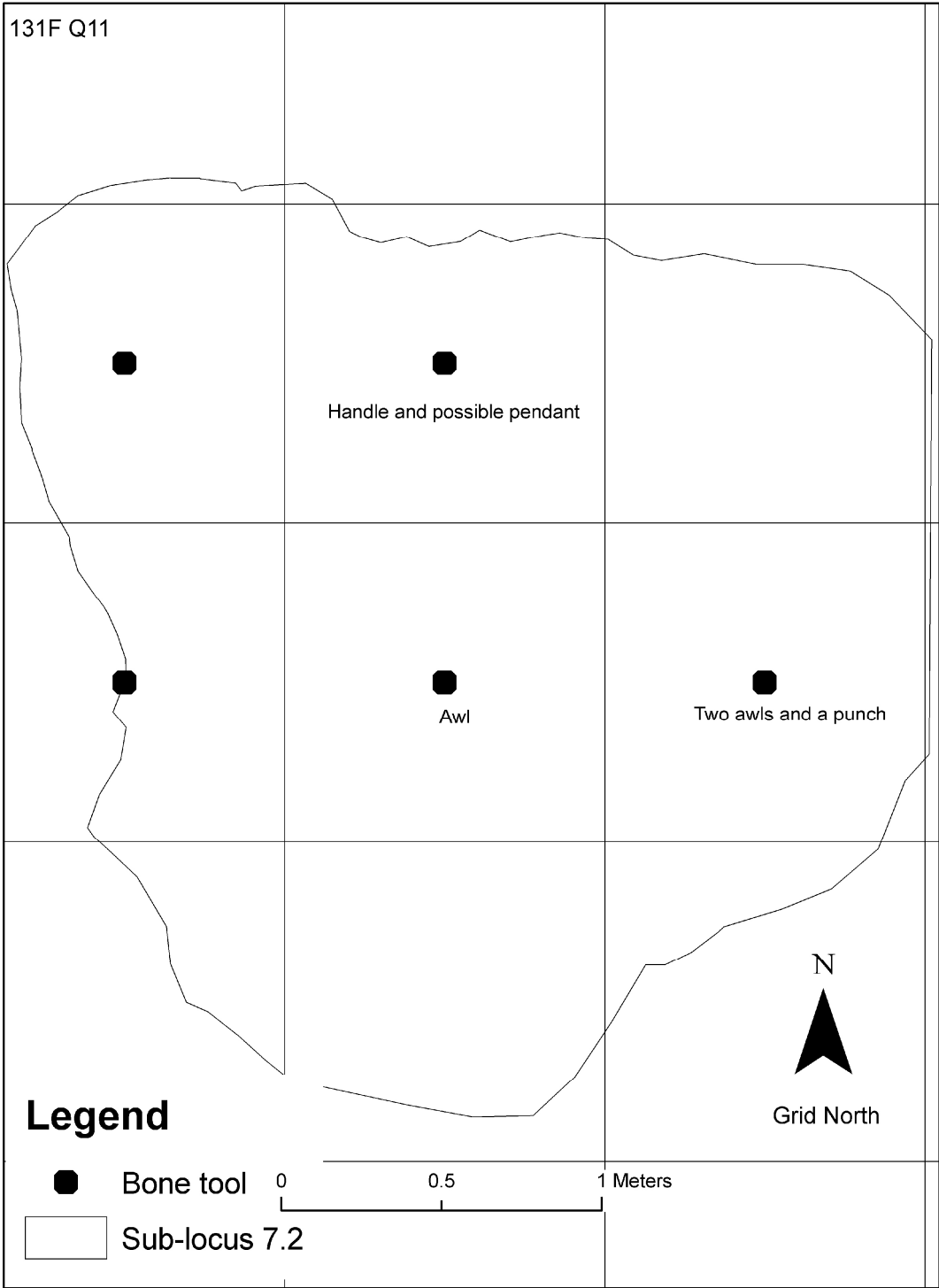


Figure 44: Centroid bone tool locations in Sub-locus 7.2

Digitized Early Neolithic ceramics in Sub-locus 7.2

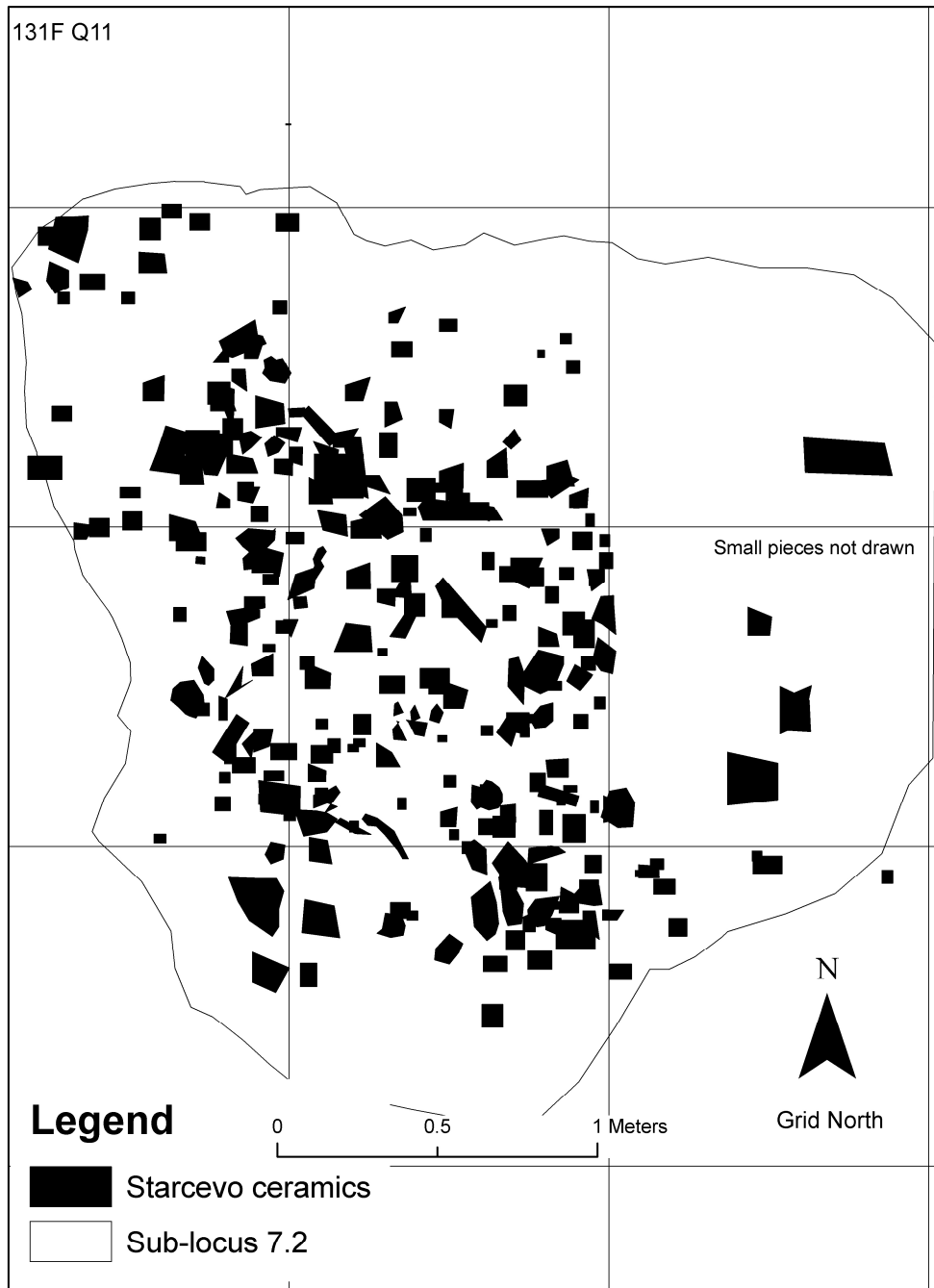


Figure 45: Digitized Early Neolithic ceramics in Sub-locus 7.2

Digitized unidentified daub in Sub-locus 7.2

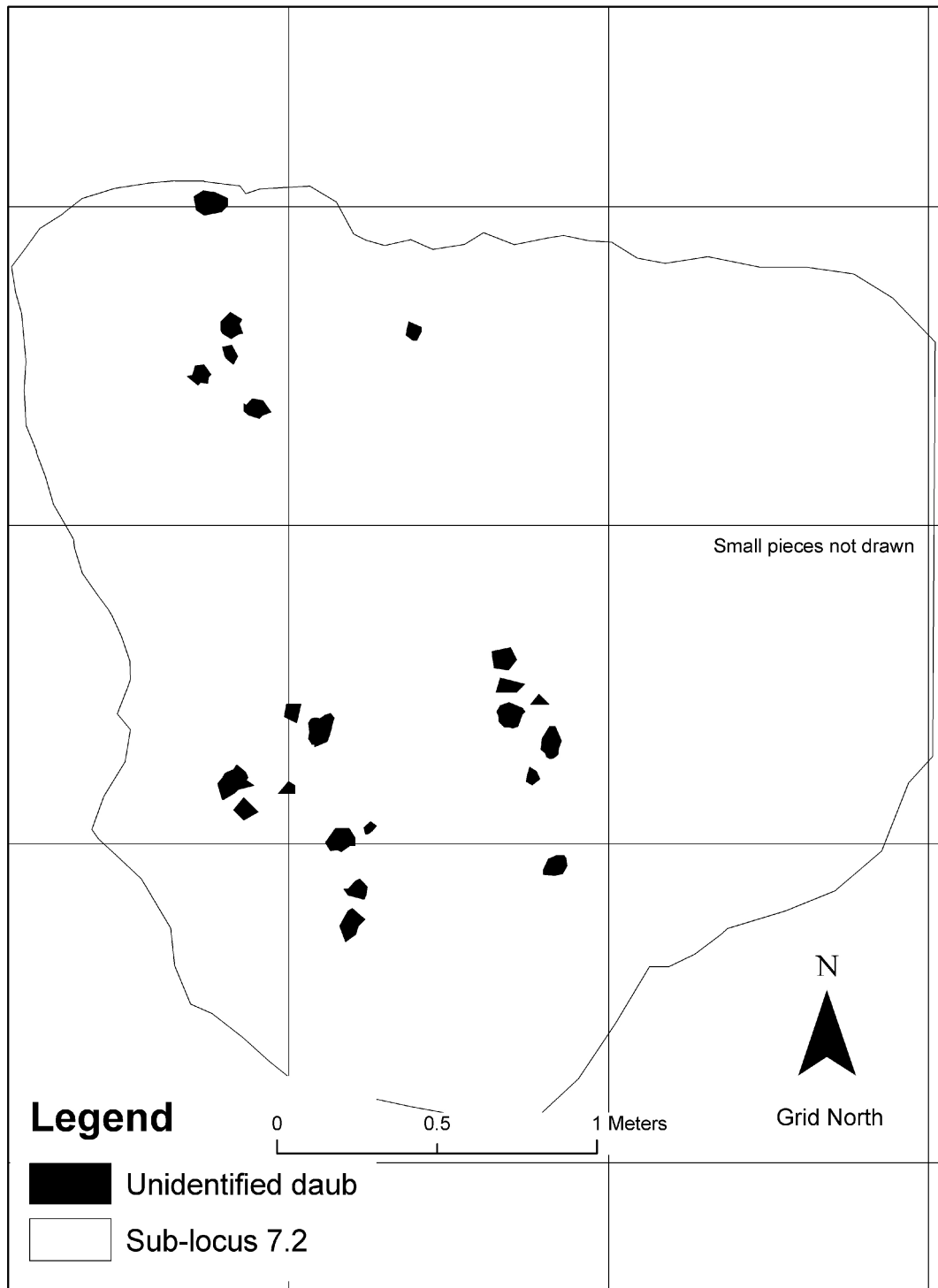


Figure 46: Digitized unidentified daub in Sub-locus 7.2

Digitized grinding stone in Sub-locus 7.2

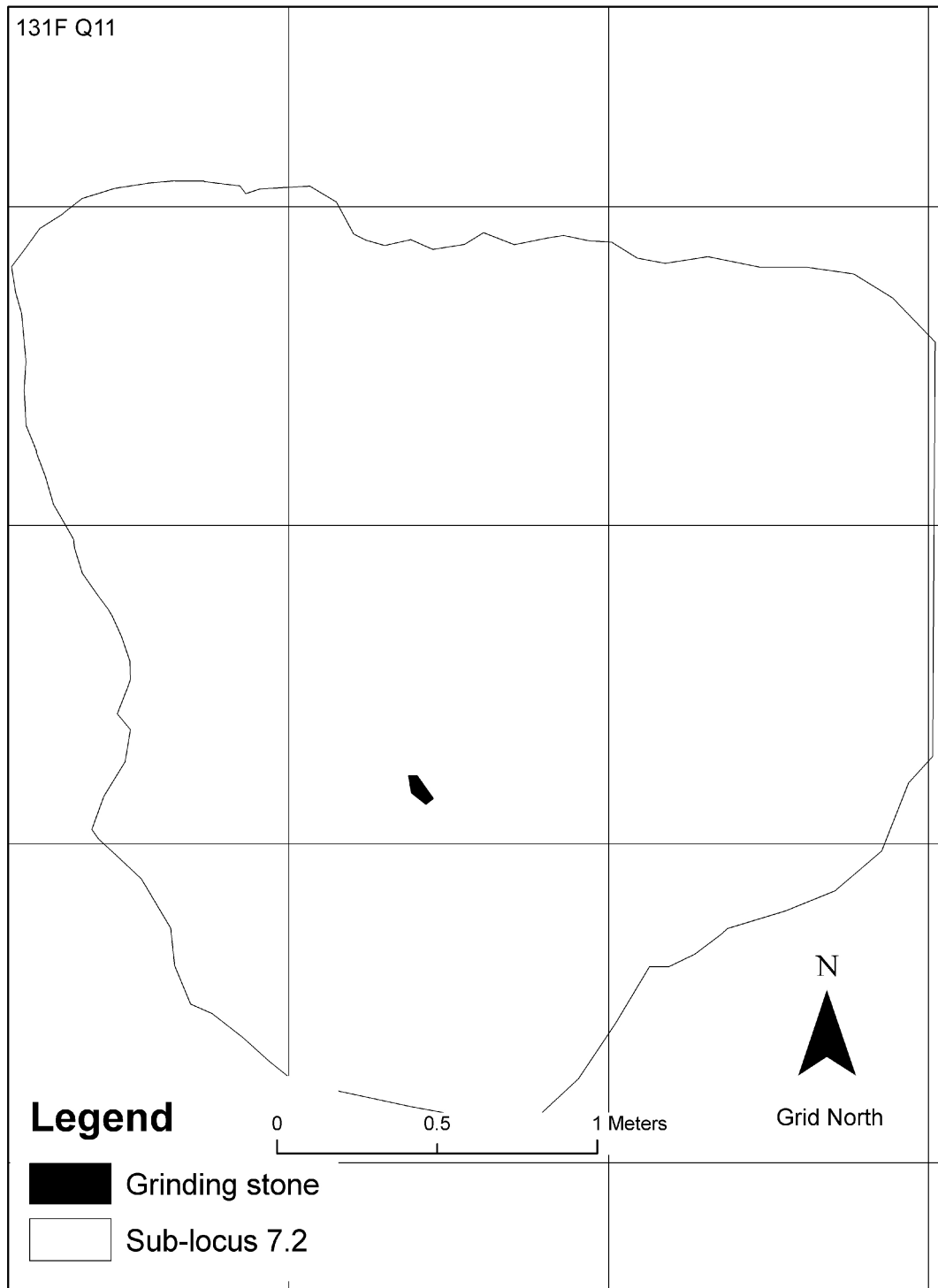


Figure 47: Digitized grinding stone in Sub-locus 7.2

Digitized loom weights in Sub-locus 7.2

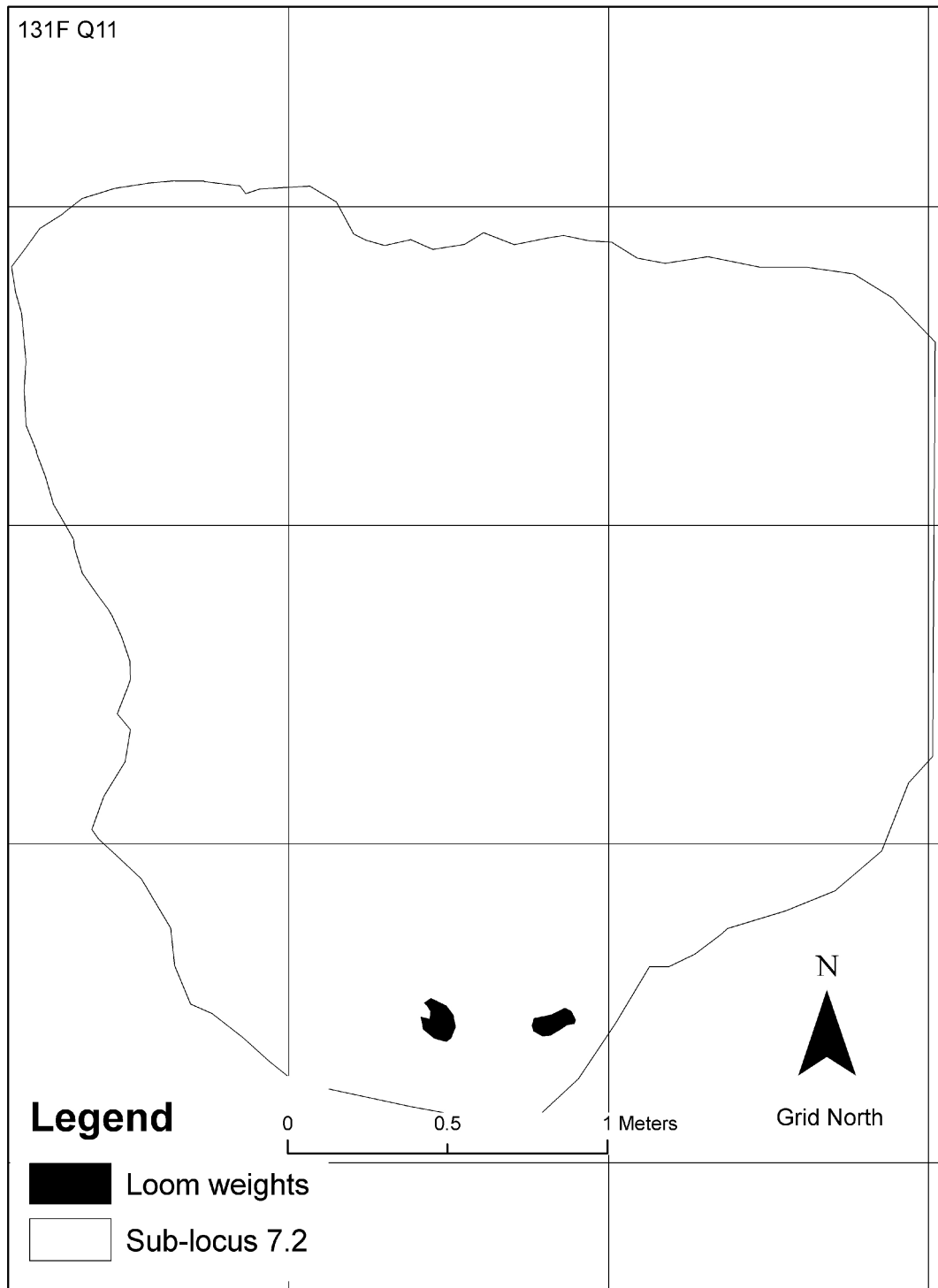


Figure 48: Digitized loom weights in Sub-locus 7.2

Digitized features and bone in Sublocus 7.3

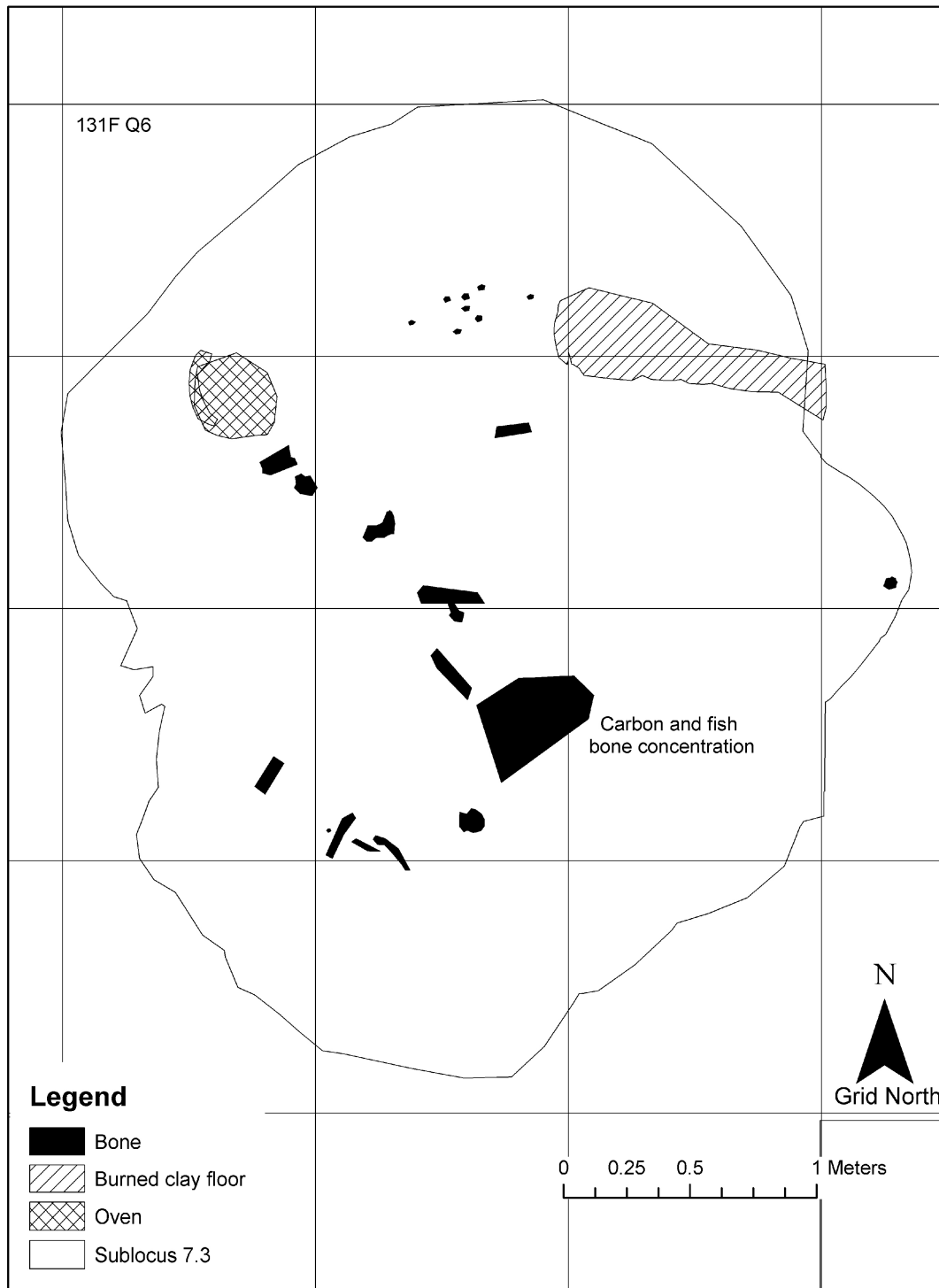


Figure 49: Digitized features and bone in Sub-locus 7.3

Centroid bone tool locations in Sublocus 7.3

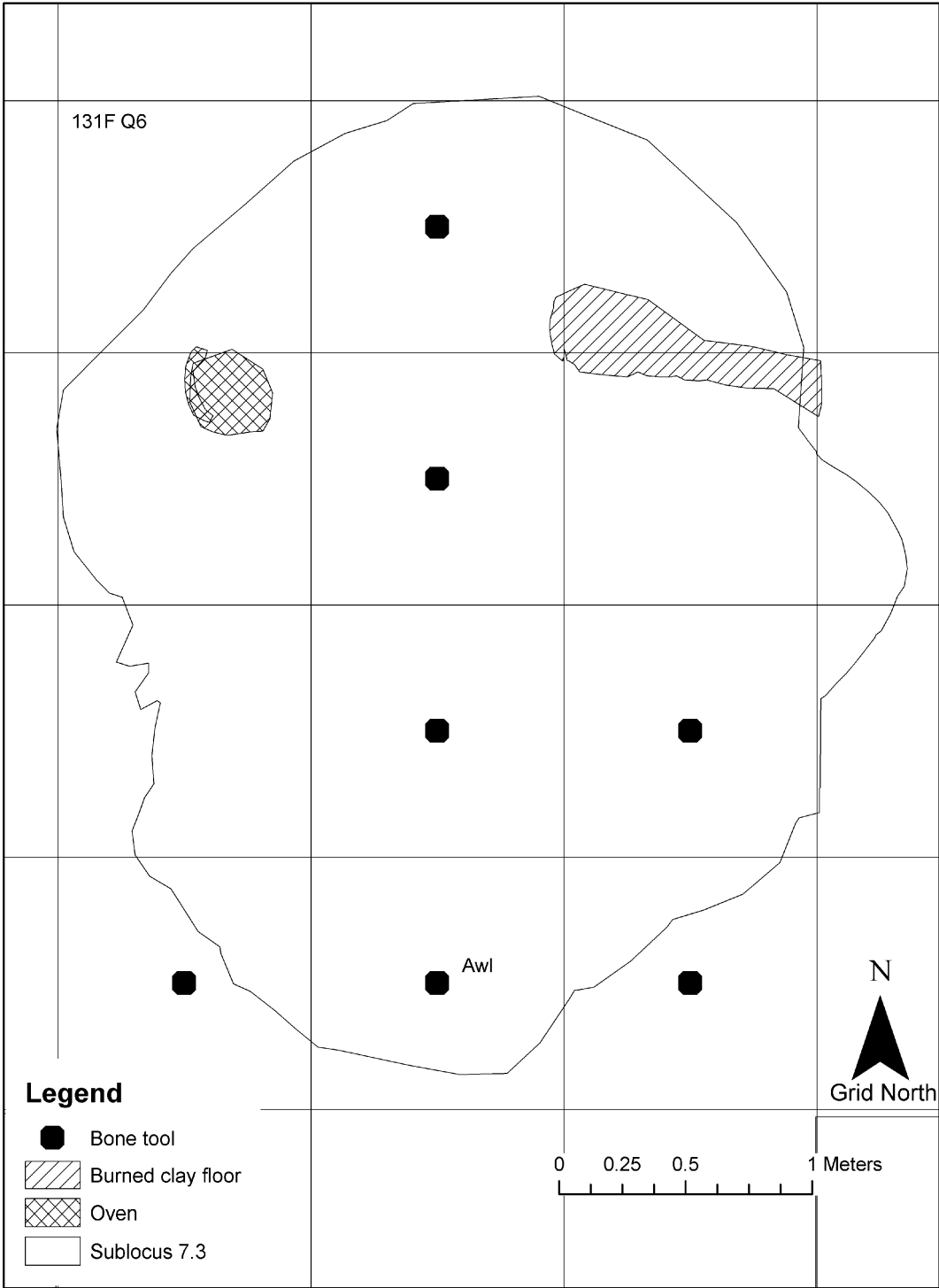


Figure 50: Centroid bone tools in Sub-locus 7.3

Centroid bone tool and digitized grinding stone locations in Sublocus 7.3

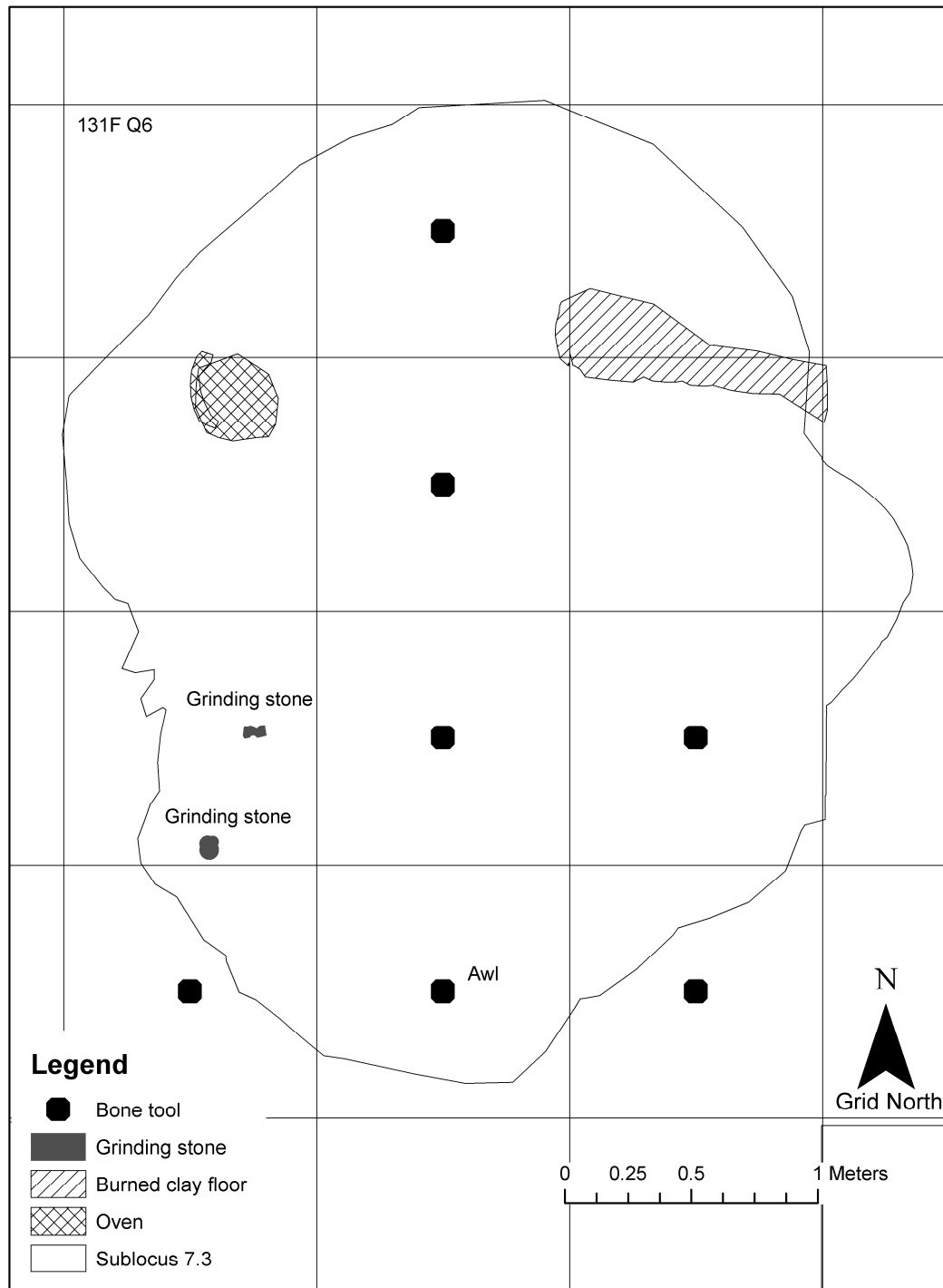


Figure 51: Centroid bone tools and digitized grinding stone in Sub-locus 7.3

Digitized Early Neolithic ceramic locations in Sublocus 7.3

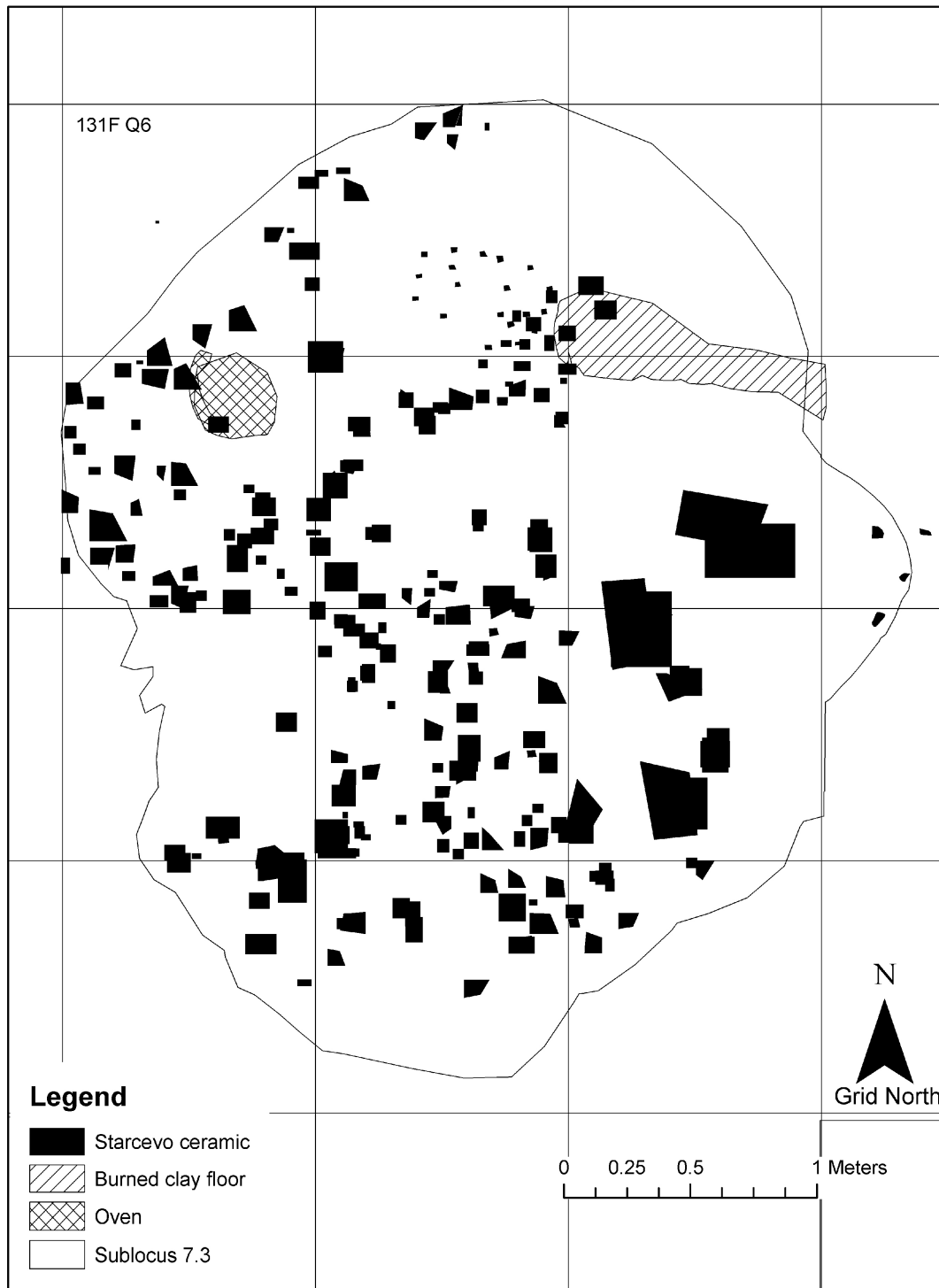


Figure 52: Digitized Early Neolithic ceramics in Sub-locus 7.3

Digitized weights and chipped lithics in Sublocus 7.3

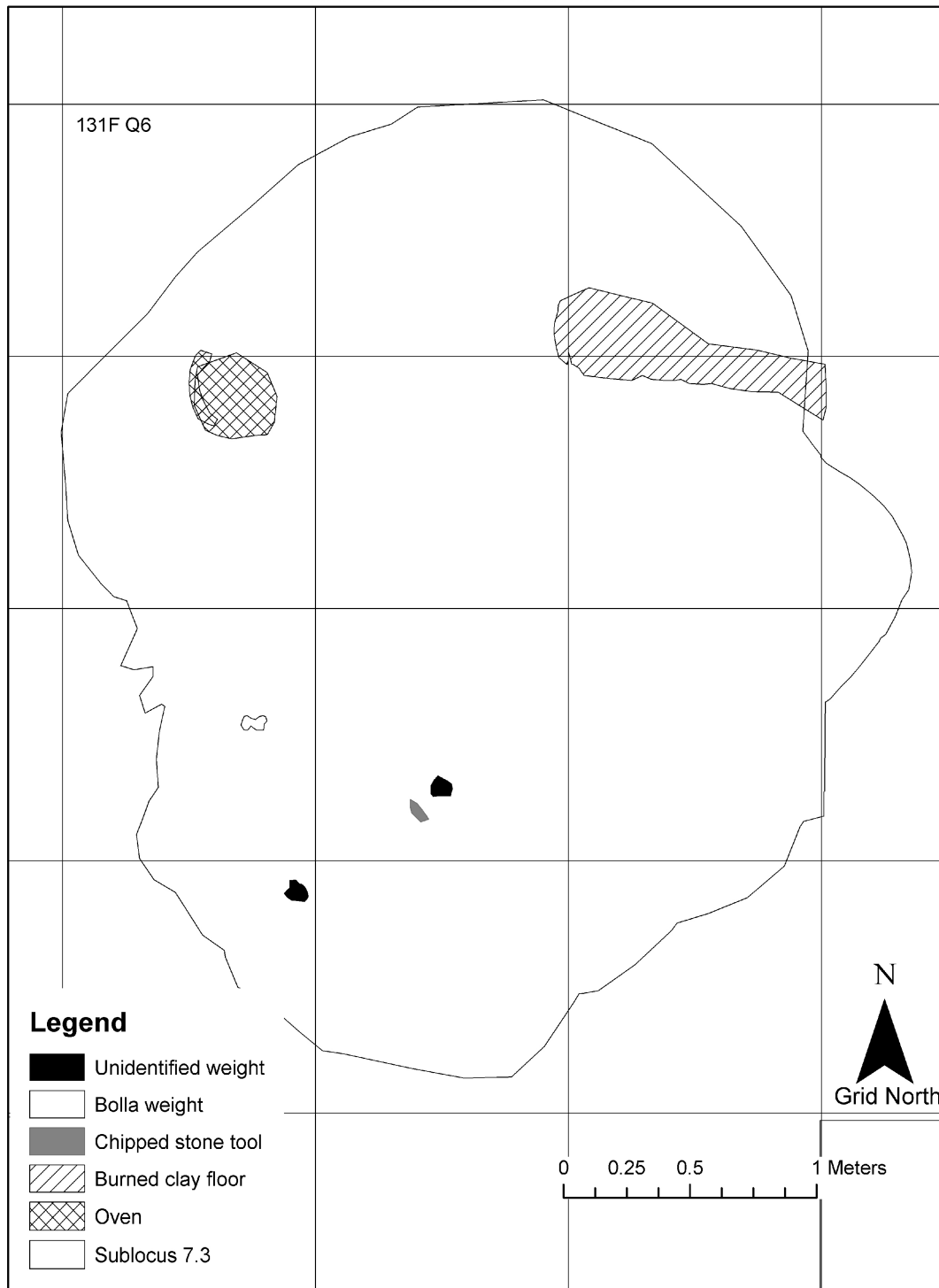


Figure 53: Digitized weights and chipped lithics in Sub-locus 7.3

Unidentified daub locations in Sublocus 7.3

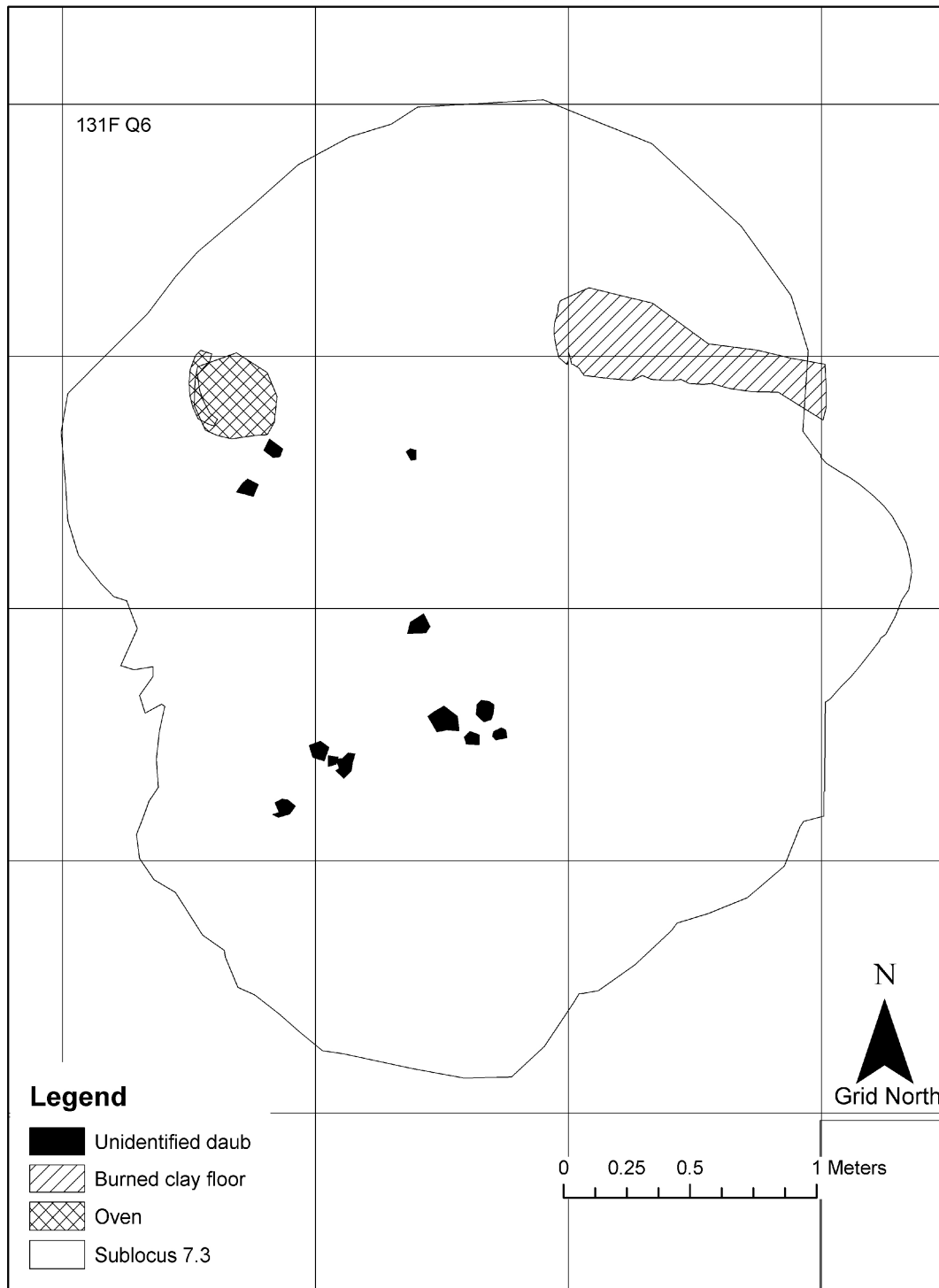


Figure 54: Digitized unidentified daub in Sub-locus 7.3

Digitized weights and stone tools in Sublocus 7.3

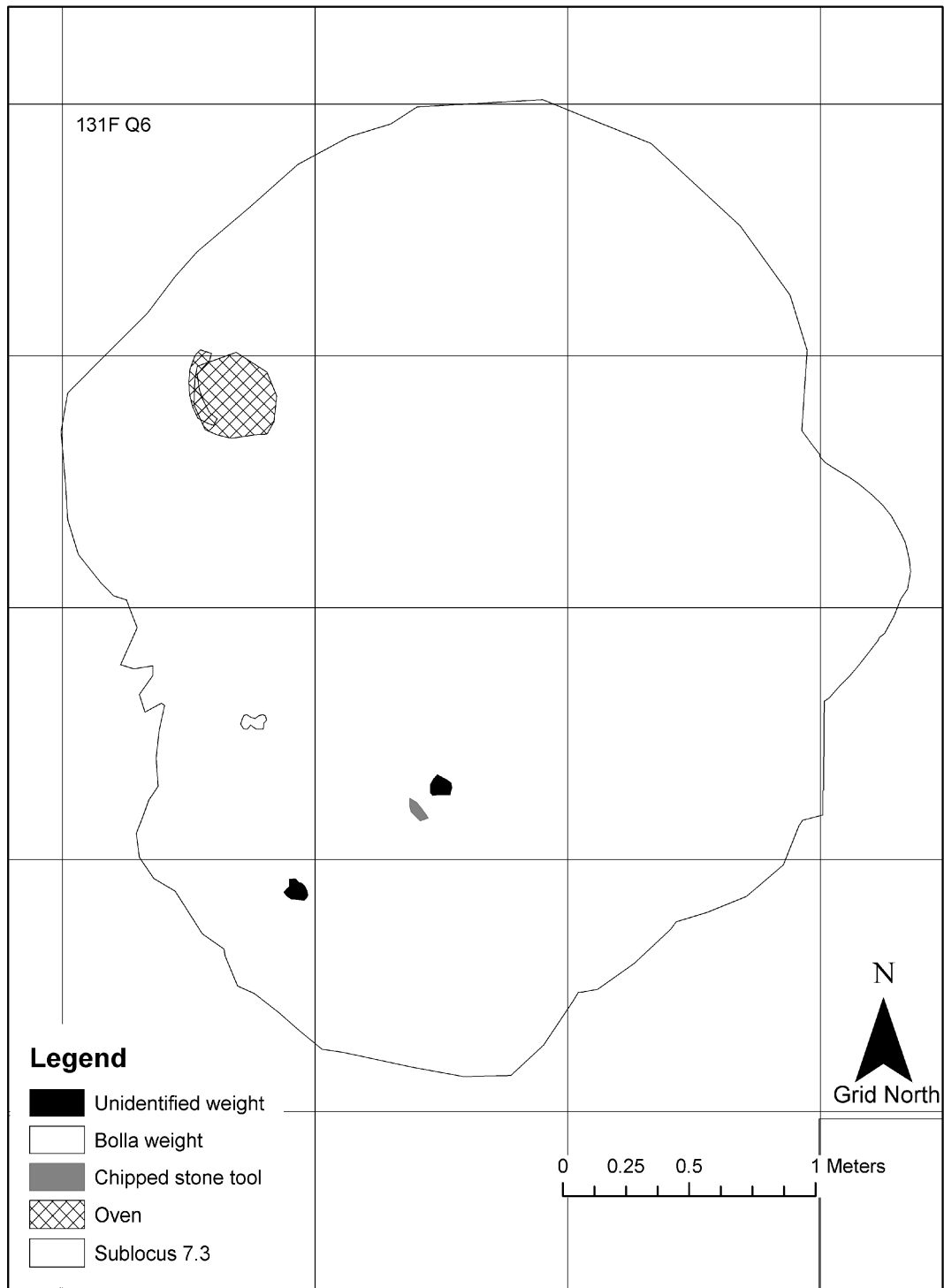


Figure 55: Digitized weights and stone tools in Sub-locus 7.3

Artefact concentrations in Sub-locus 7.1

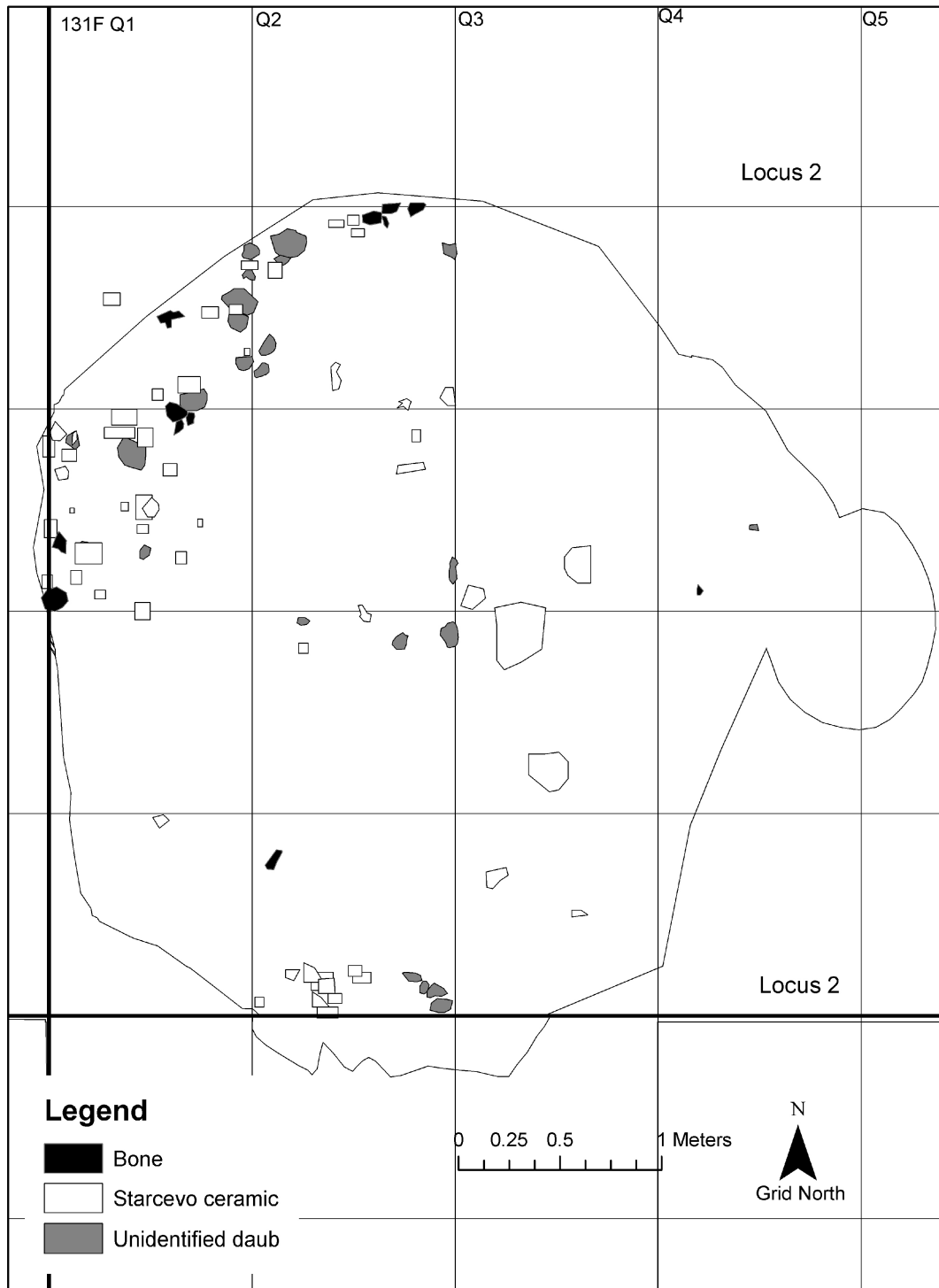


Figure 56: Artefact concentrations in Sub-locus 7.1

Entrance way in Sub-locus 7.3

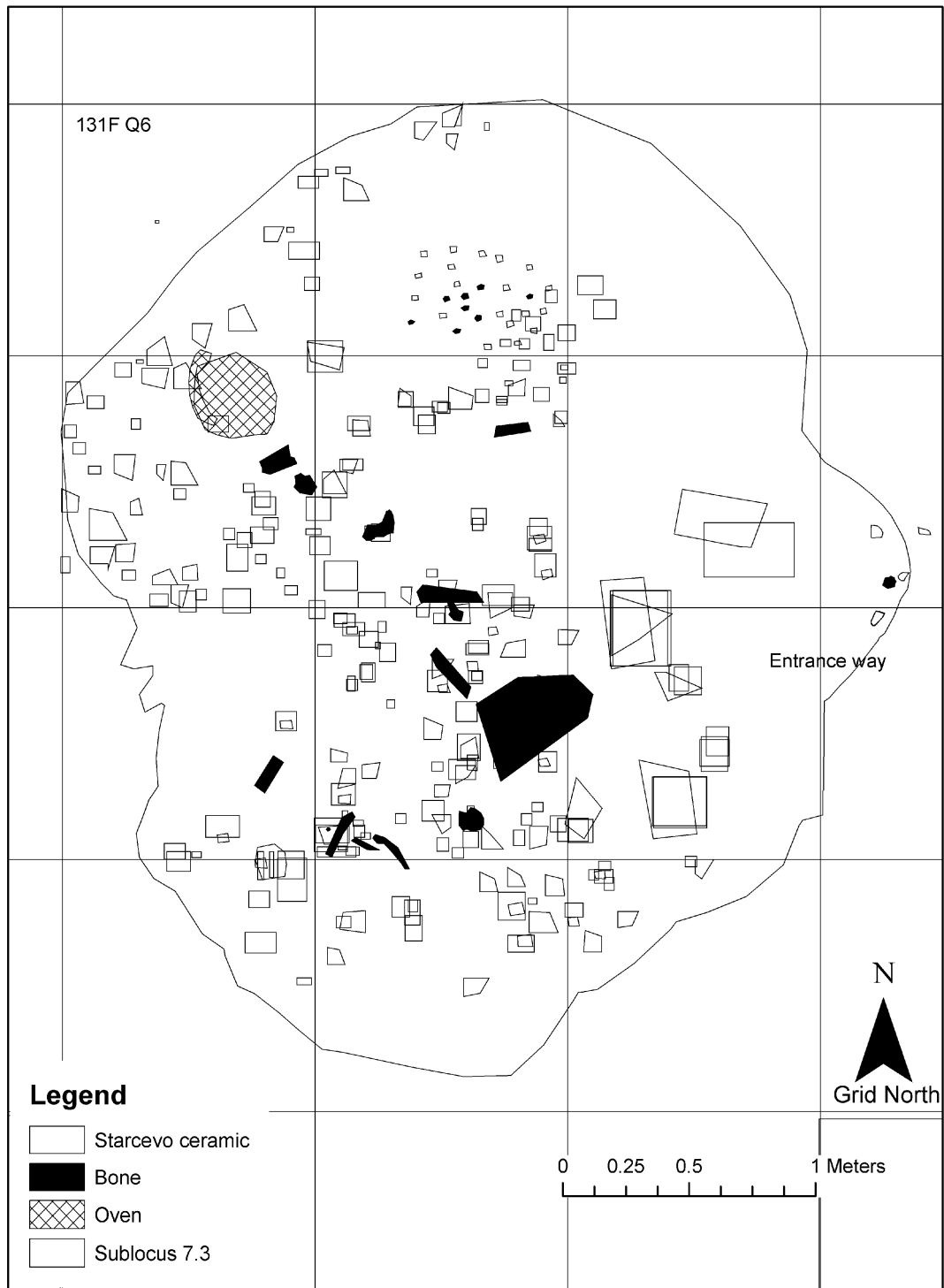


Figure 57: Entrance way in Sub-locus 7.3

Sub-strata in Locus 23

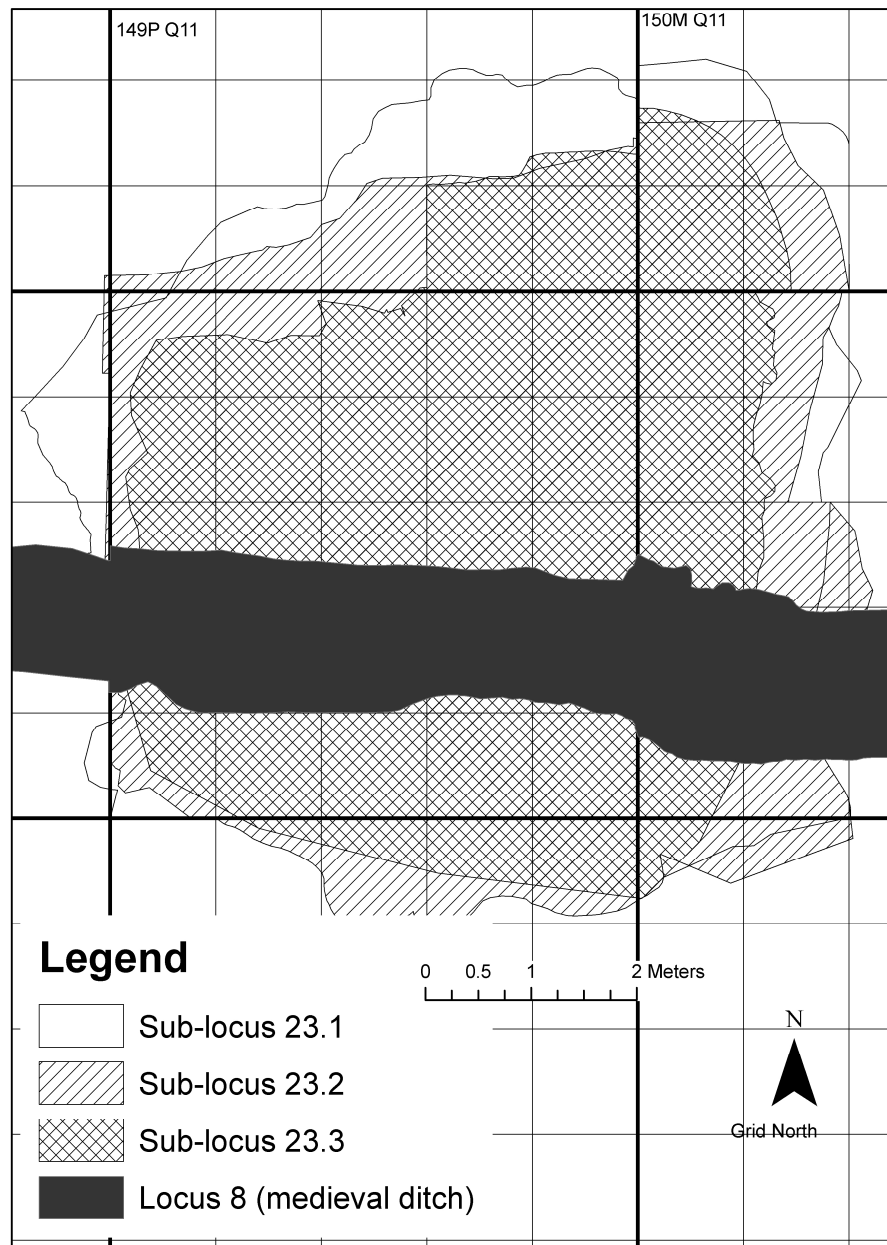


Figure 58: Sub-strata in Locus 23

Sub-strata in Locus 7

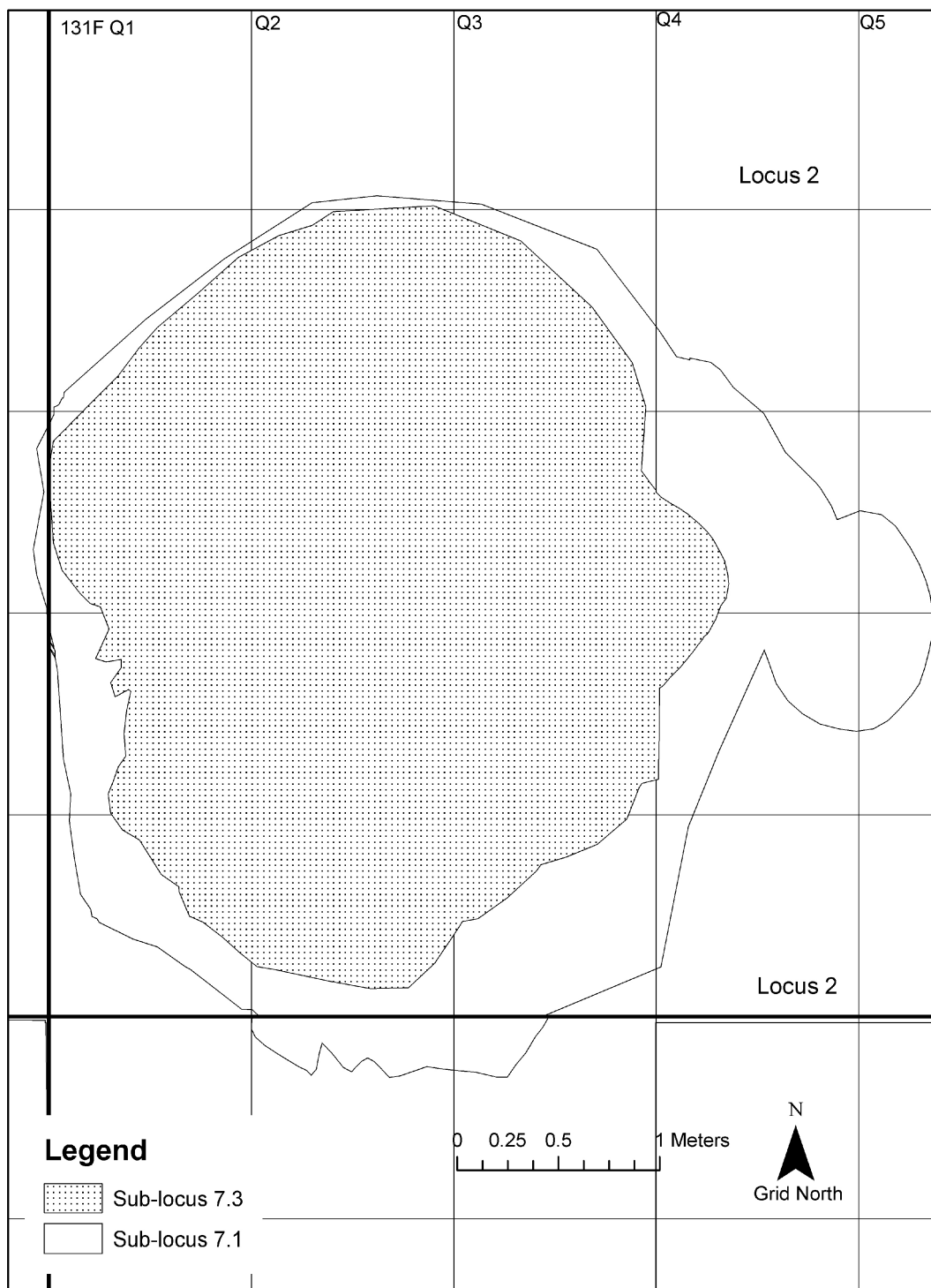


Figure 59: Sub-strata of Locus 7

Digitized bone in Sub-locus 23.1

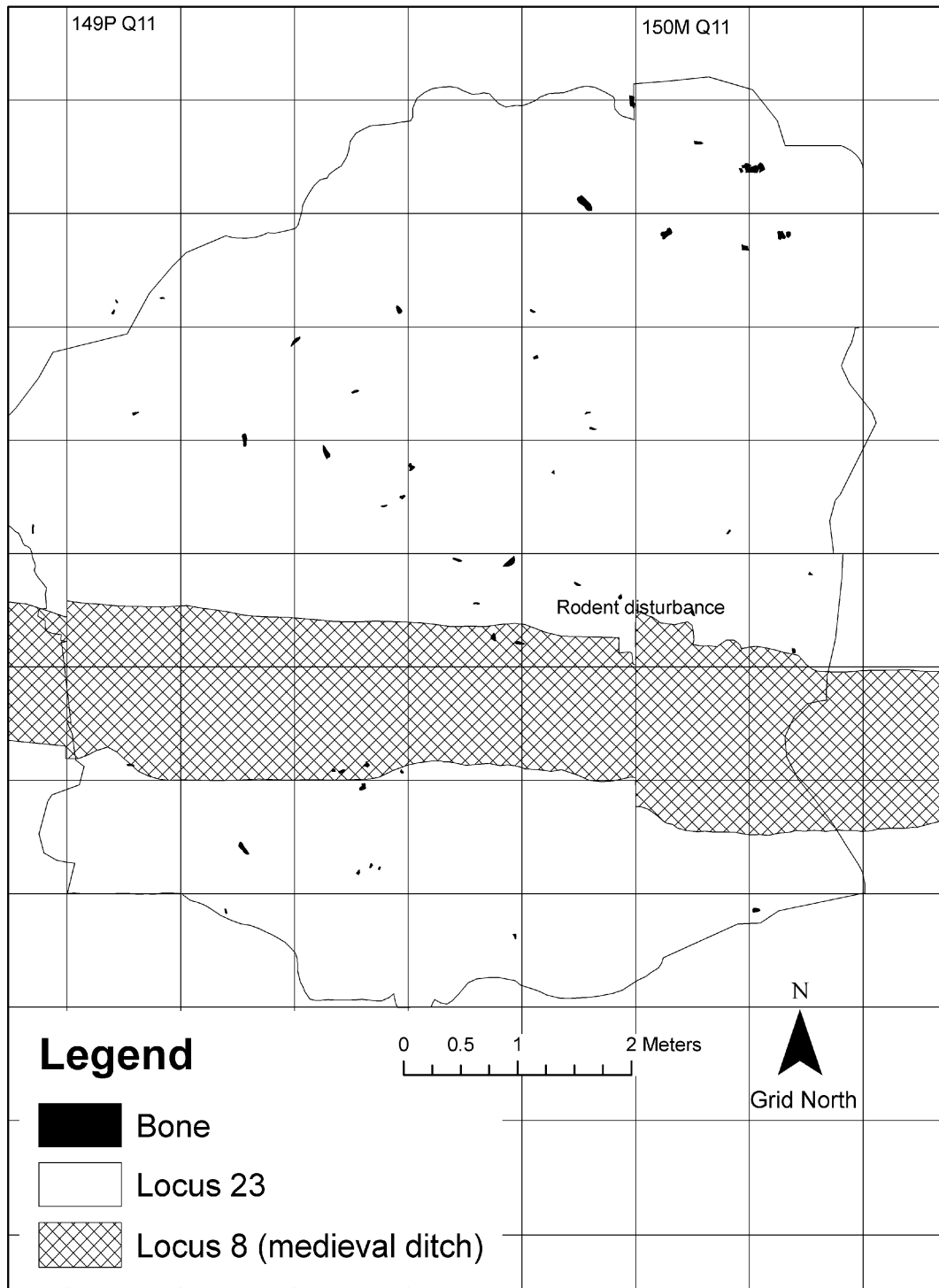


Figure 60: Digitized bone in Sub-locus 23.1

Centroid bone tool locations in Sub-locus 23.1

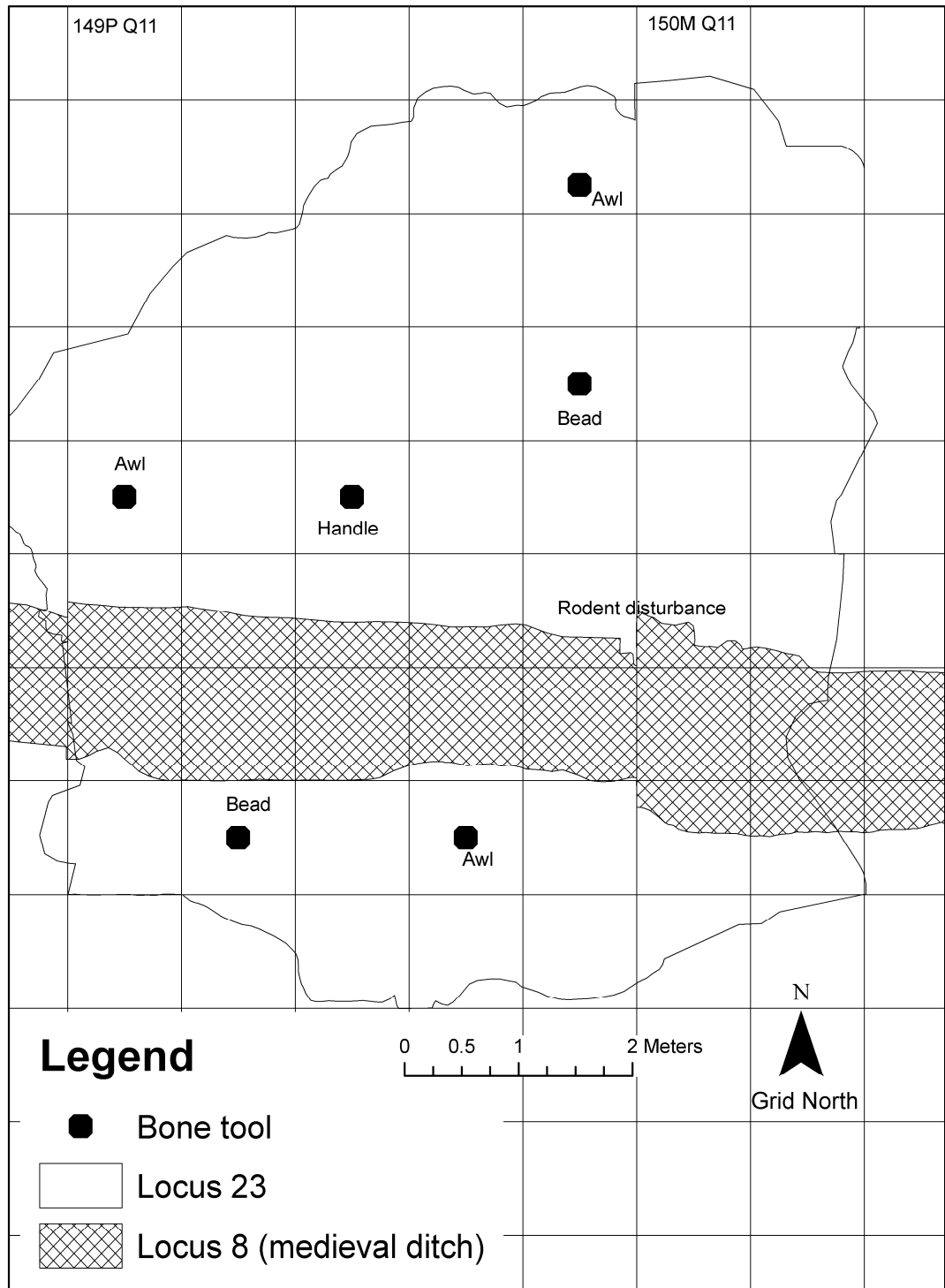


Figure 61: Centroid bone tools in Sub-locus 23.1

Digitized Early Neolithic ceramics in Sub-locus 23.1

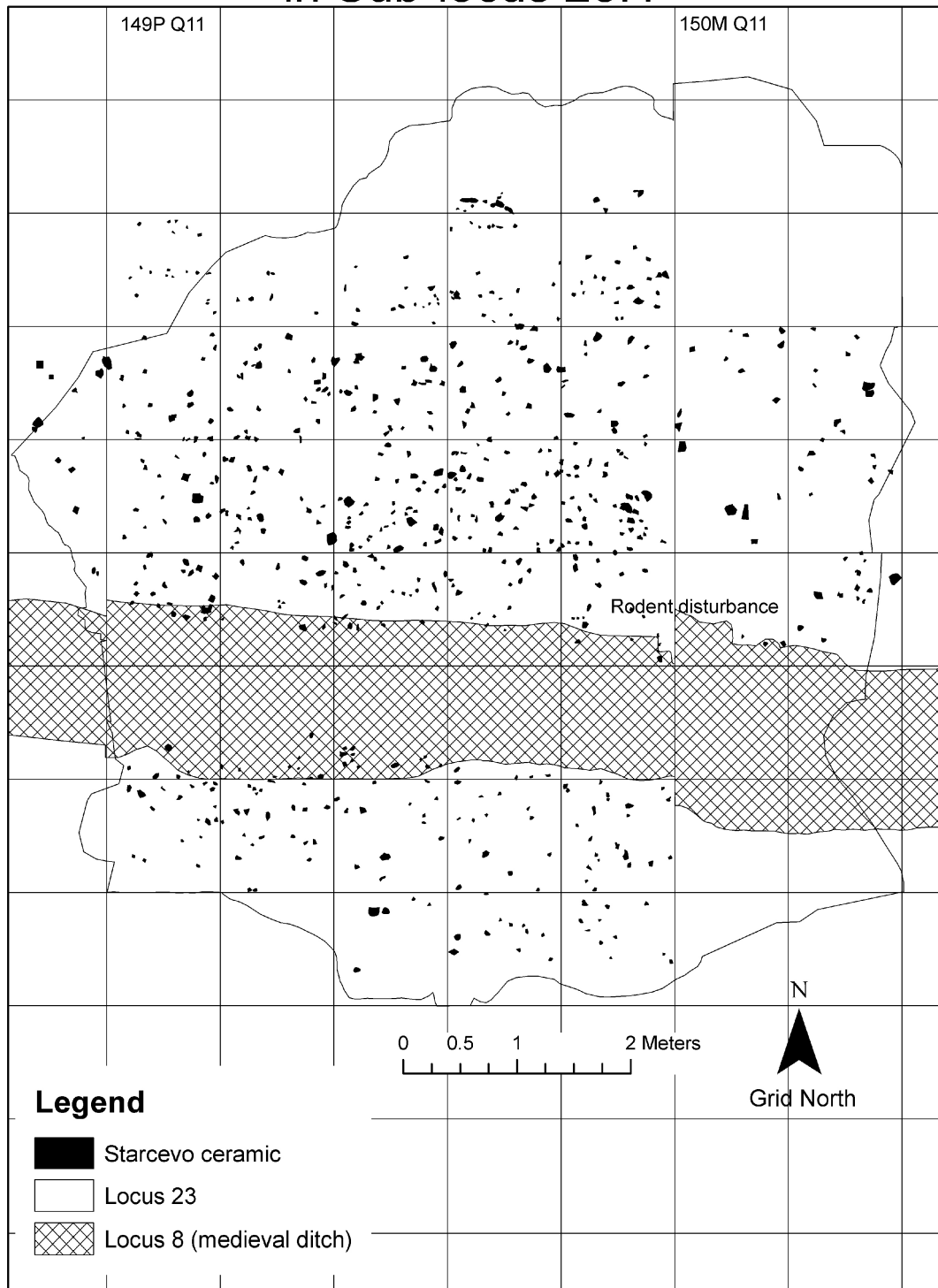


Figure 62: Digitized Early Neolithic ceramics in Sub-locus 23.1

Digitized chipped lithic locations in Sub-locus 23.1

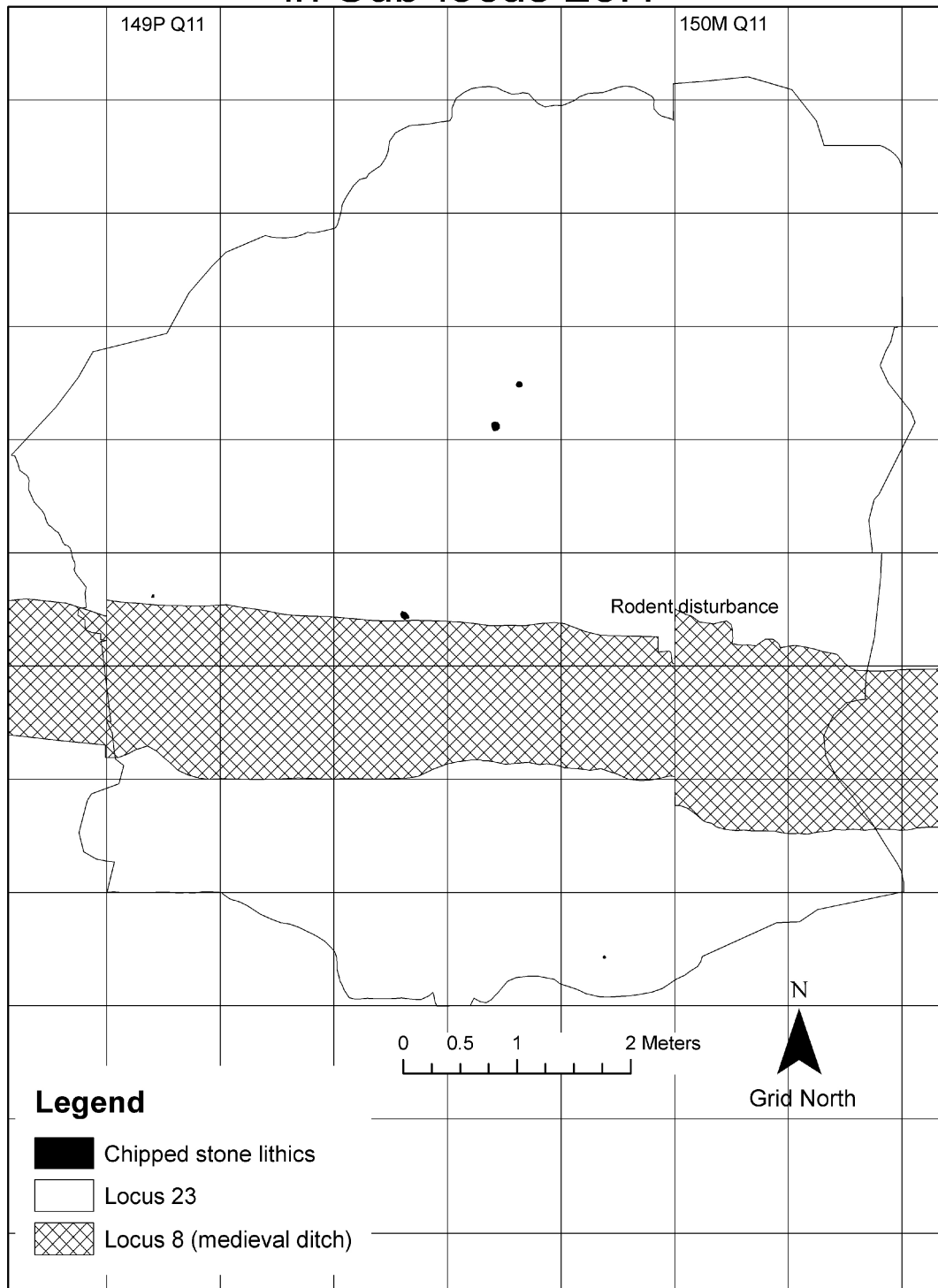


Figure 63: Digitized chipped lithics in Sub-locus 23.1

Digitized unidentified daub locations in Sub-locus 23.1

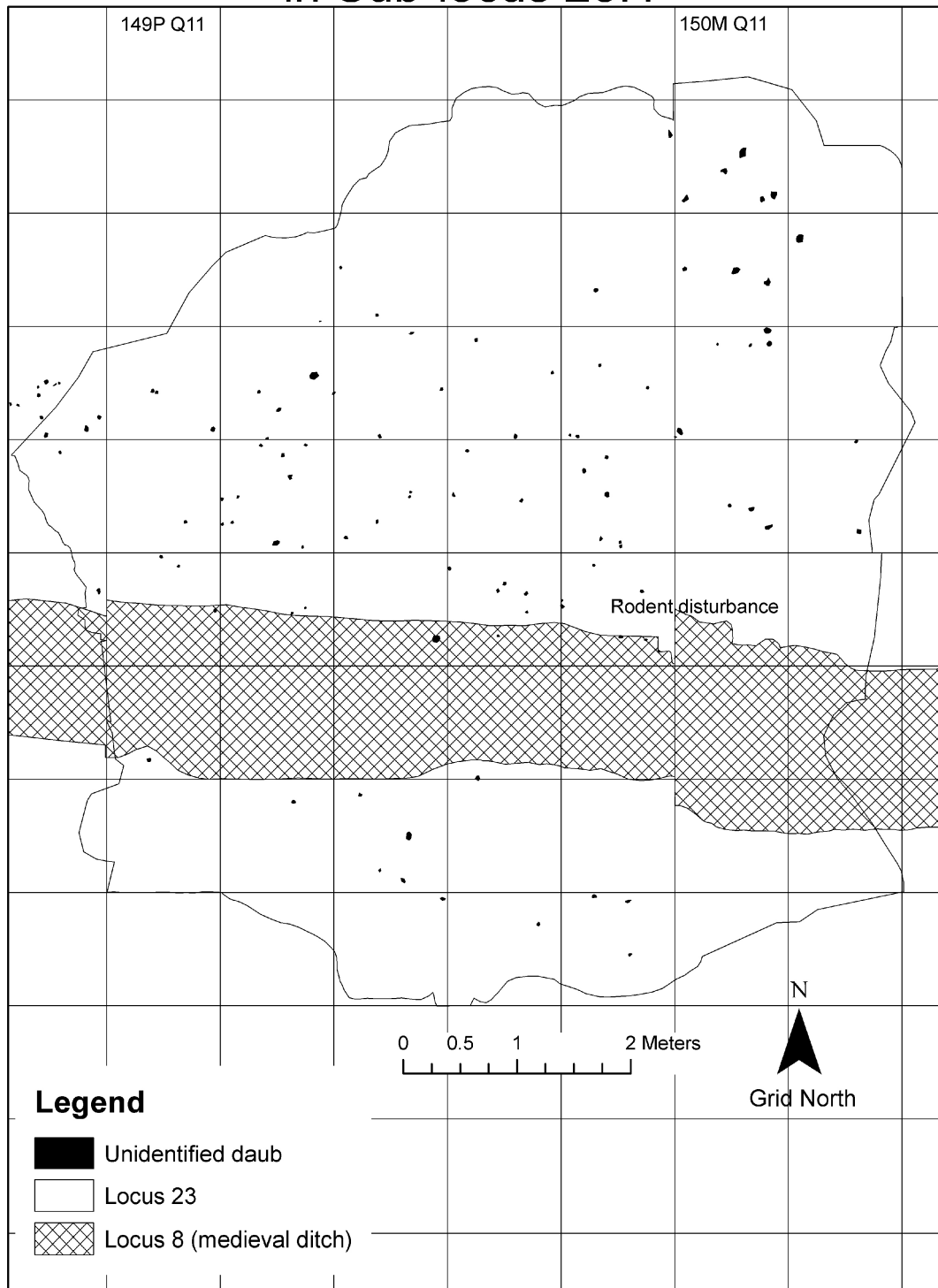


Figure 64: Digitized unidentified daub in Sub-locus 23.1

Digitized unidentified weight locations in Sub-locus 23.1

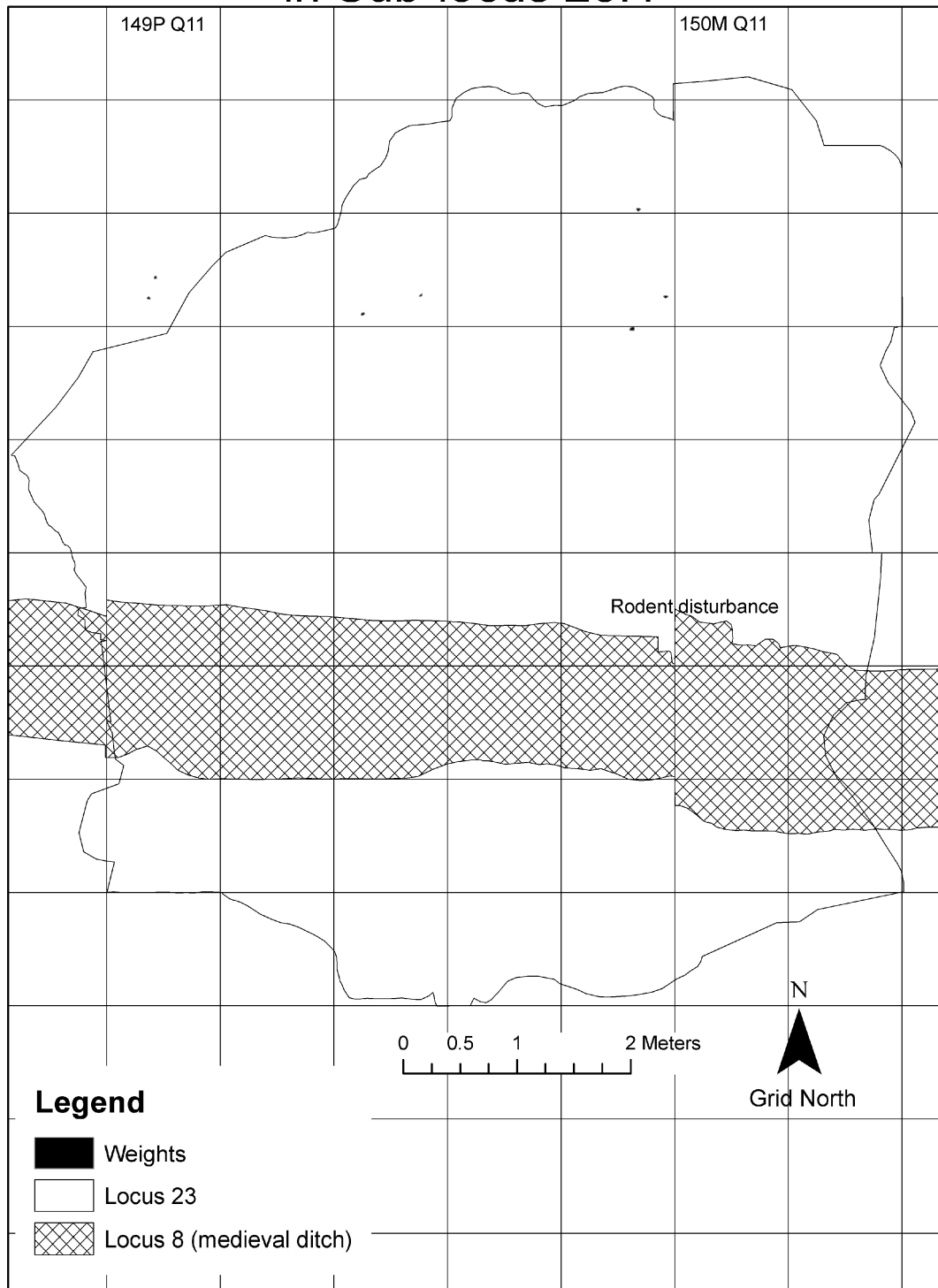


Figure 65: Digitized unidentified weights in Sub-locus 23.1

Digitized carbon and post holes in Sub-locus 23.1

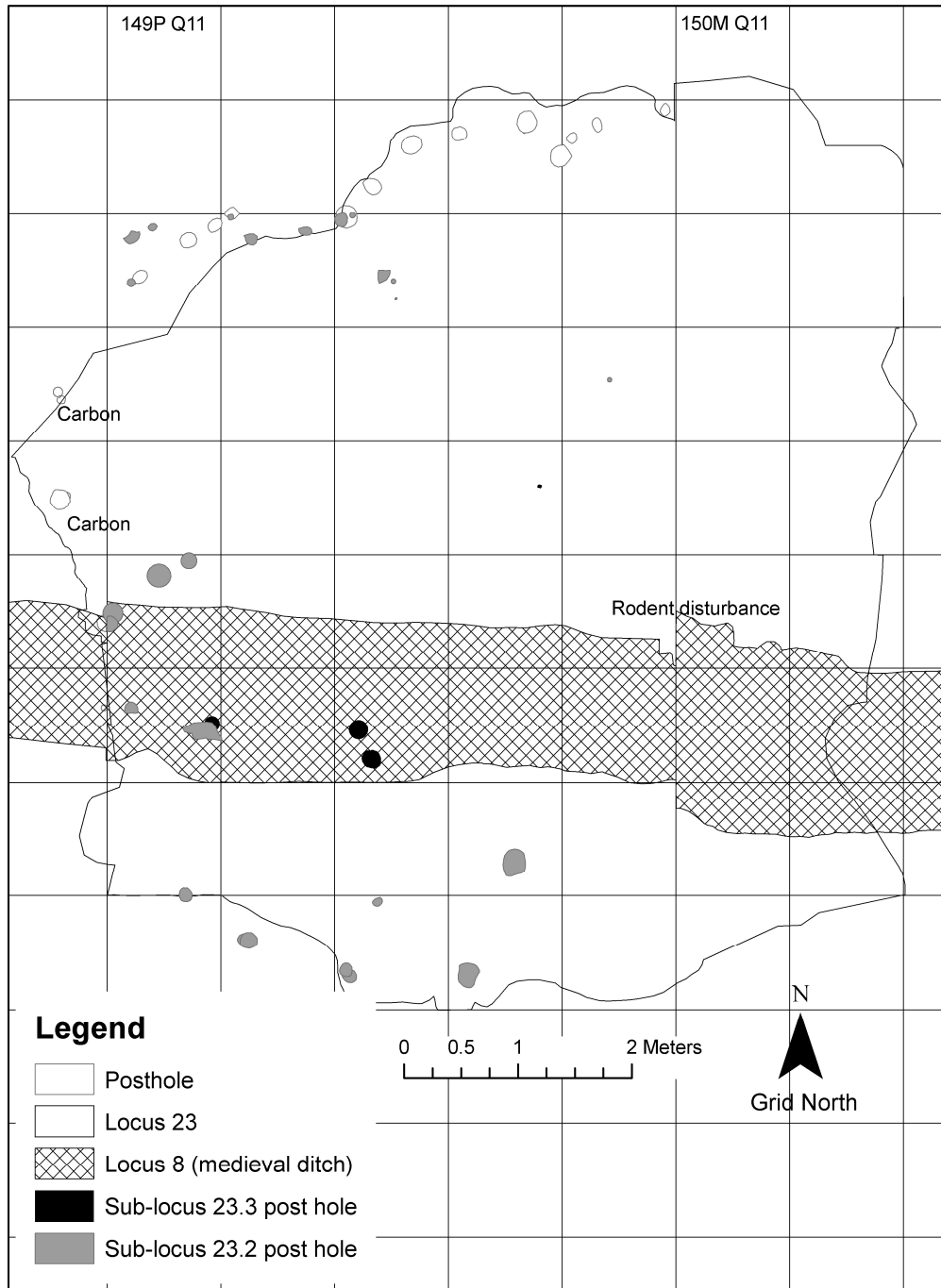


Figure 66: Post hole and digitized carbon in Sub-locus 23.1

Oven wall and daub in south half of Sub-locus 23.3

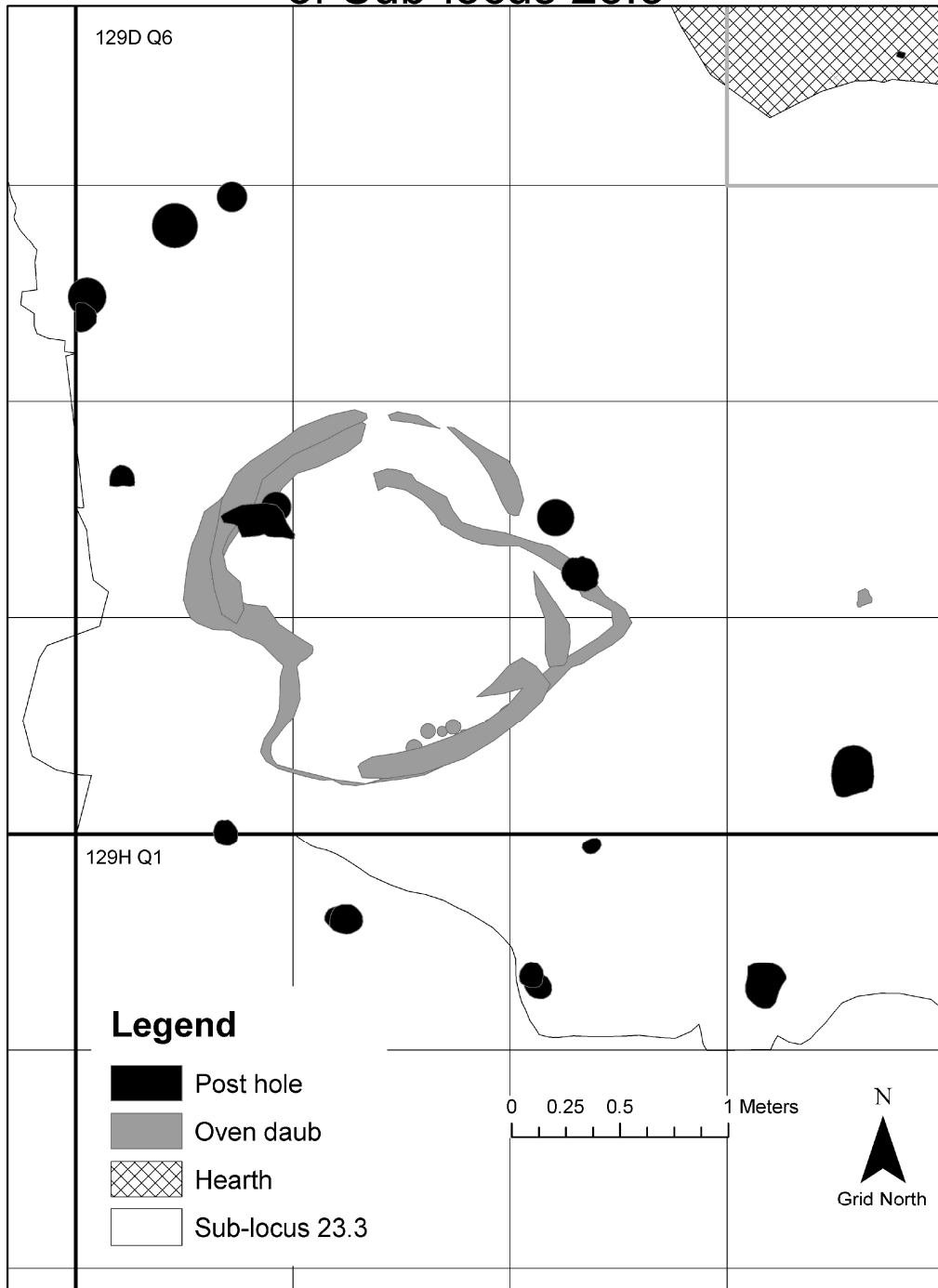


Figure 67: Digitized oven wall and daub in south half of Sub-locus 23.3

Bone locations in Sub-locus 23.2

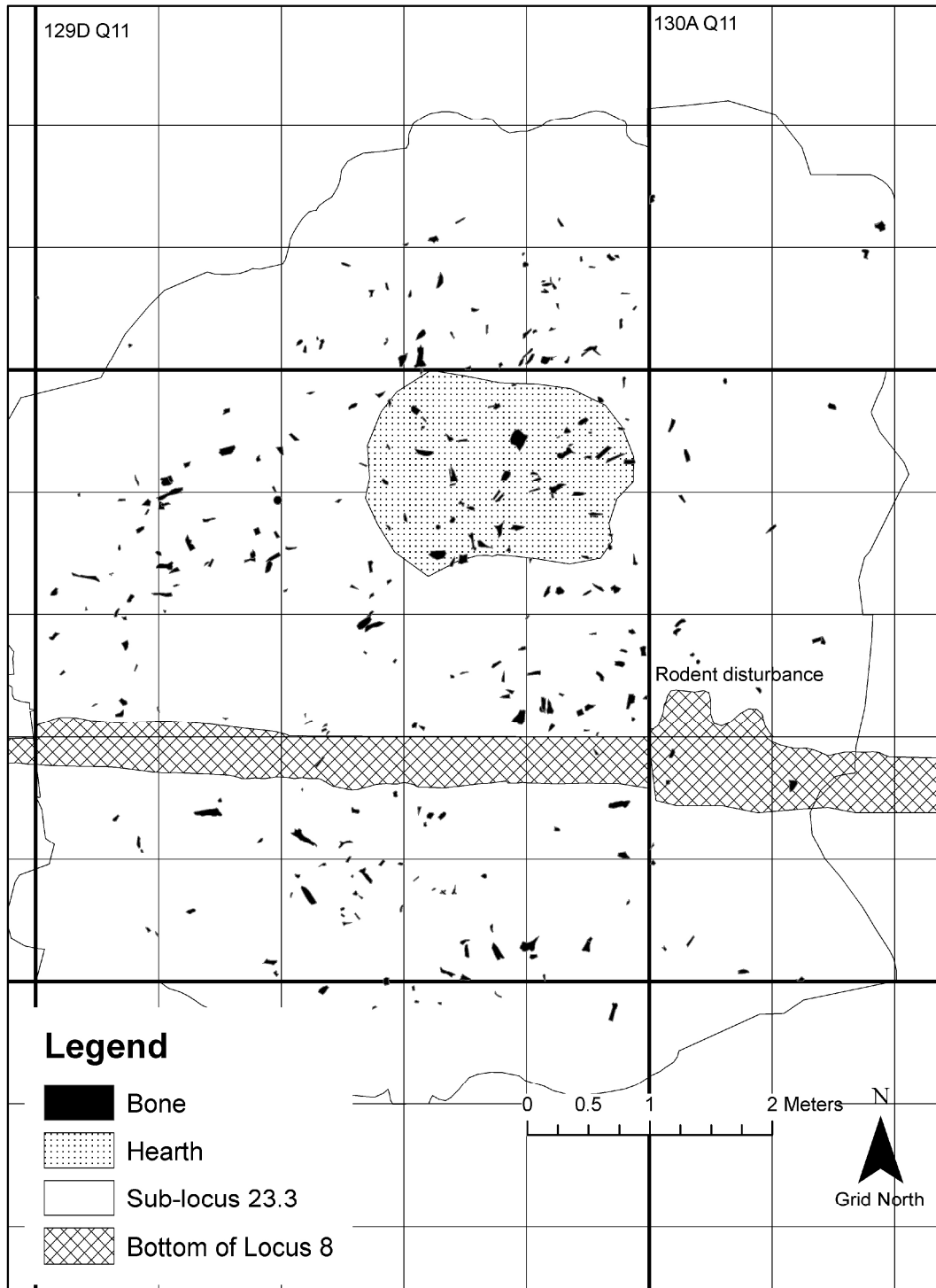


Figure 68: Digitized bone in Sub-locus 23.2

Centroid bone tool locations in Sub-locus 23.2

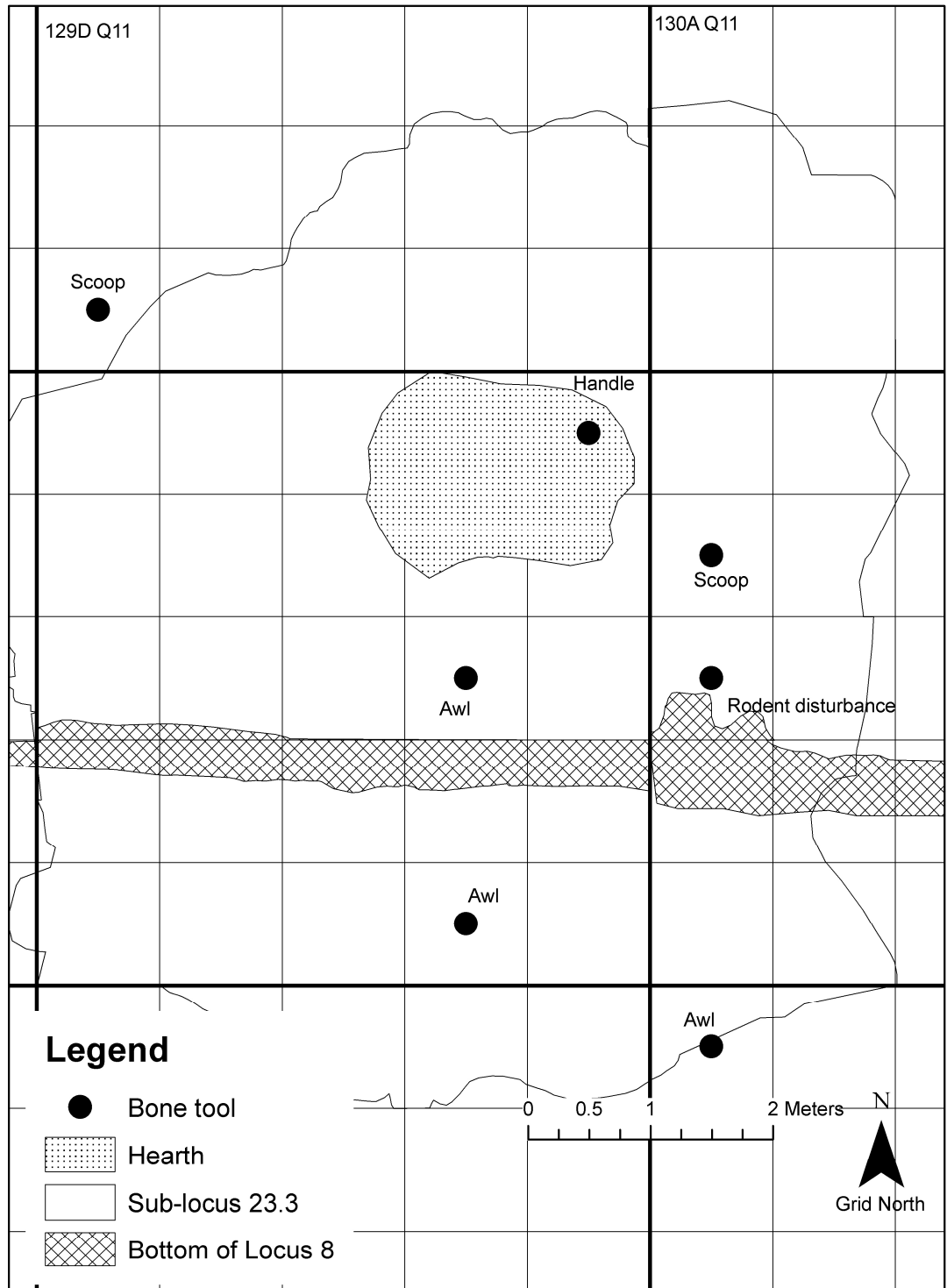


Figure 69: Centroid bone tools in Sub-locus 23.2

Digitized carbon in Sub-locus 23.2

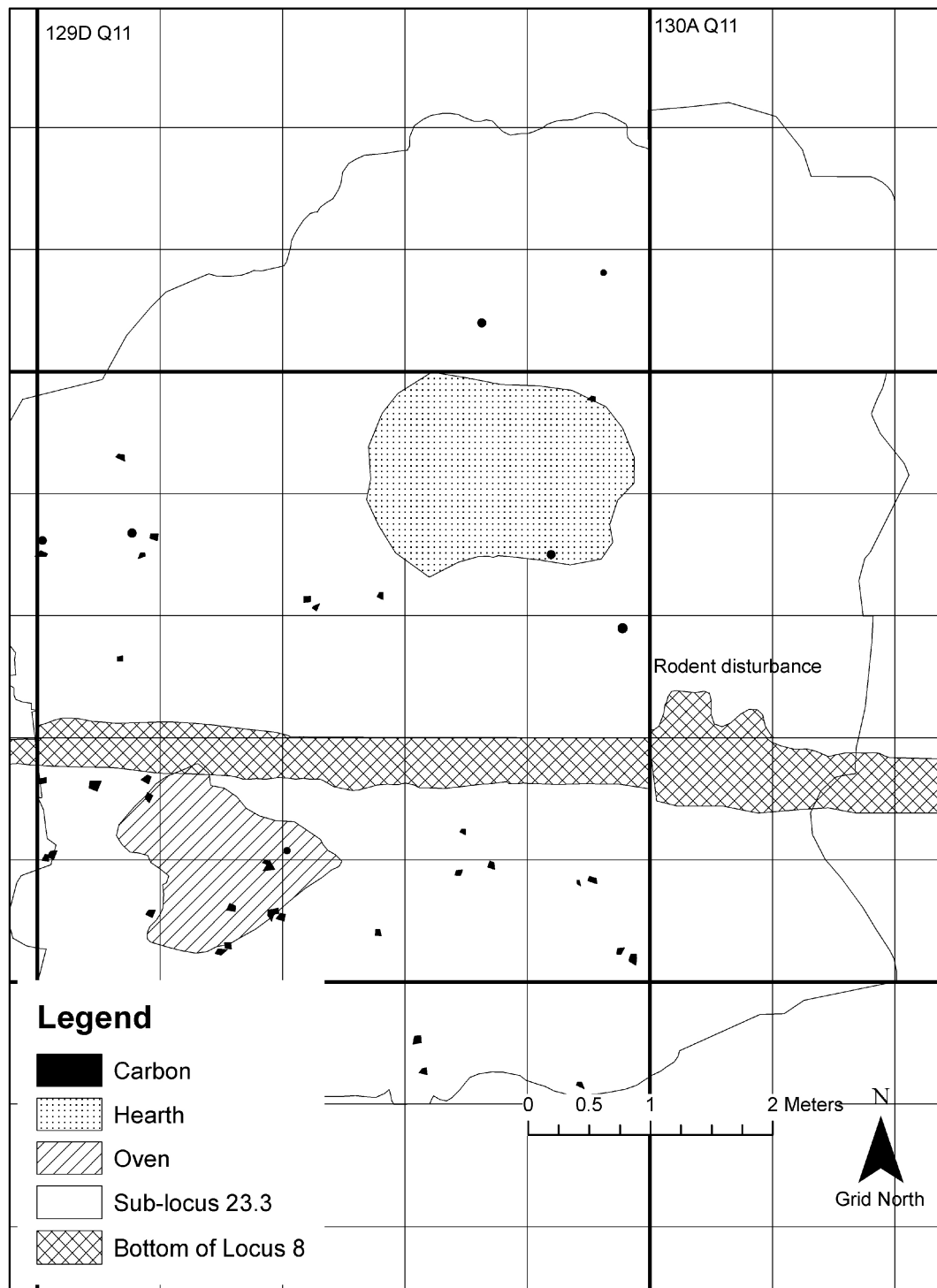


Figure 70: Digitized carbon in Sub-locus 23.2

Digitized Early Neolithic ceramics in Sub-locus 23.2

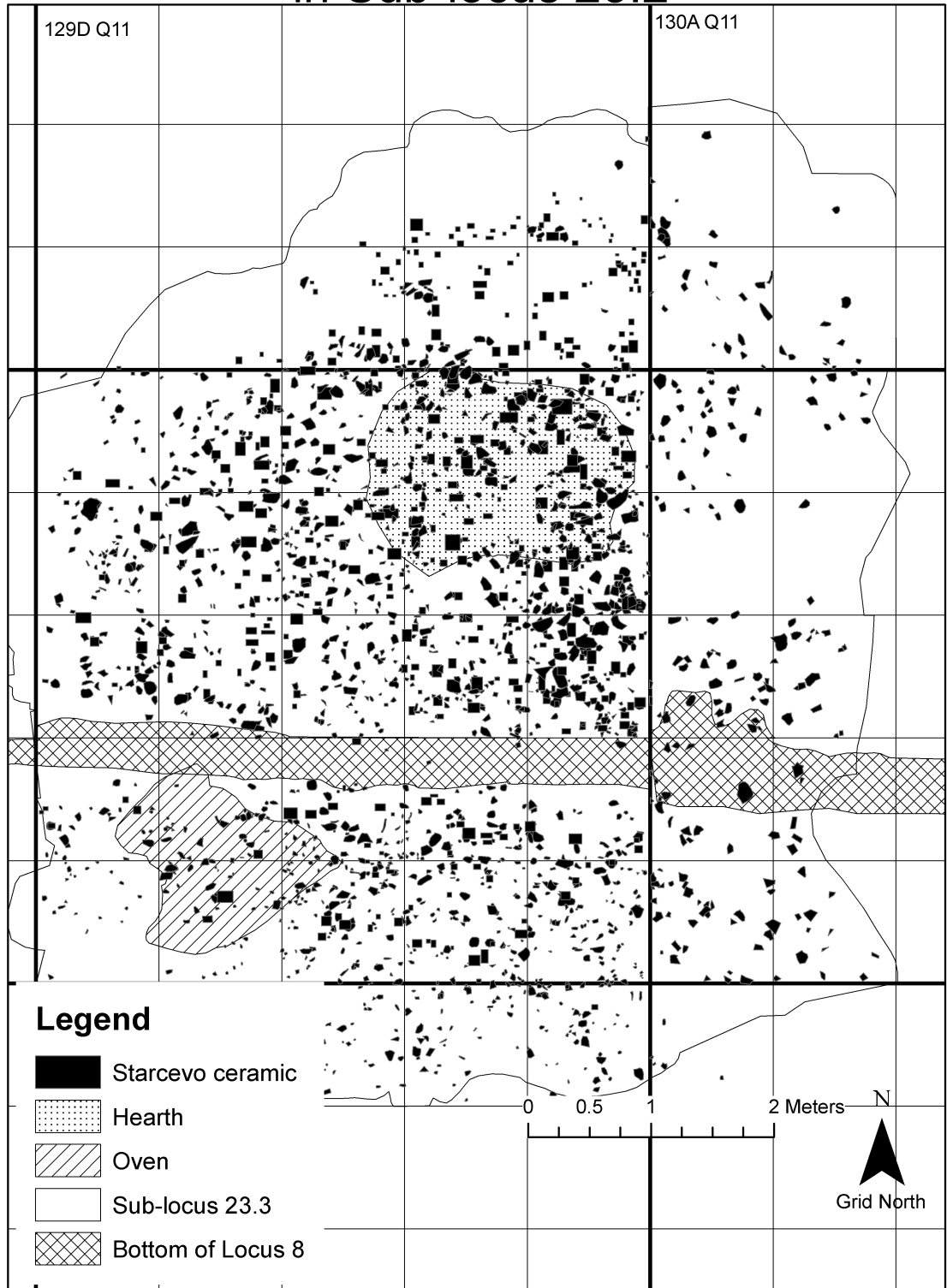


Figure 71: Digitized Early Neolithic ceramics in Sub-locus 23.2

Digitized chipped lithic tools in Sub-locus 23.2

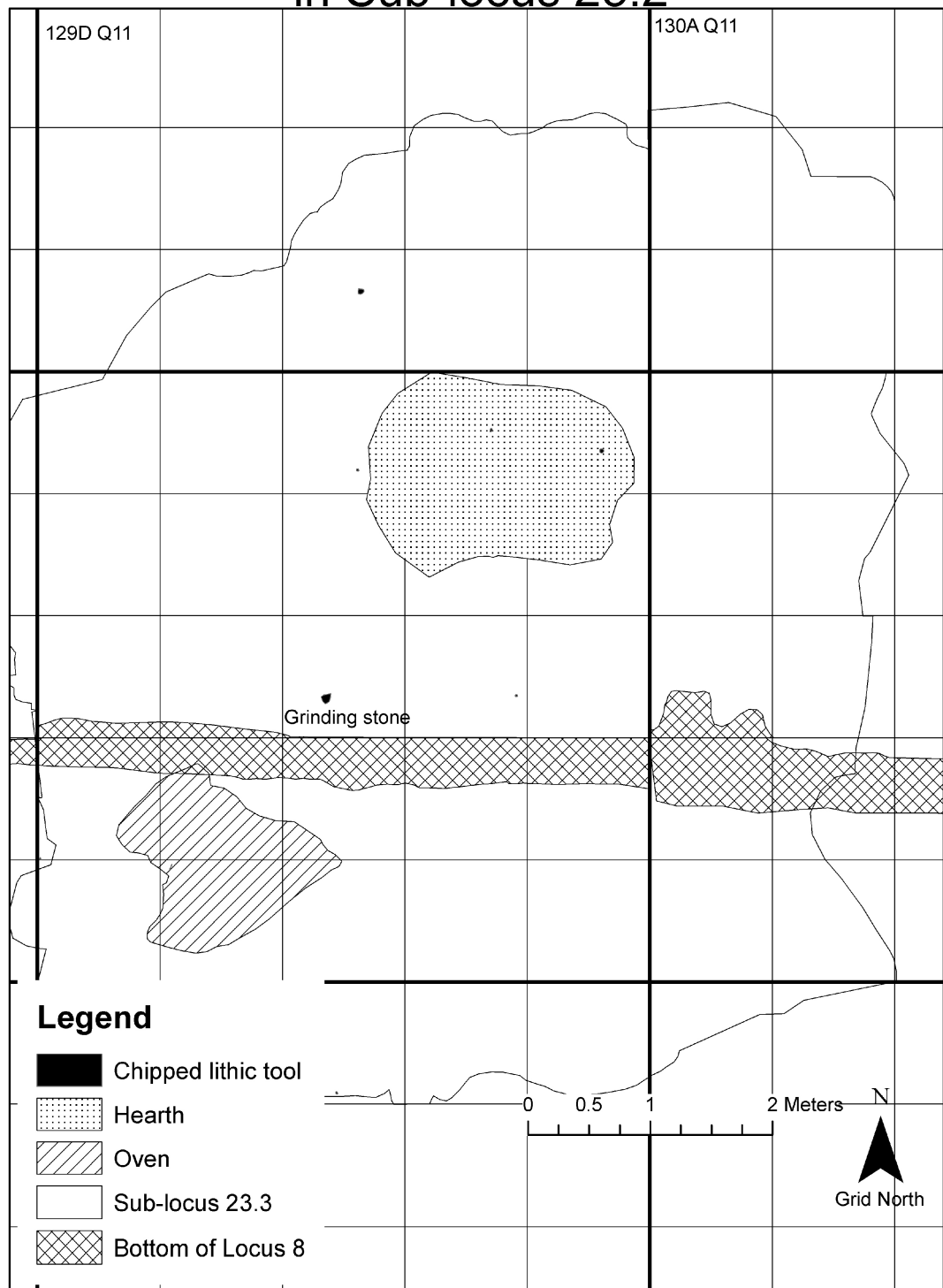


Figure 72: Digitized chipped lithic tools in Sub-locus 23.2

Digitized unidentified daub in Sub-locus 23.2

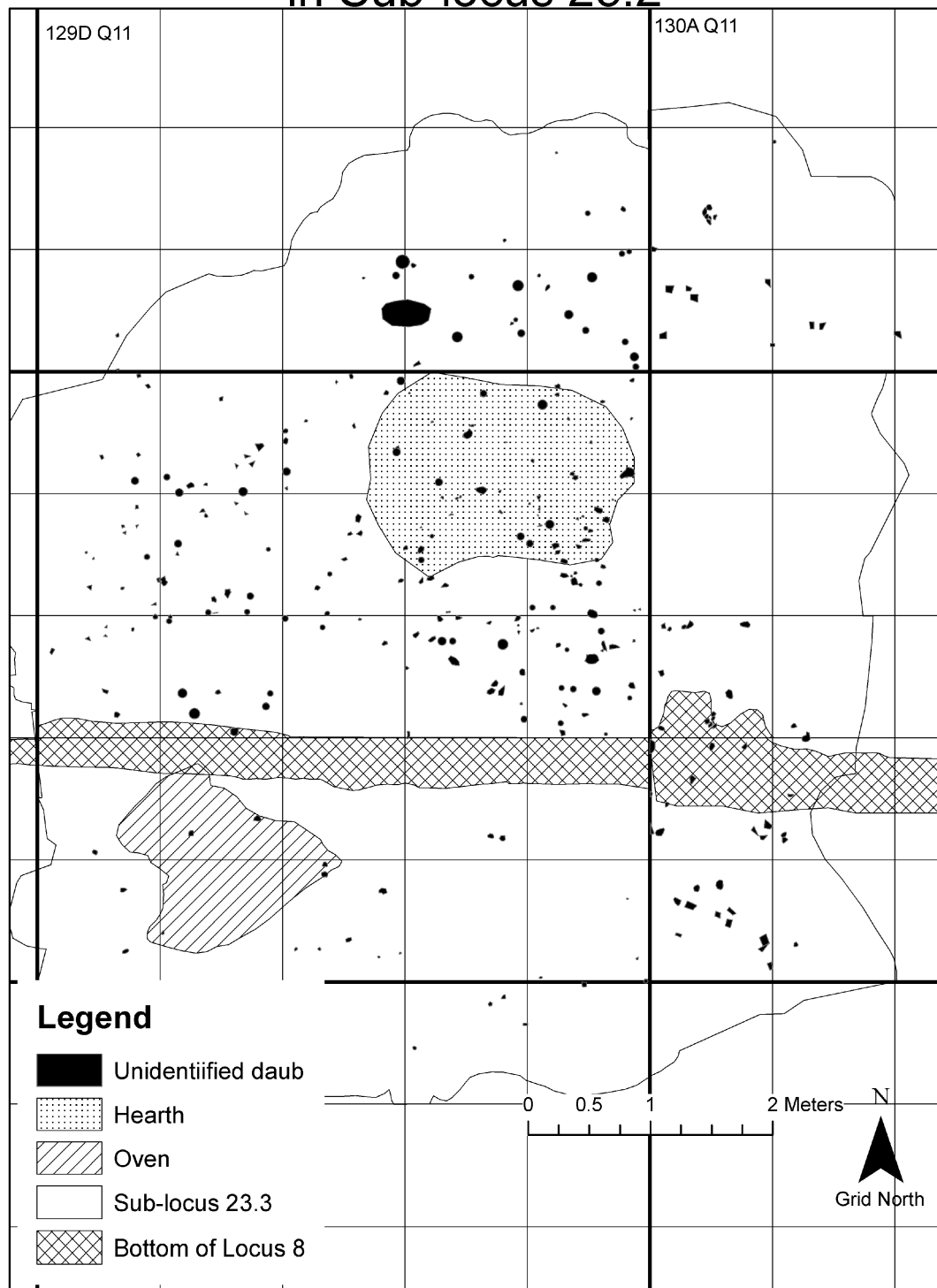


Figure 73: Digitized unidentified daub in Sub-locus 23.2

Digitized floor daub in Sub-locus 23.2

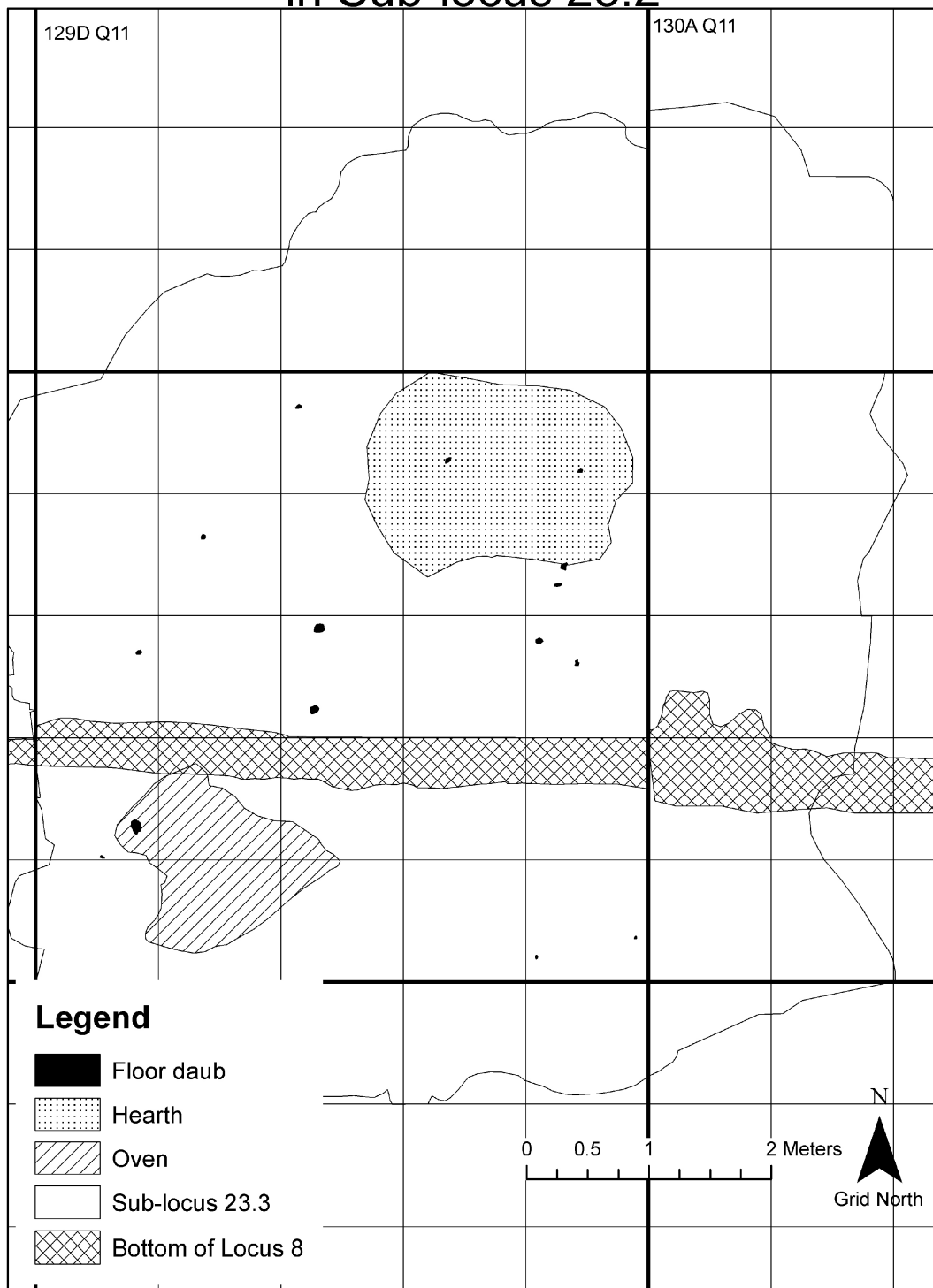


Figure 74: Digitized floor daub in Sub-locus 23.2

Digitized wall daub in Sub-locus 23.2

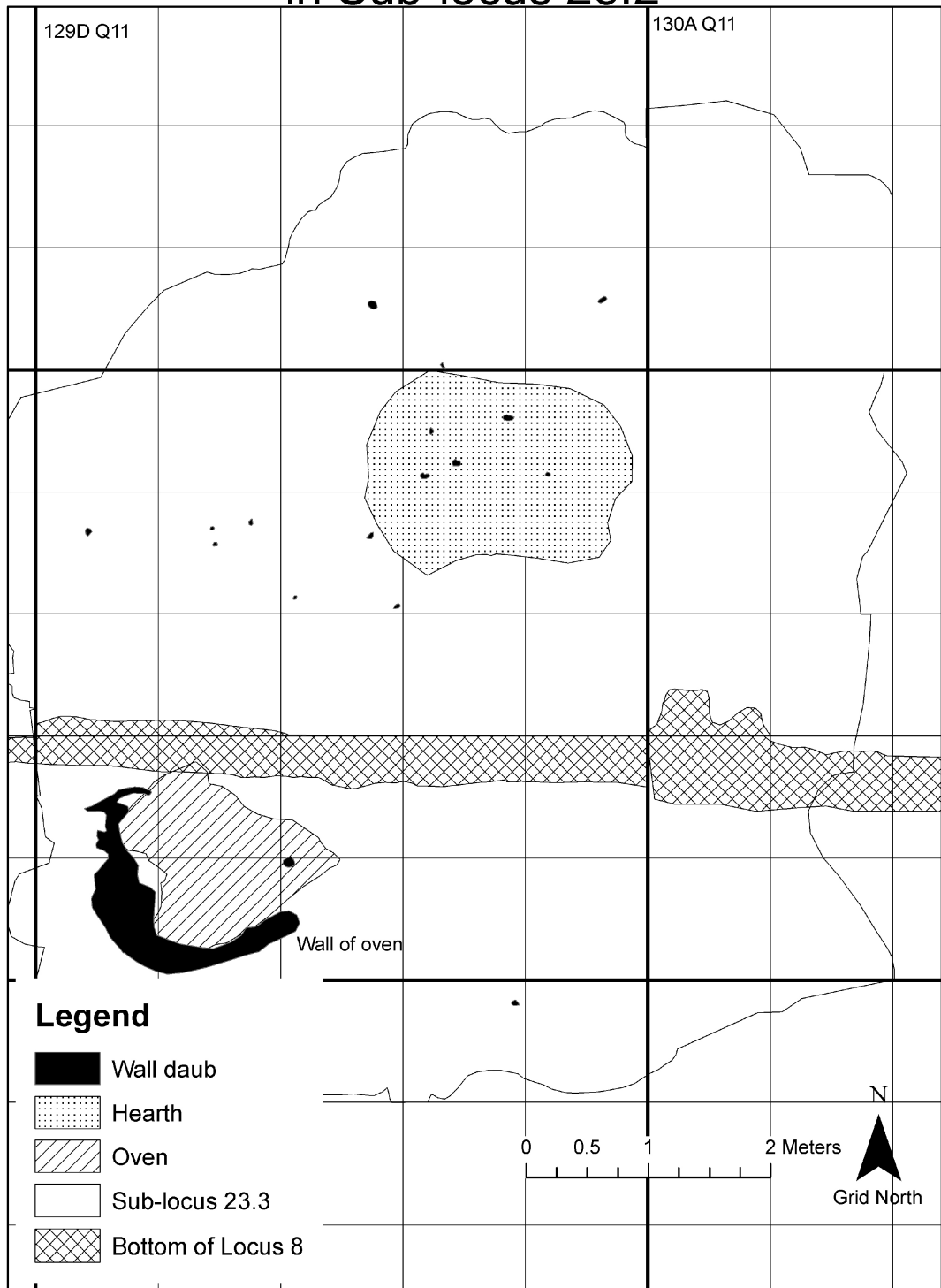


Figure 75: Digitized wall daub in Sub-locus 23.2

Digitized unidentified weight types in Sub-locus 23.2

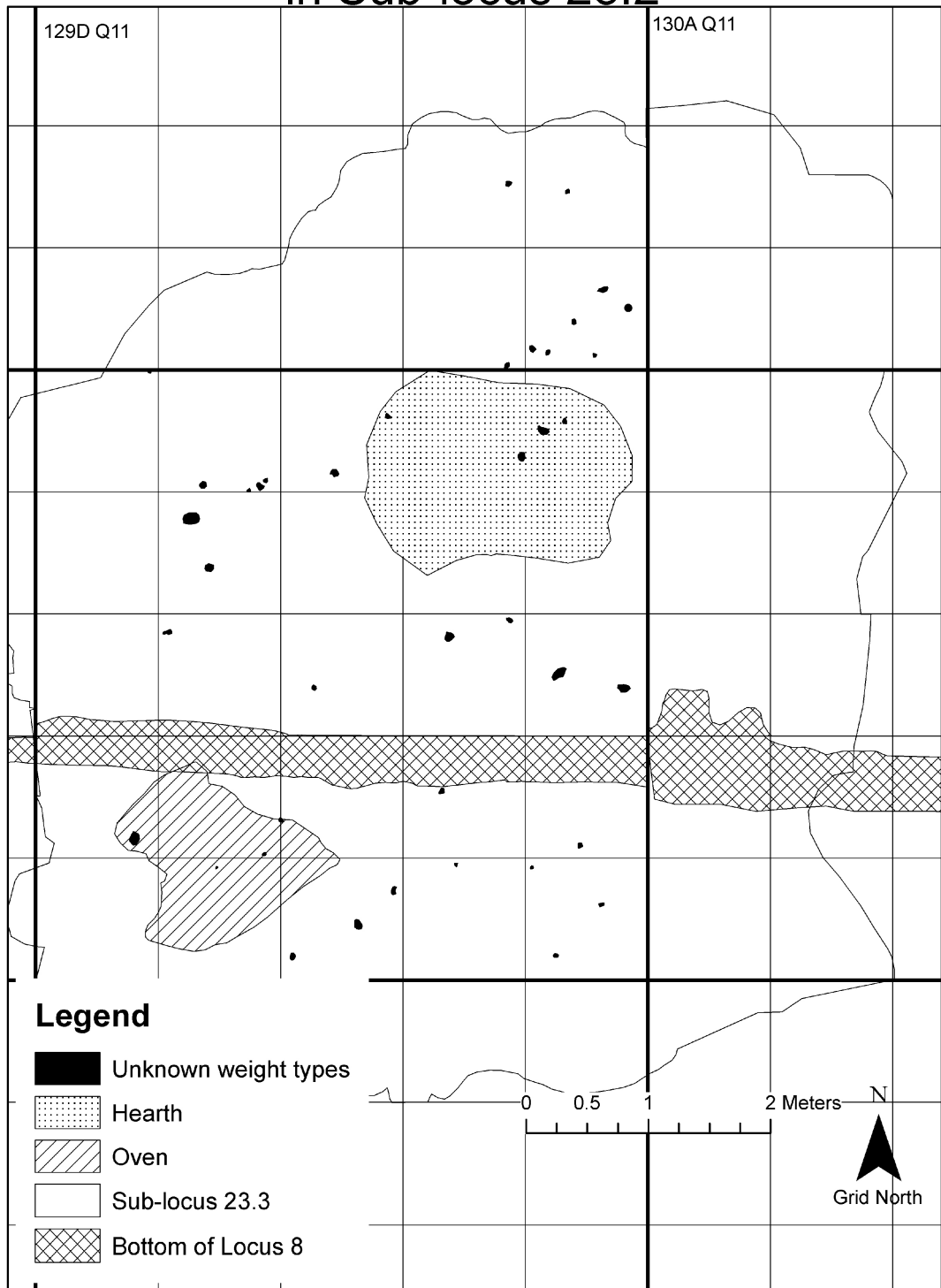


Figure 76: Digitized unidentified weight types in Sub-locus 23.2

Digitized loom and net weights in Sub-locus 23.2

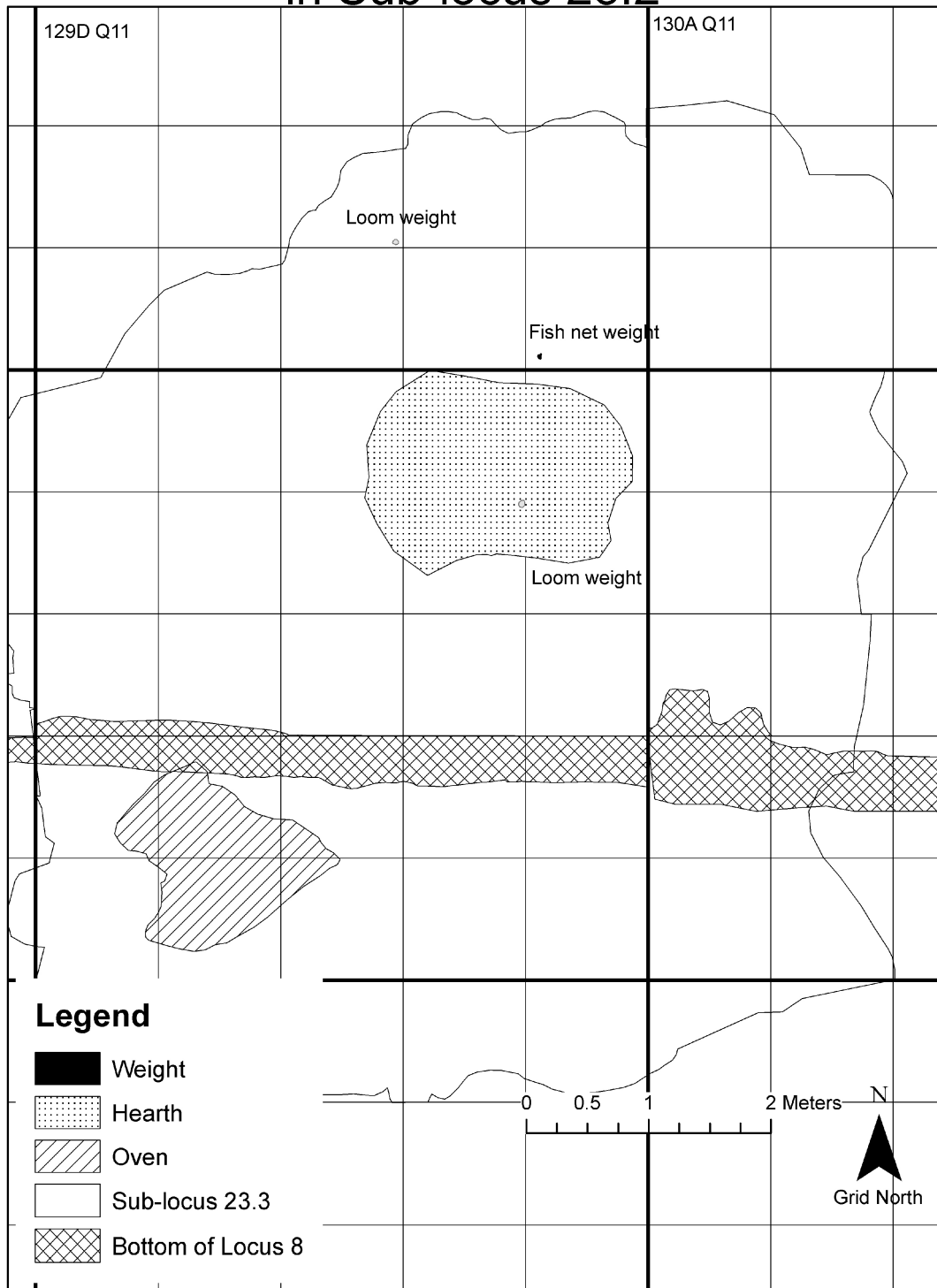


Figure 77: Digitized loom and net weights in Sub-locus 23.2

Digitized loaf weights in Sub-locus 23.2

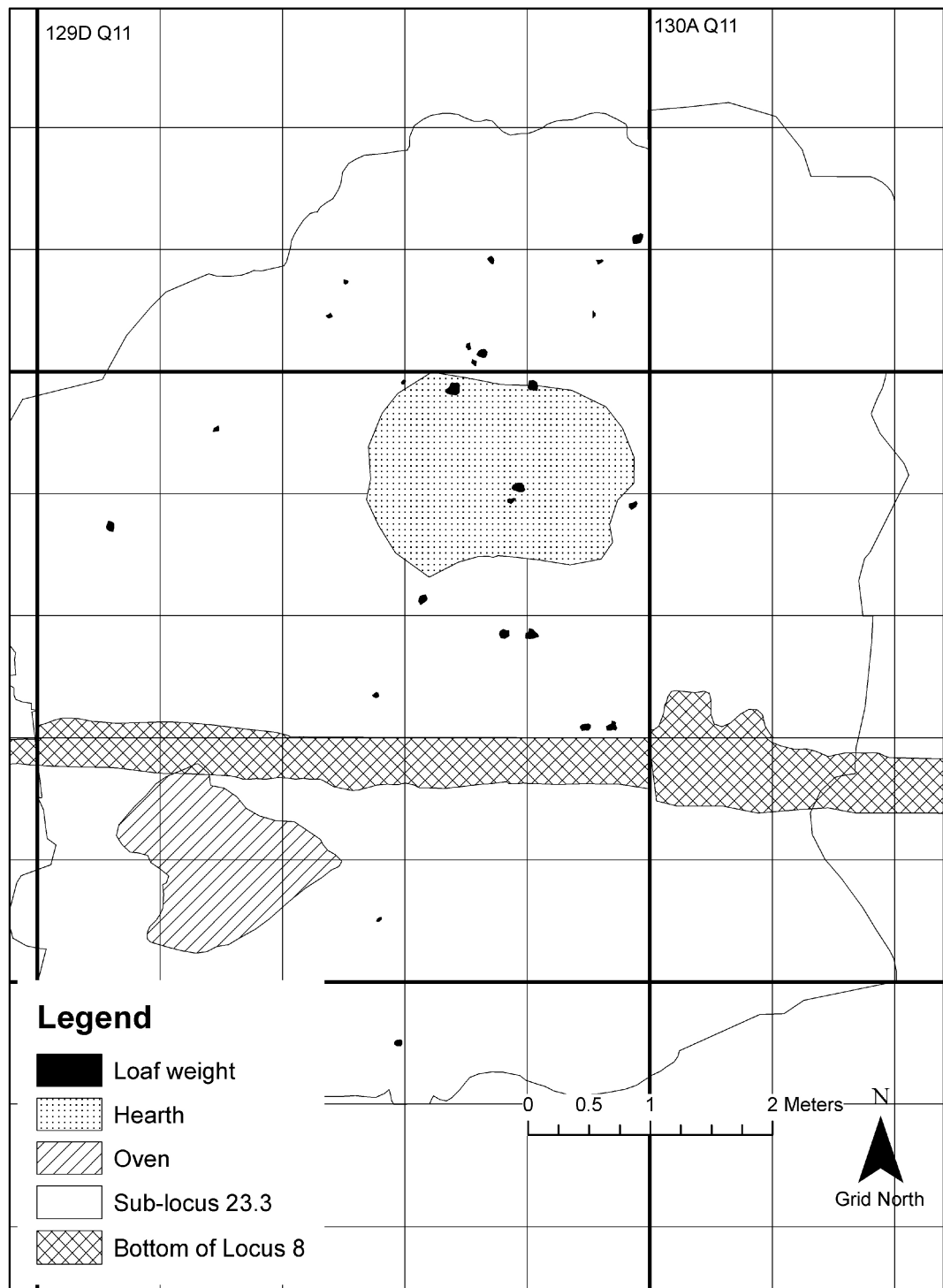


Figure 78: Digitized loaf weights in Sub-locus 23.2

Post hole locations in Sub-locus 23.2

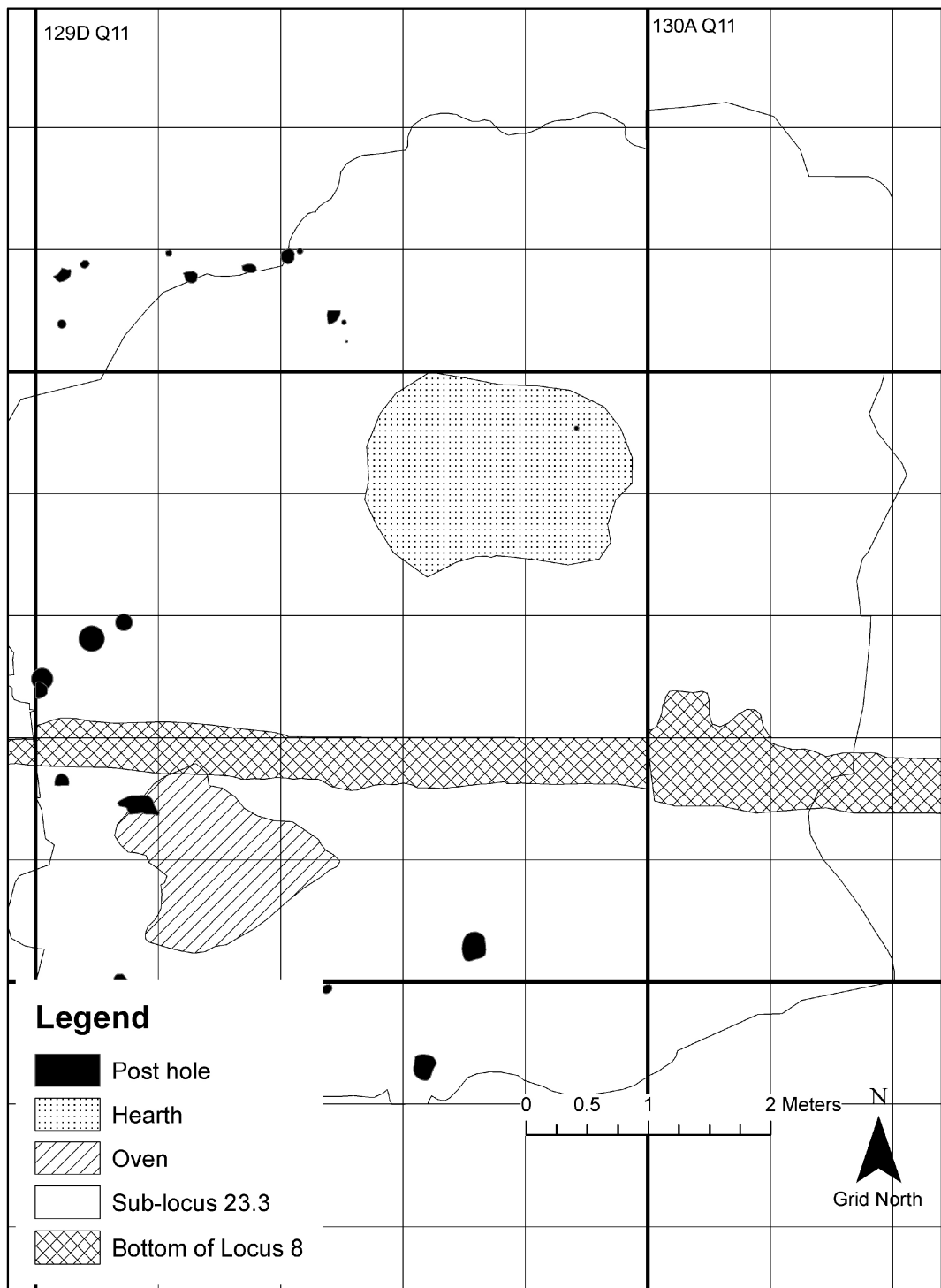


Figure 79: Post holes in Sub-locus 23.2

Features in Sub-locus 23.3

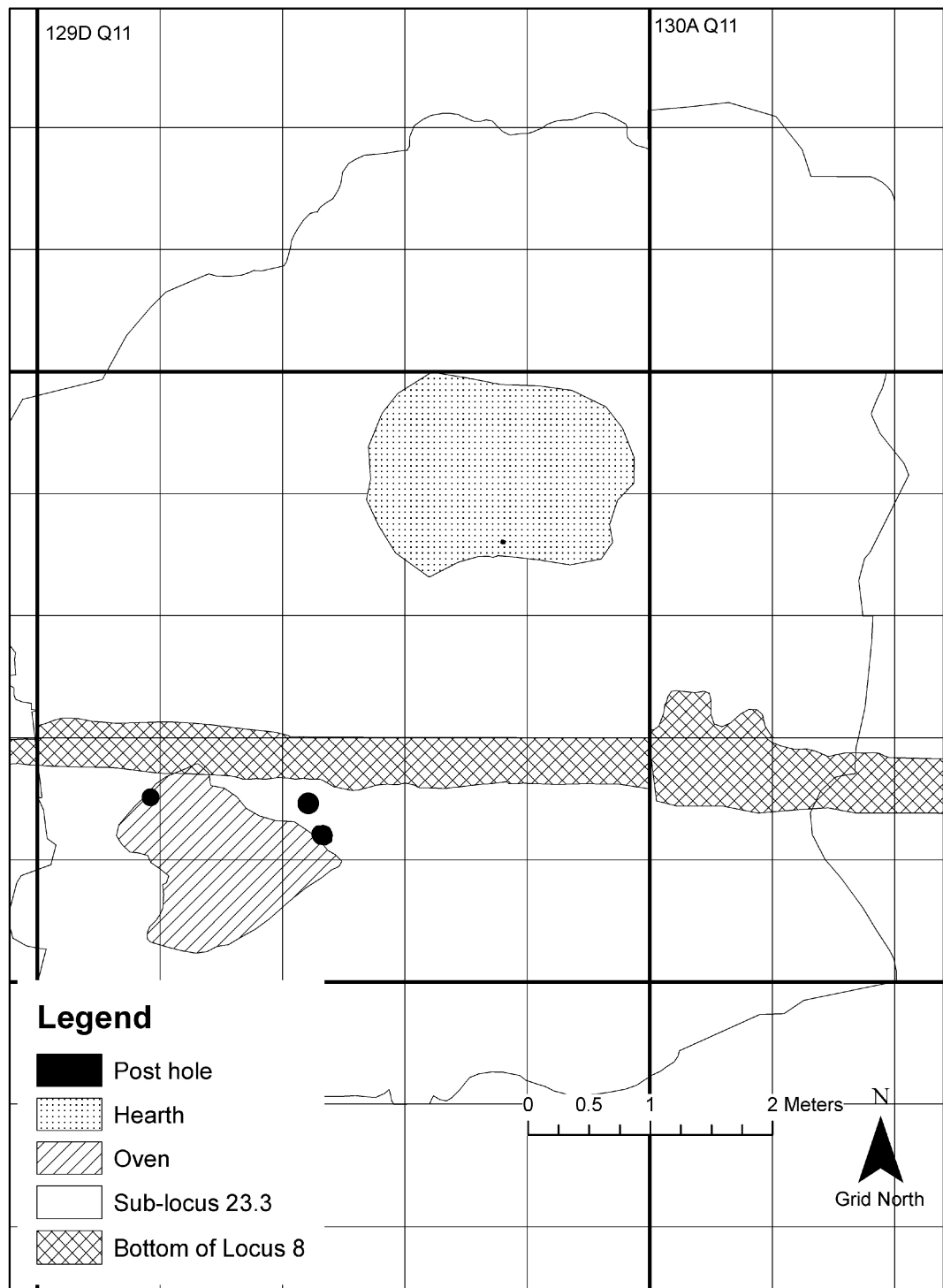


Figure 80: Features in in Sub-locus 23.3

Oven detail in Sub-locus 23.3

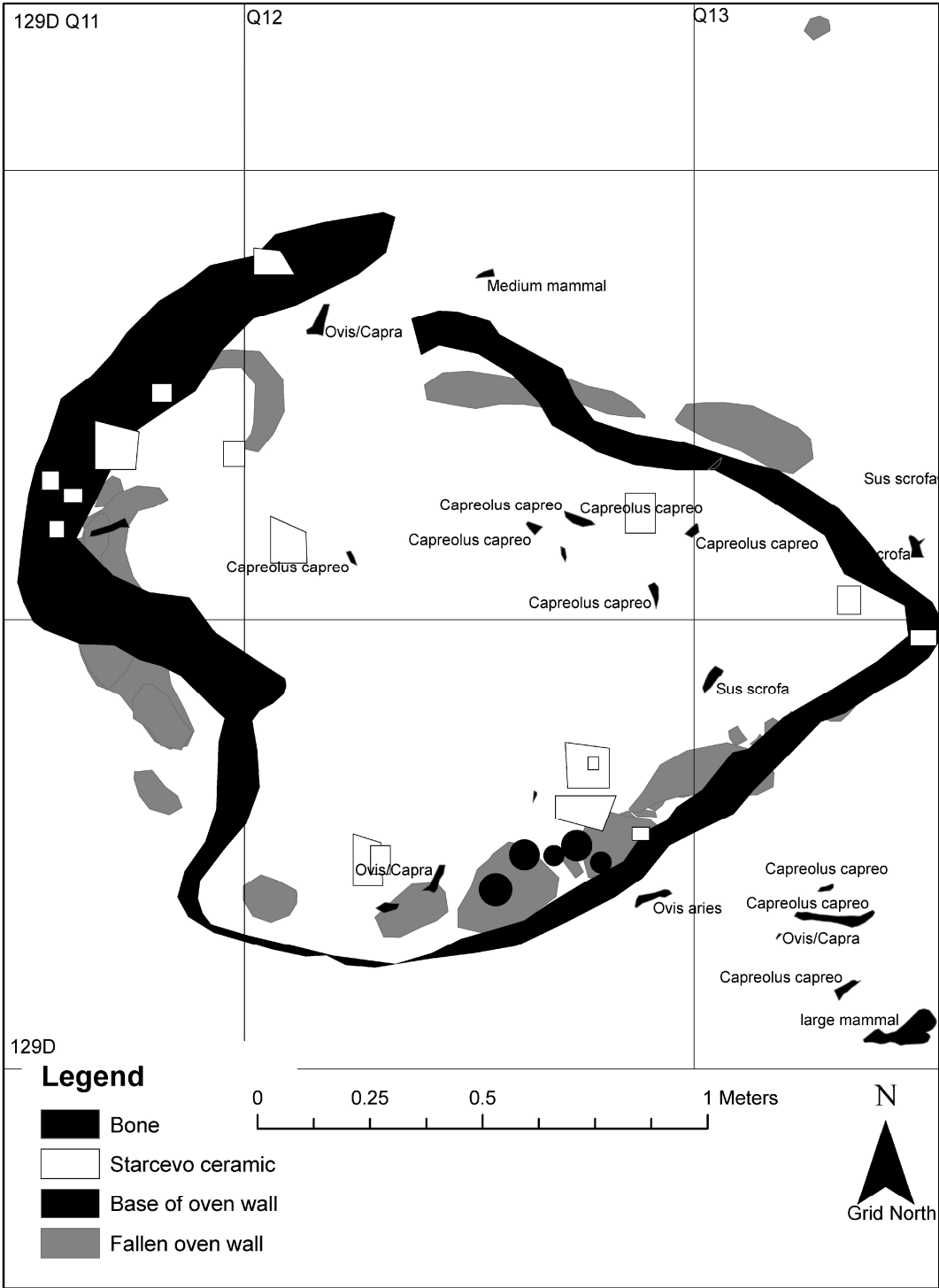


Figure 81: Oven detail in Sub-locus 23.2

Digitized bone in Sub-locus 23.3

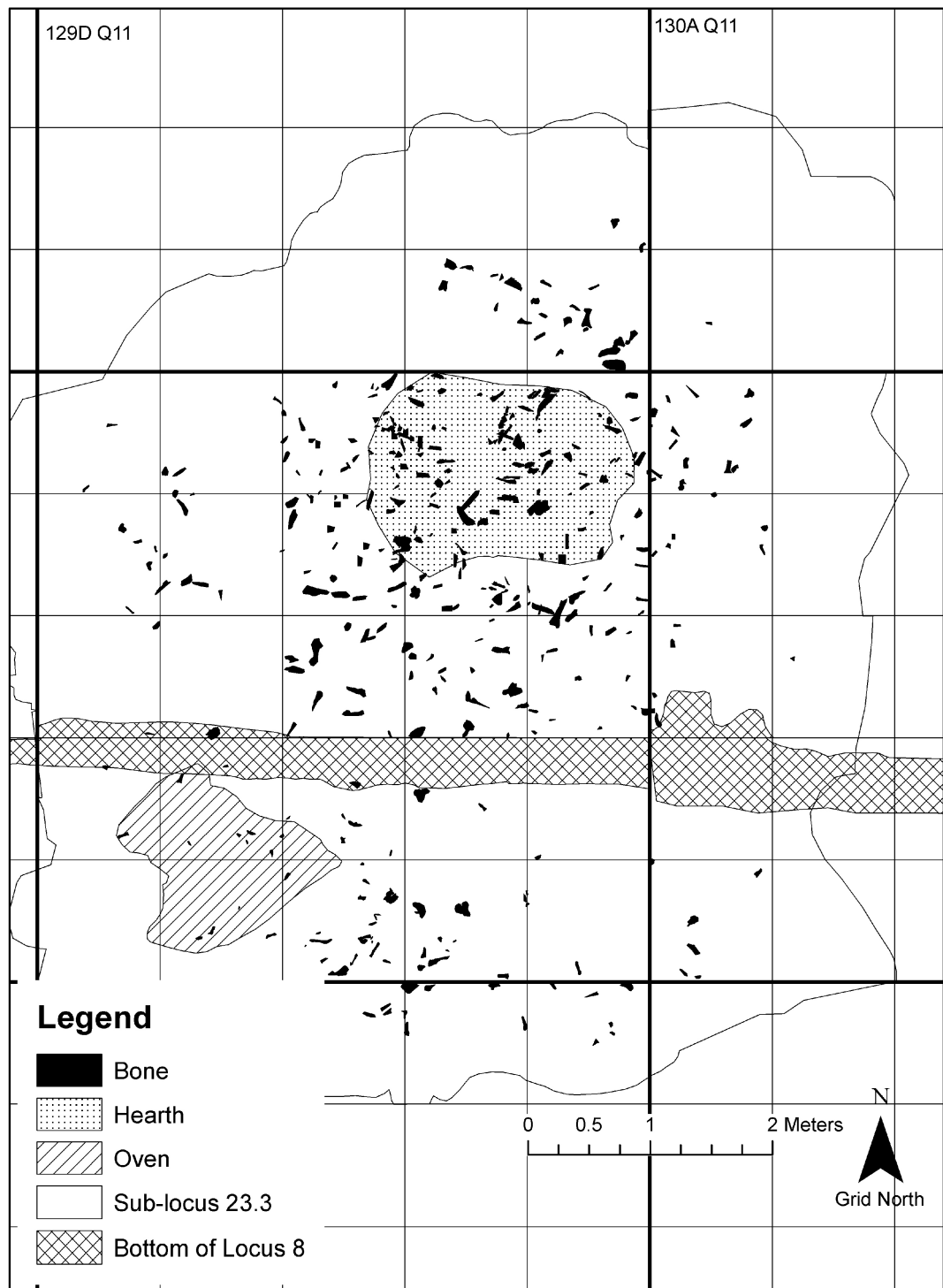


Figure 82: Digitized bone in Sub-locus 23.3

Centroid bone tool locations in Sub-locus 23.3

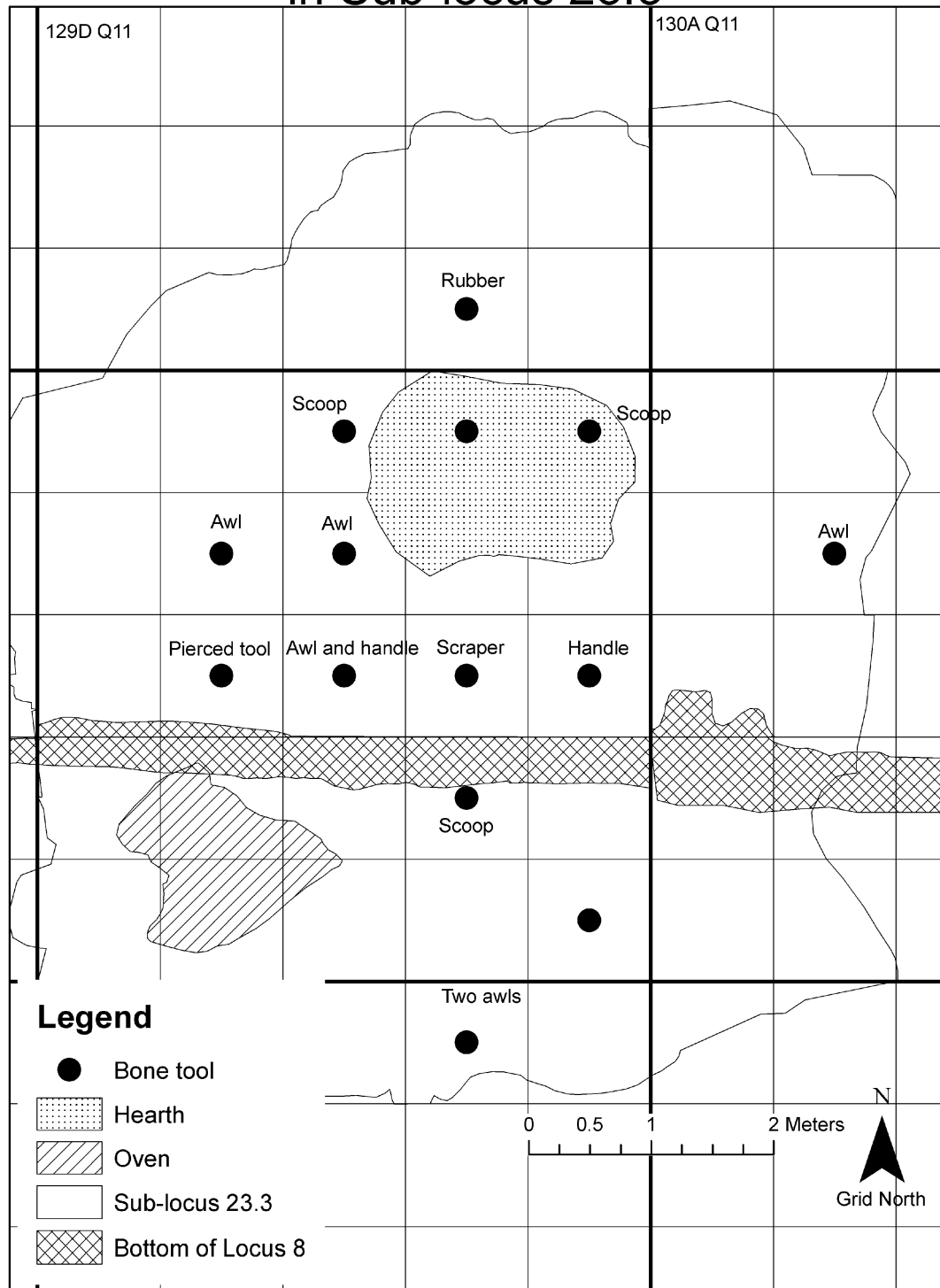


Figure 83: Centroid bone tools in Sub-locus 23.3

Digitized carbon locations in Sub-locus 23.3

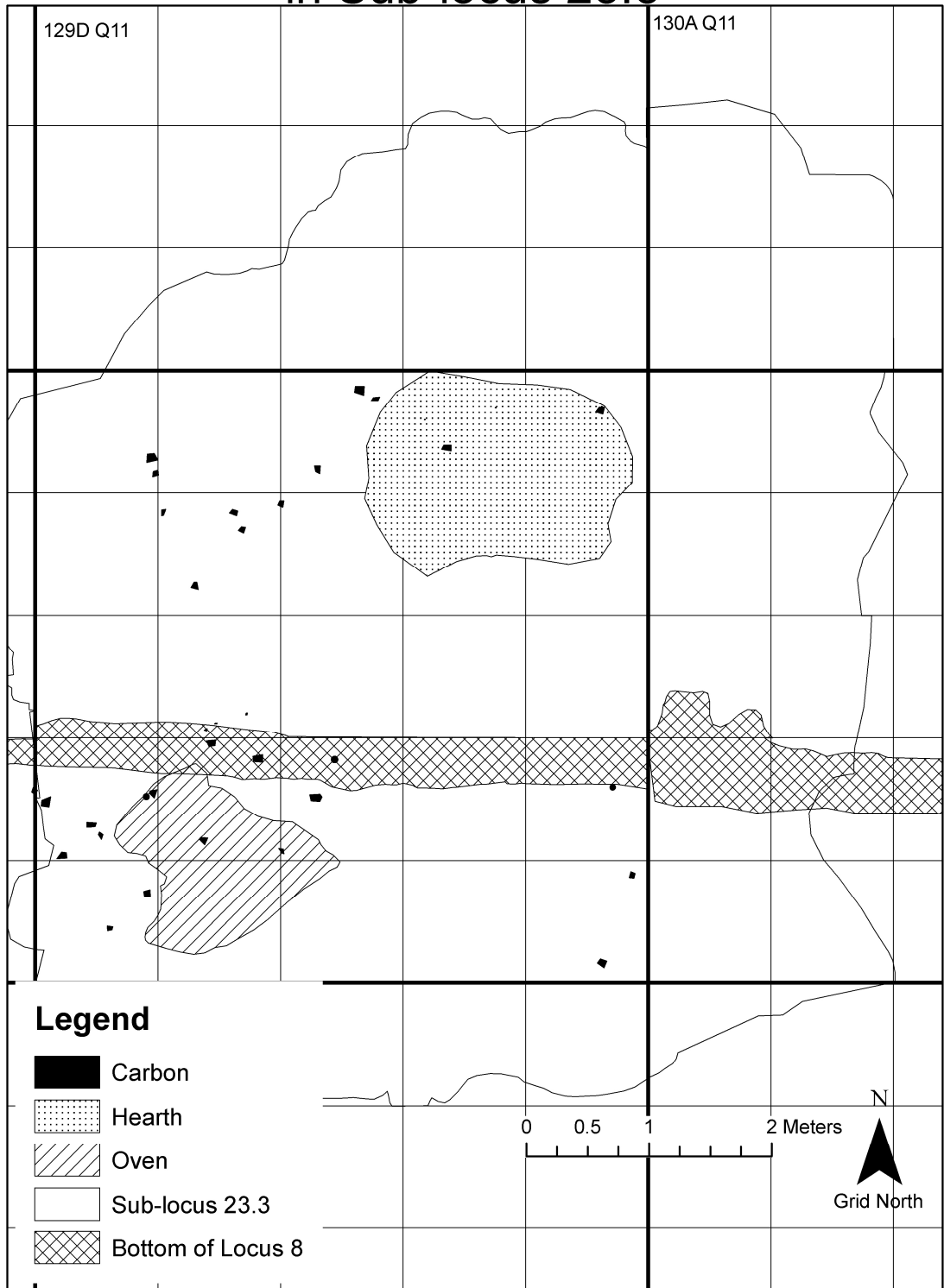


Figure 84: Digitized carbon in Sub-locus 23.3

Digitized Early Neolithic ceramics in Sub-locus 23.3

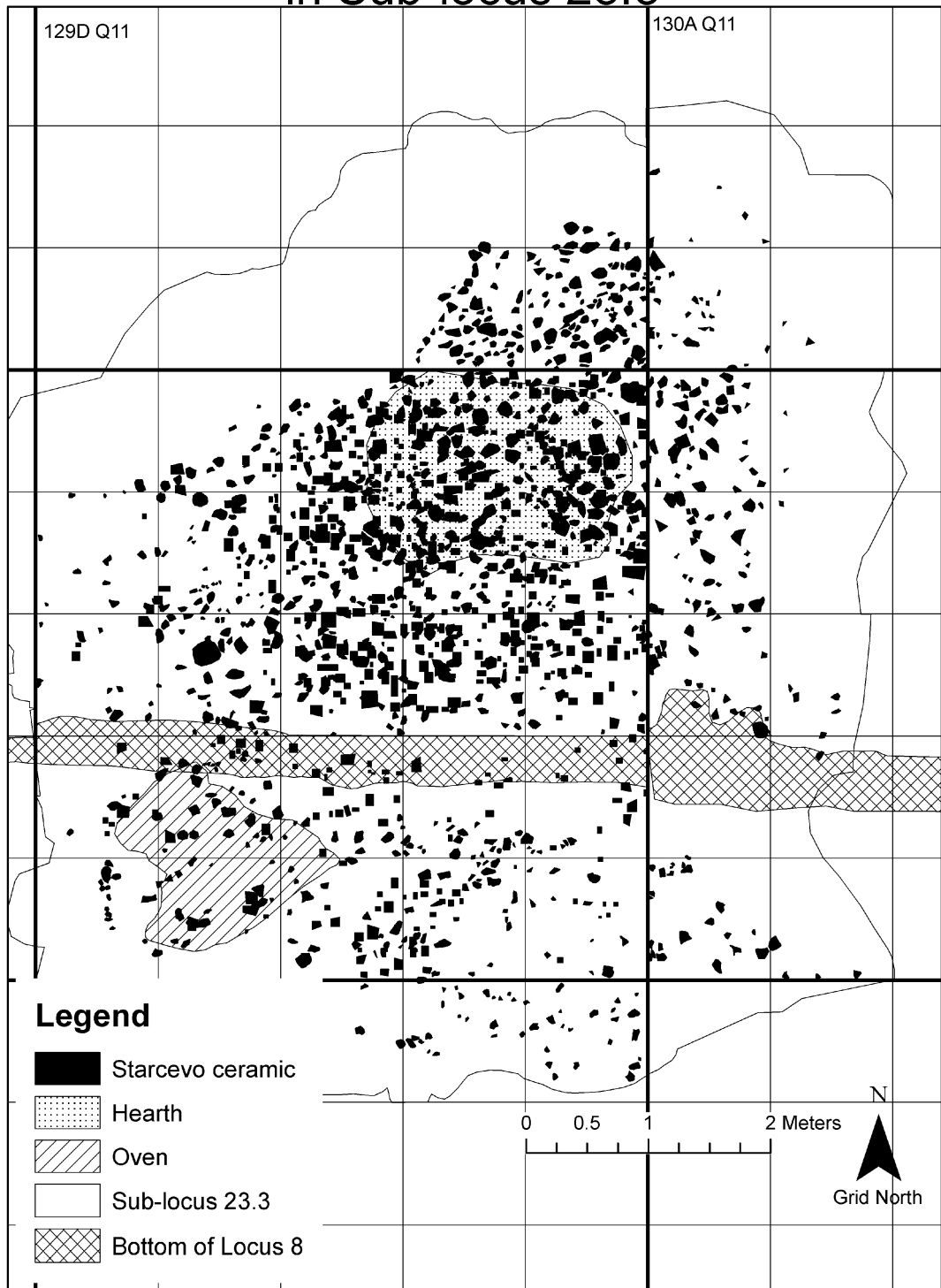


Figure 85: Digitized Early Neolithic ceramics in Sub-locus 23.3

Digitized chipped lithics and grinding stone locations in Sub-locus 23.3

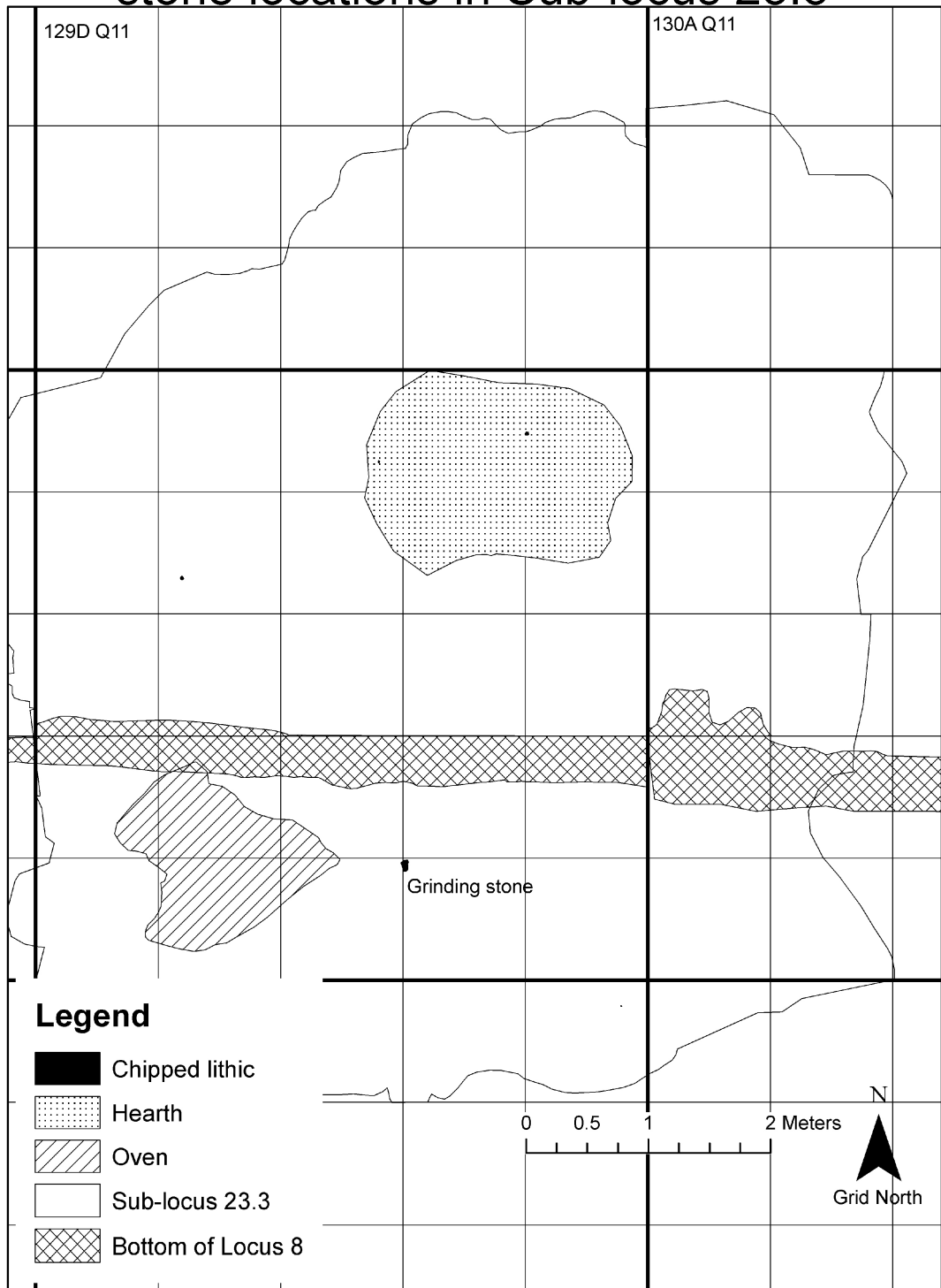


Figure 86: Digitized chipped lithics and grinding stone in Sub-locus 23.3

Digitized unidentified daub in Sub-locus 23.3

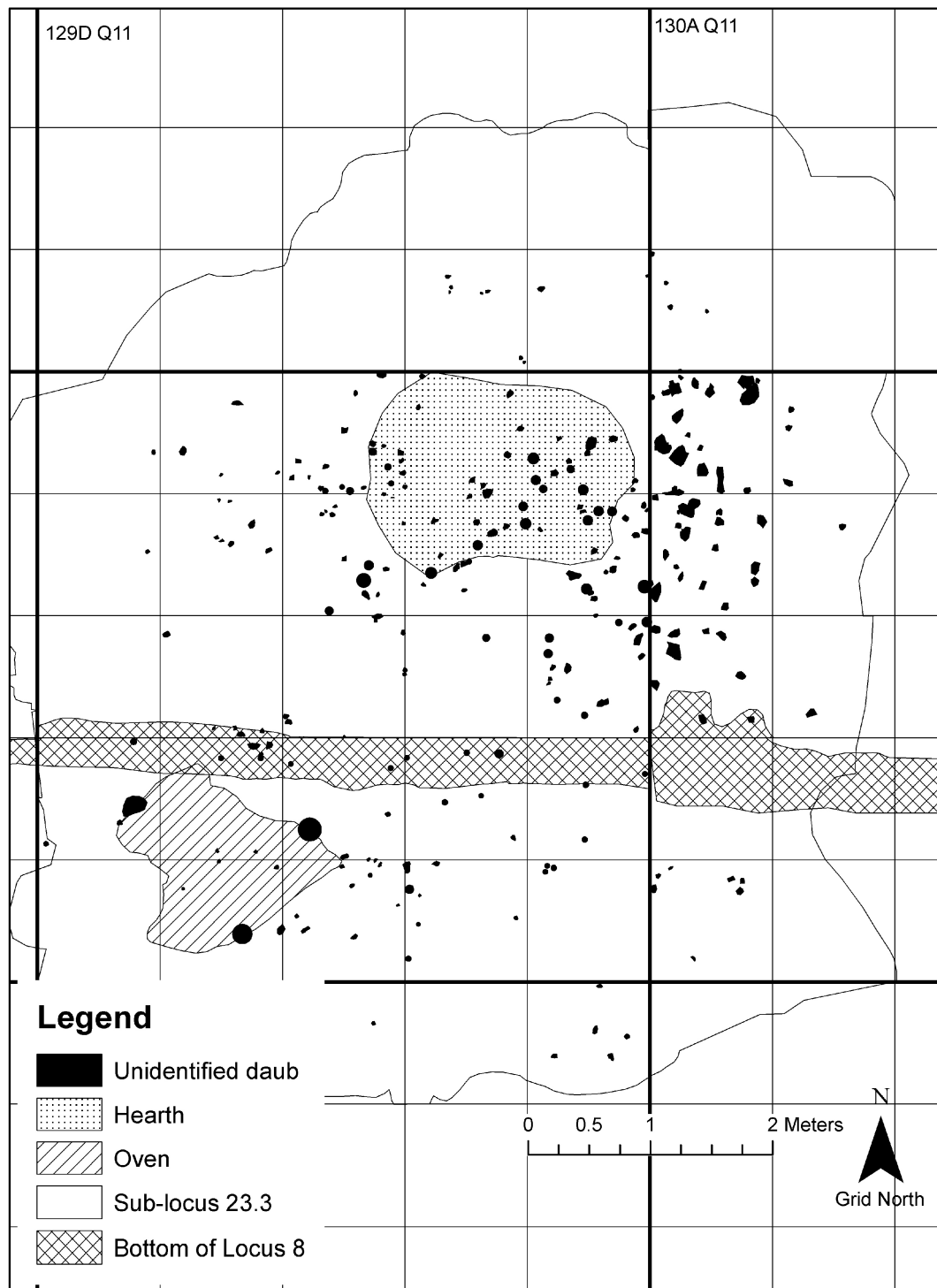


Figure 87: Digitized unidentified daub in Sub-locus 23.3

Digitized oven daub in Sub-locus 23.3

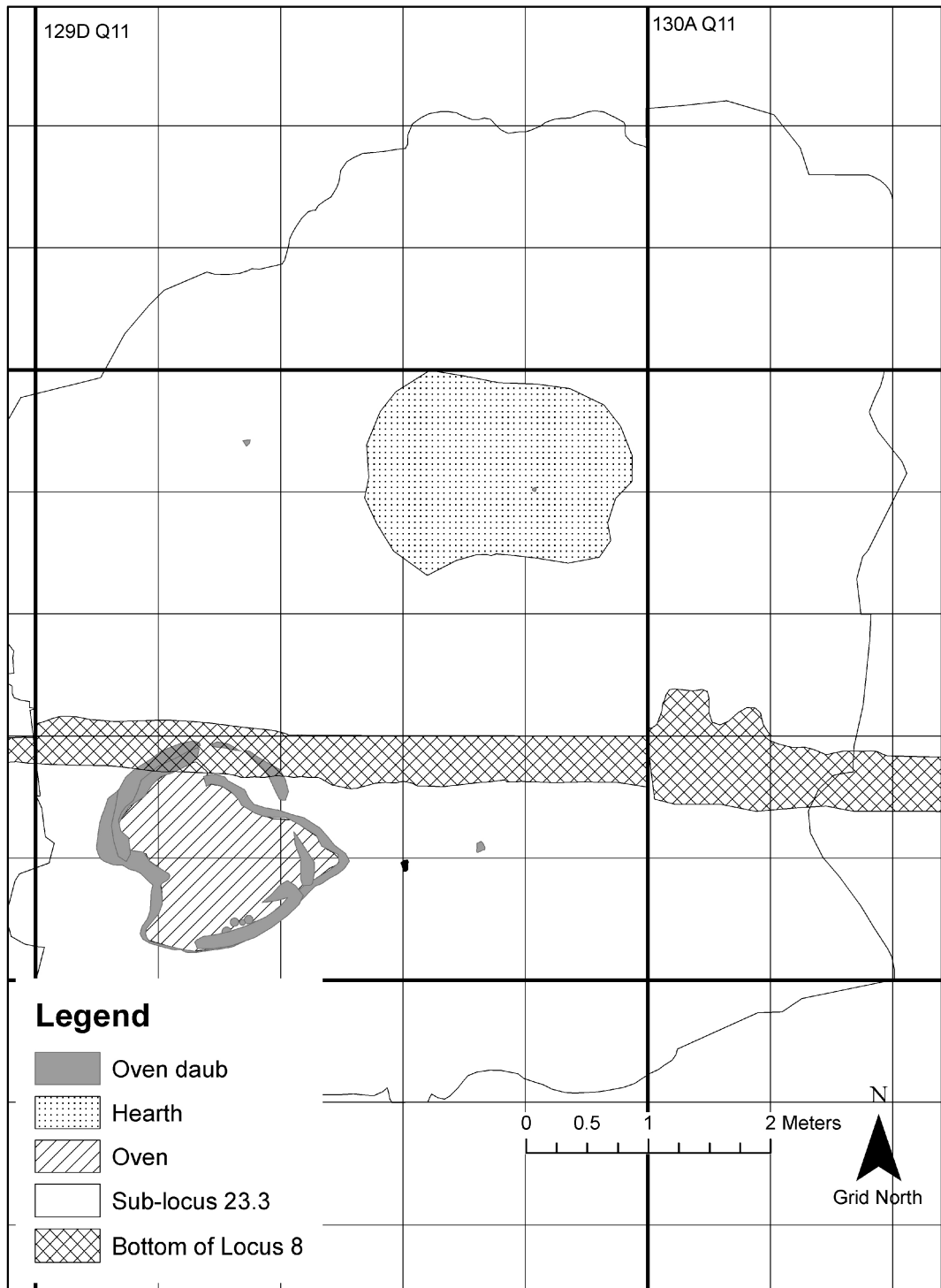


Figure 88: Digitized oven daub in Sub-locus 23.3

Digitized wall daub in Sub-locus 23.3

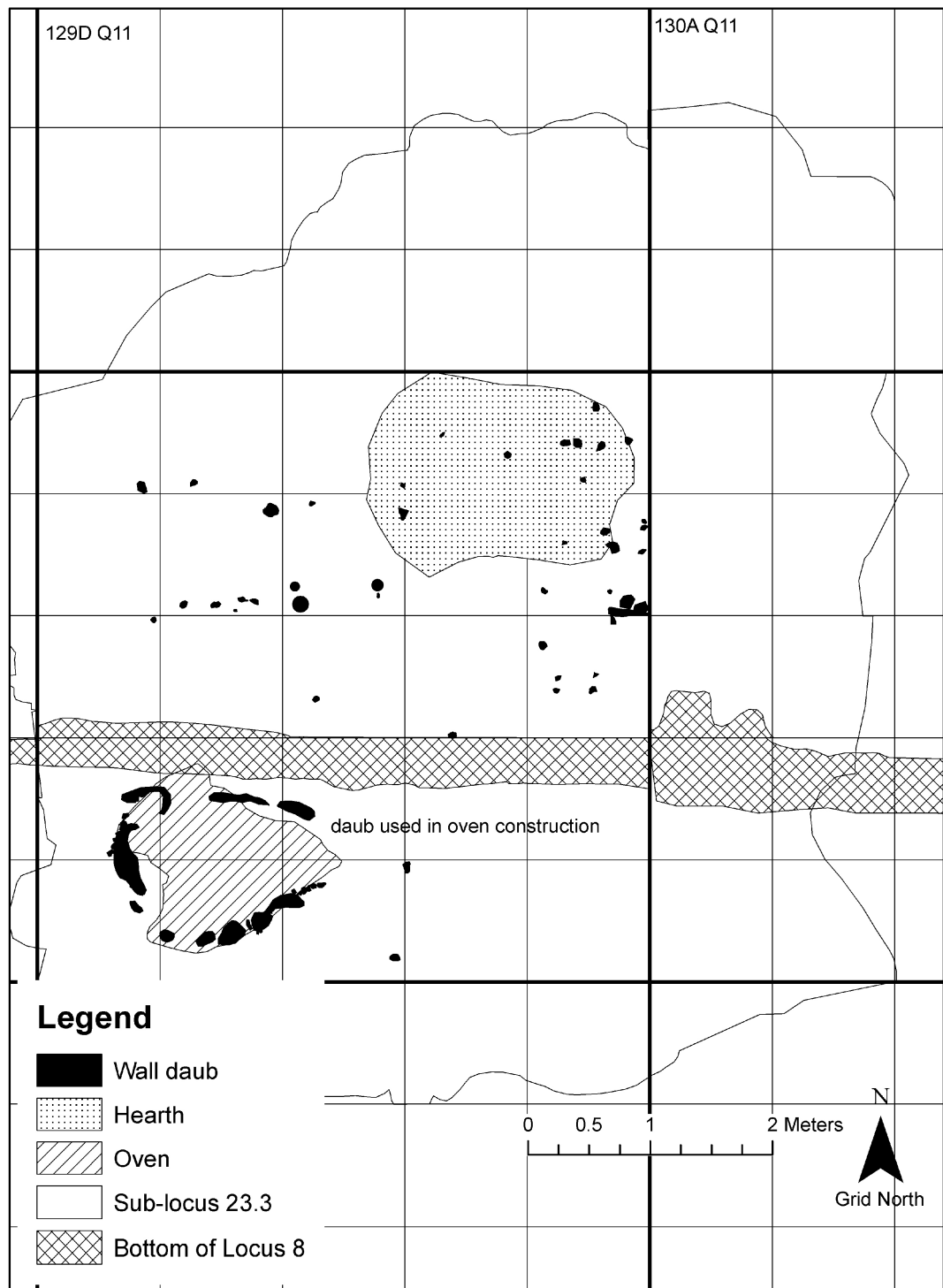


Figure 89: Digitized wall daub in Sub-locus 23.3

Oven in Sub-locus 23.3

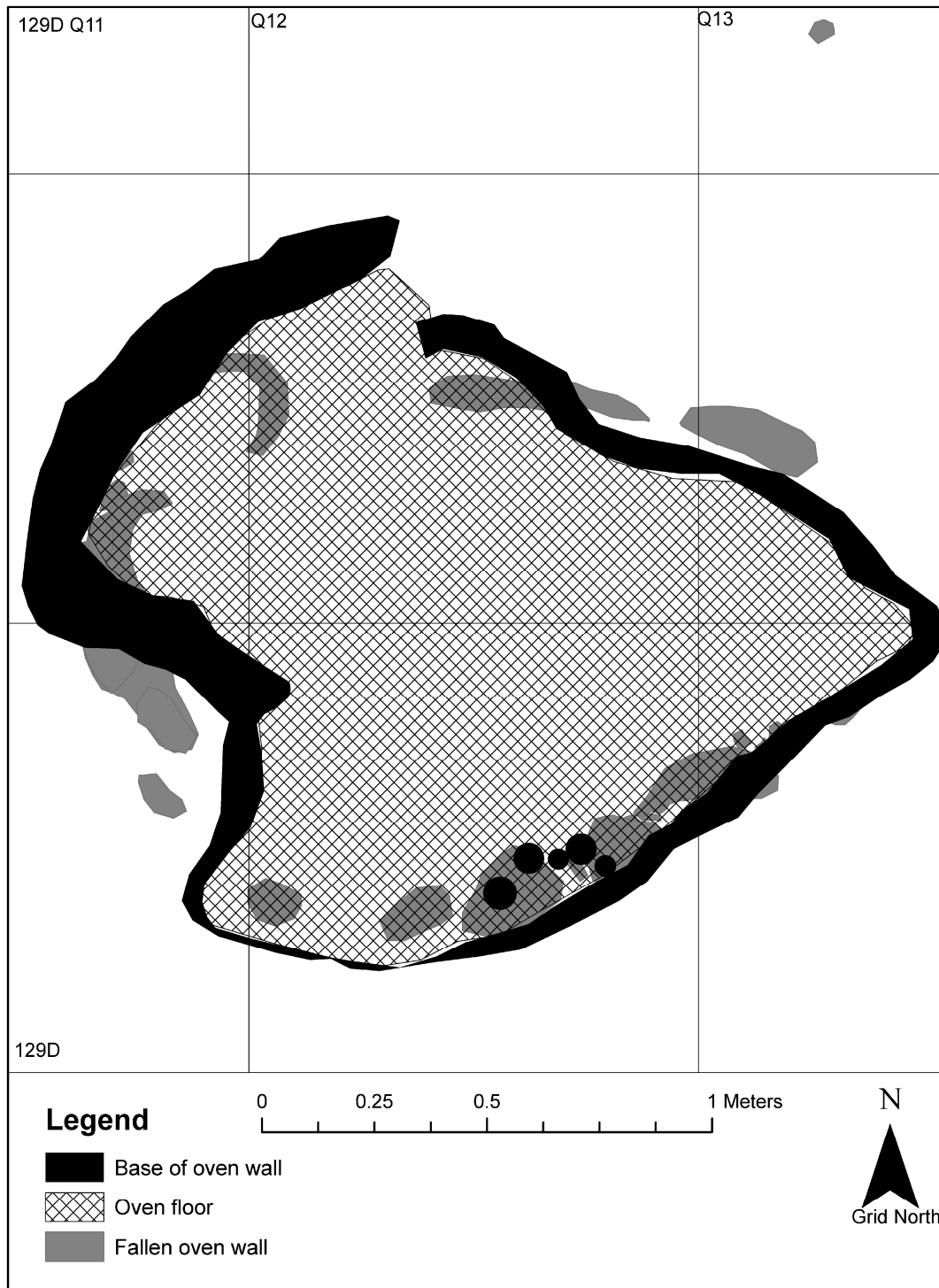


Figure 90: Oven in Sub-locus 23.3

Digitized loaf weights in Sub-locus 23.3

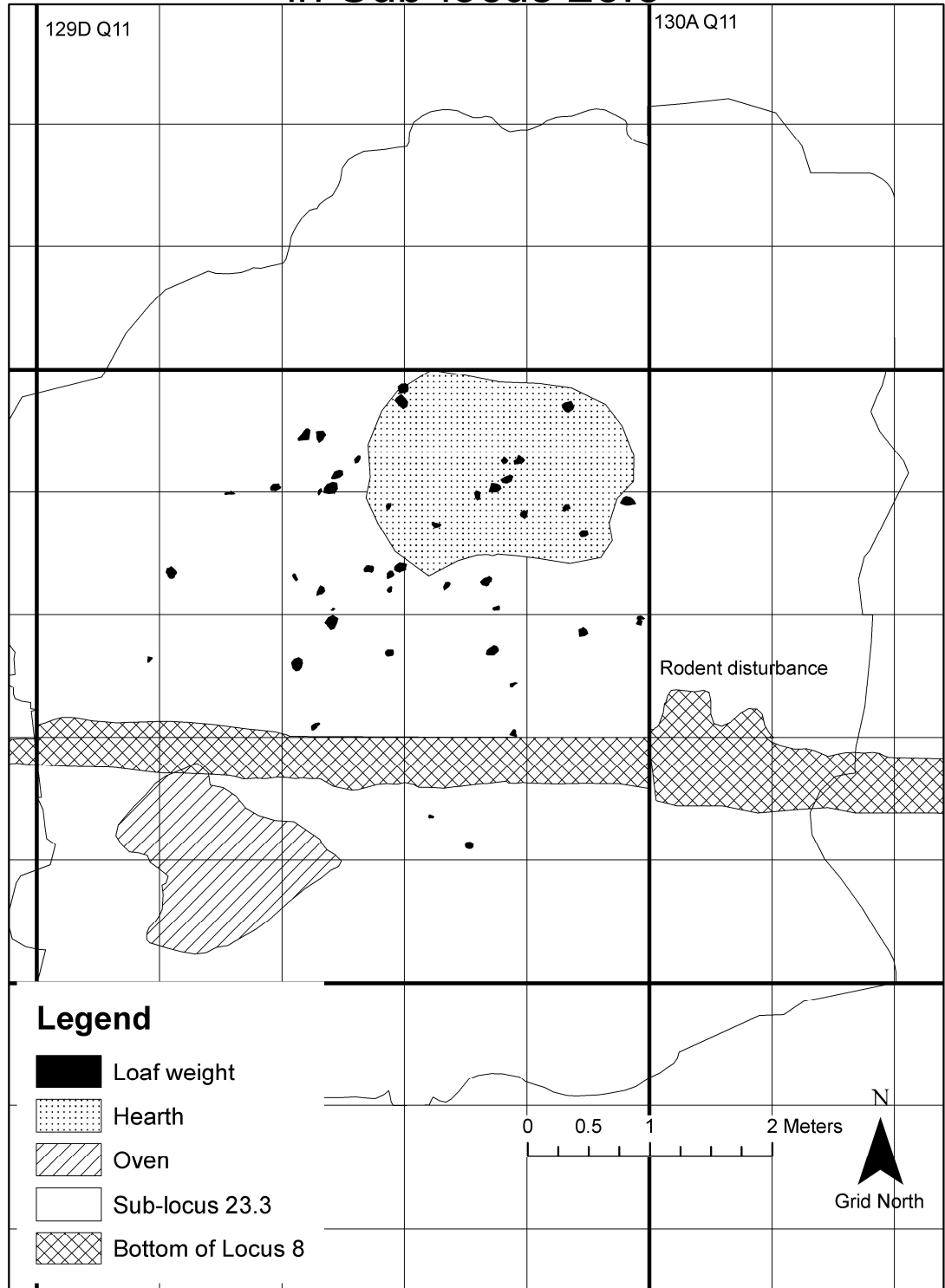


Figure 91: Digitized loaf weights in Sub-locus 23.3

Digitized unidentified weights in Sub-locus 23.3

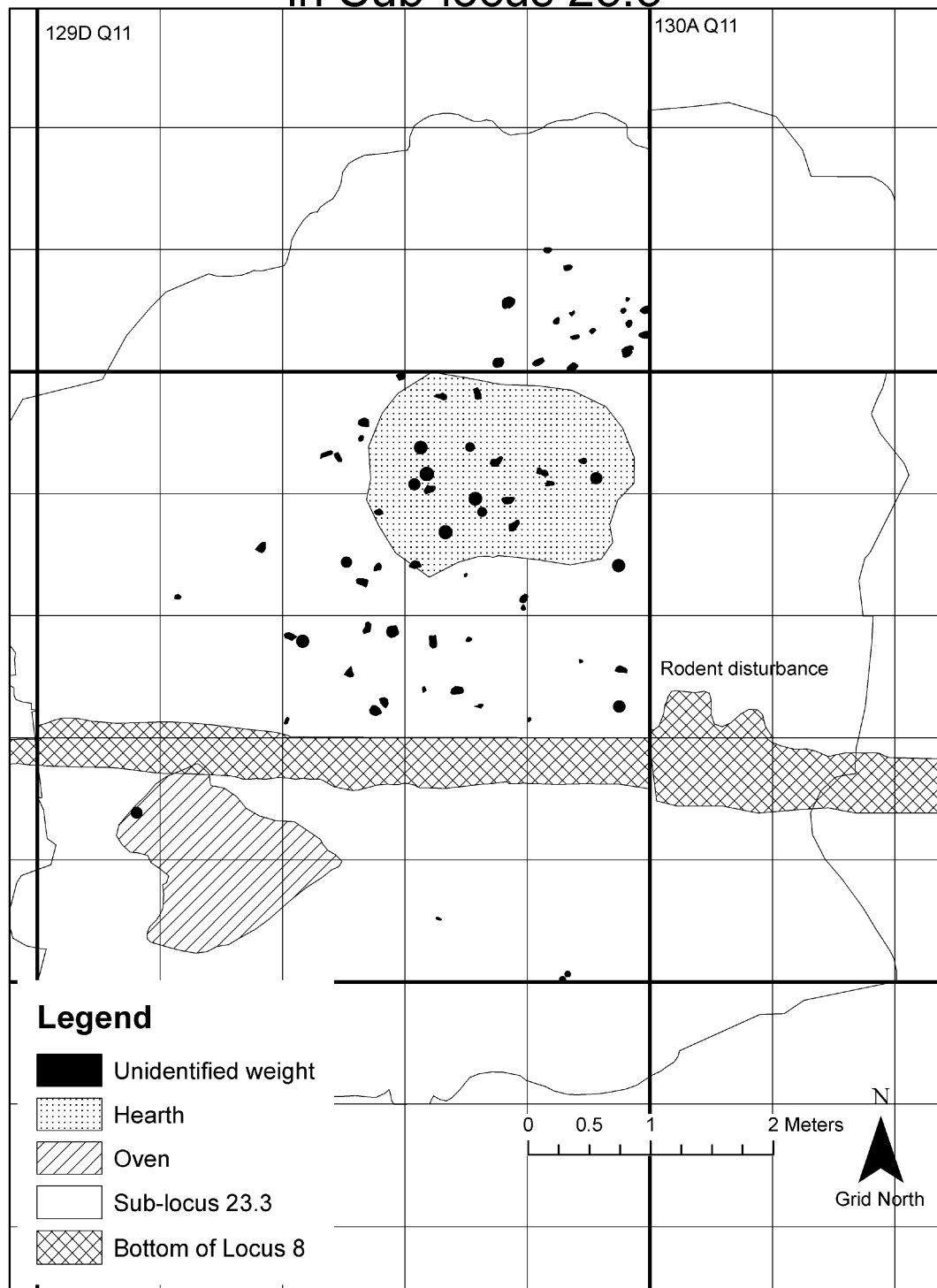


Figure 92: Digitized unidentified weights in Sub-locus 23.3

Post hole locations in Sub-locus 23.3

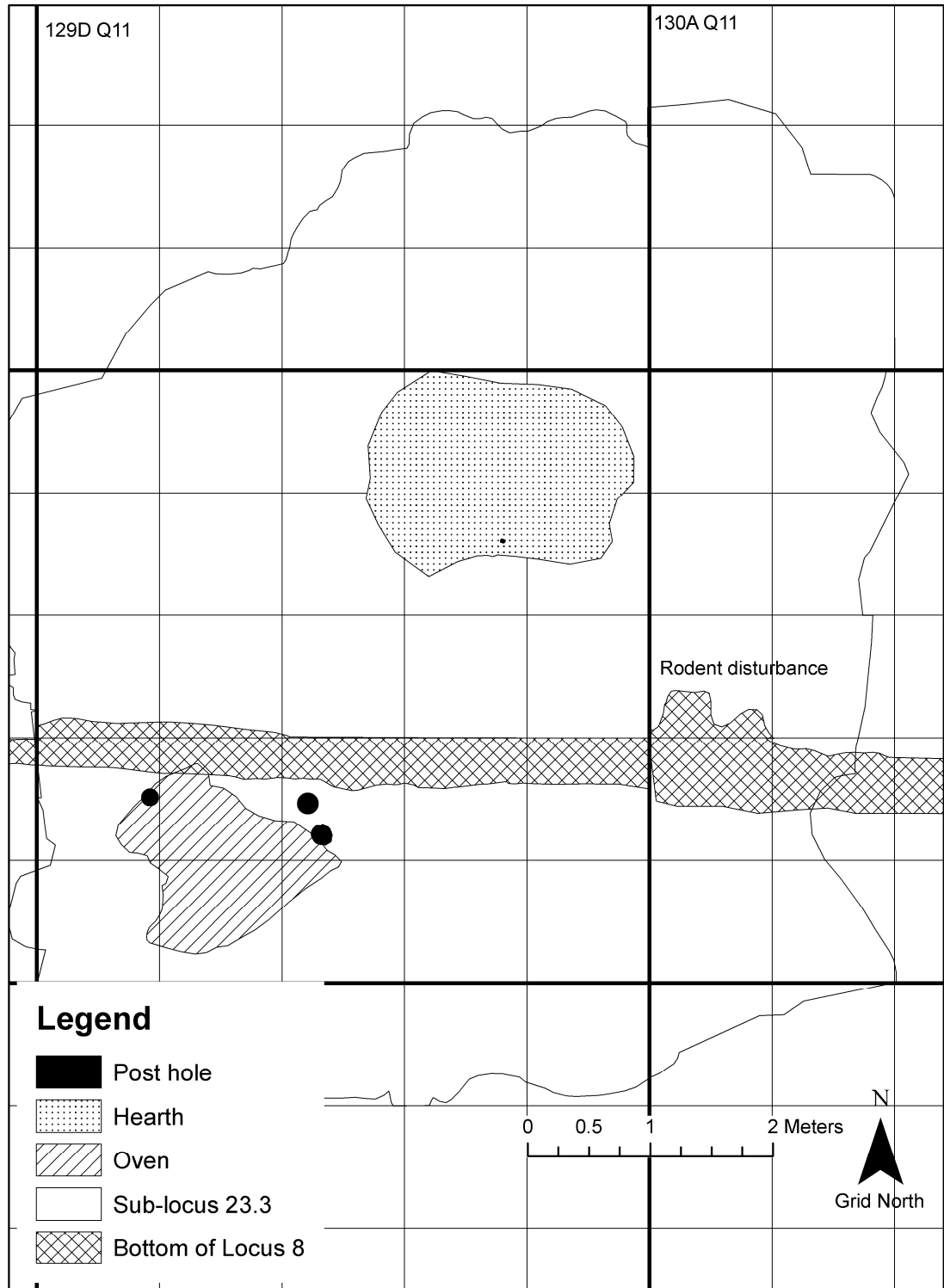


Figure 93: Post holes in Sub-locus 23.3

Entrance locations in Locus 23

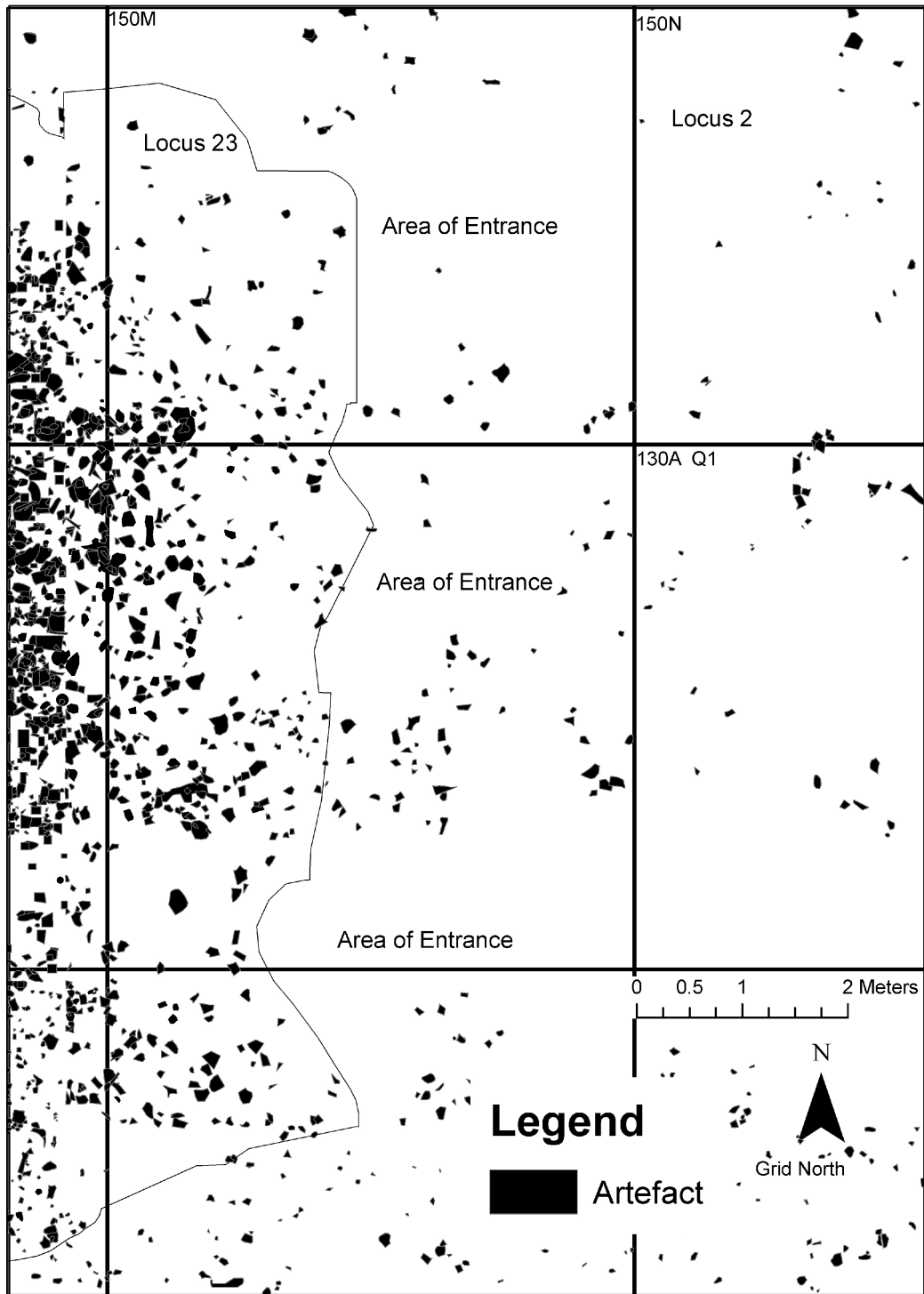


Figure 94: Entrance locations in Sub-locus 23.3

Location of Locus 10

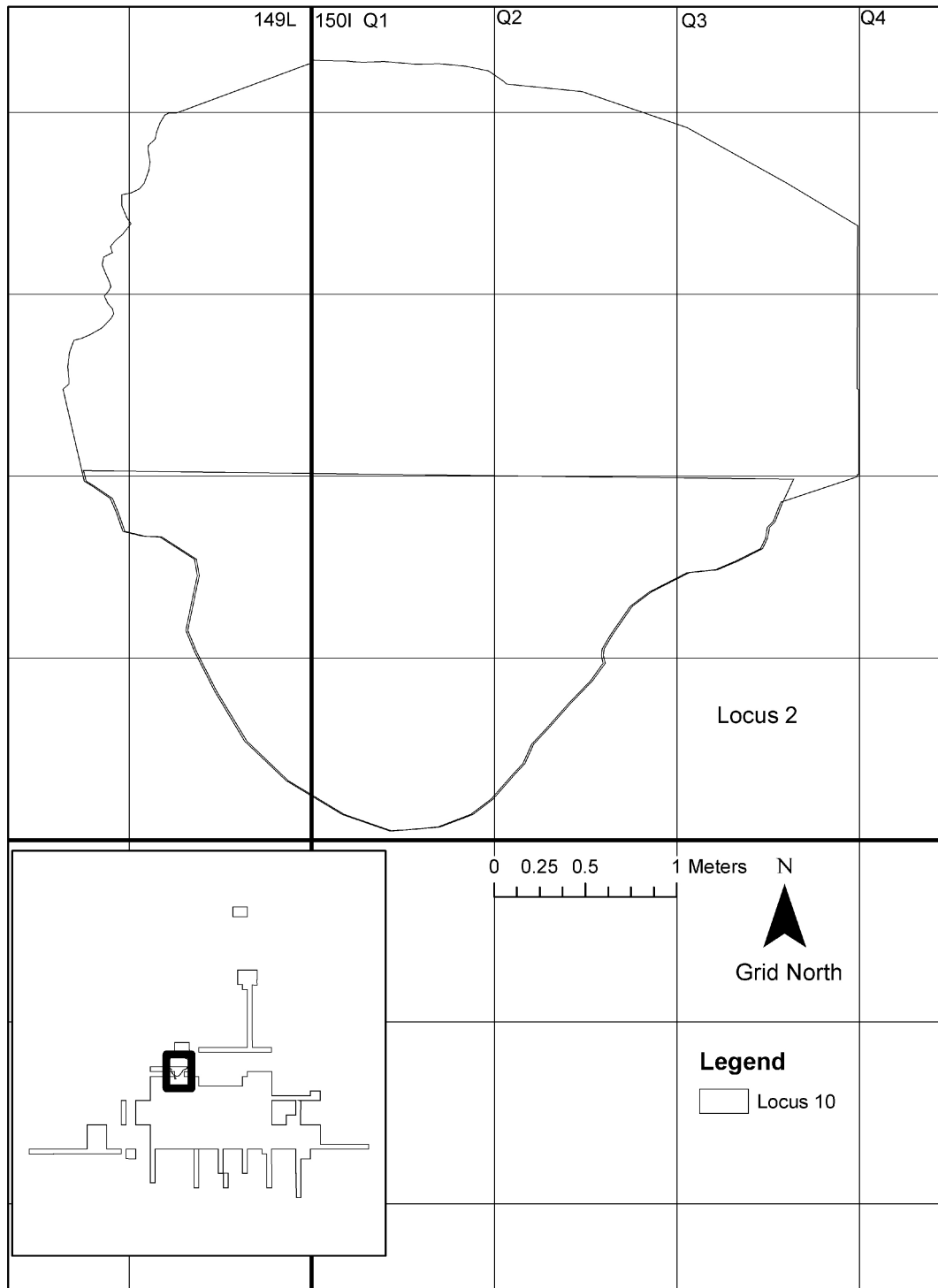


Figure 95: Location of Locus 10

Digitized bone in Locus 10

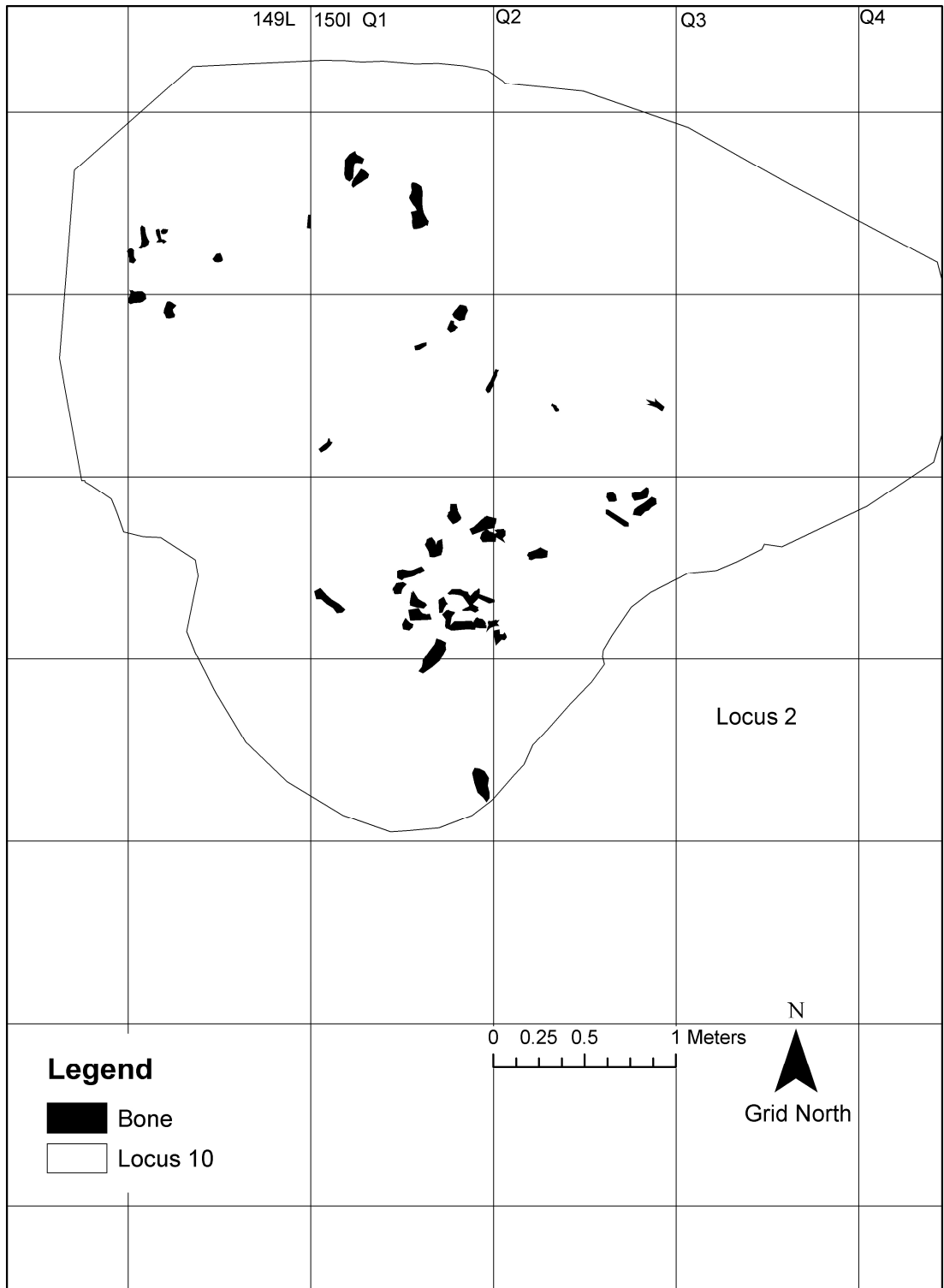


Figure 96: Digitized bone in Sub-locus 23.3

Centroid bone tools in Locus 10

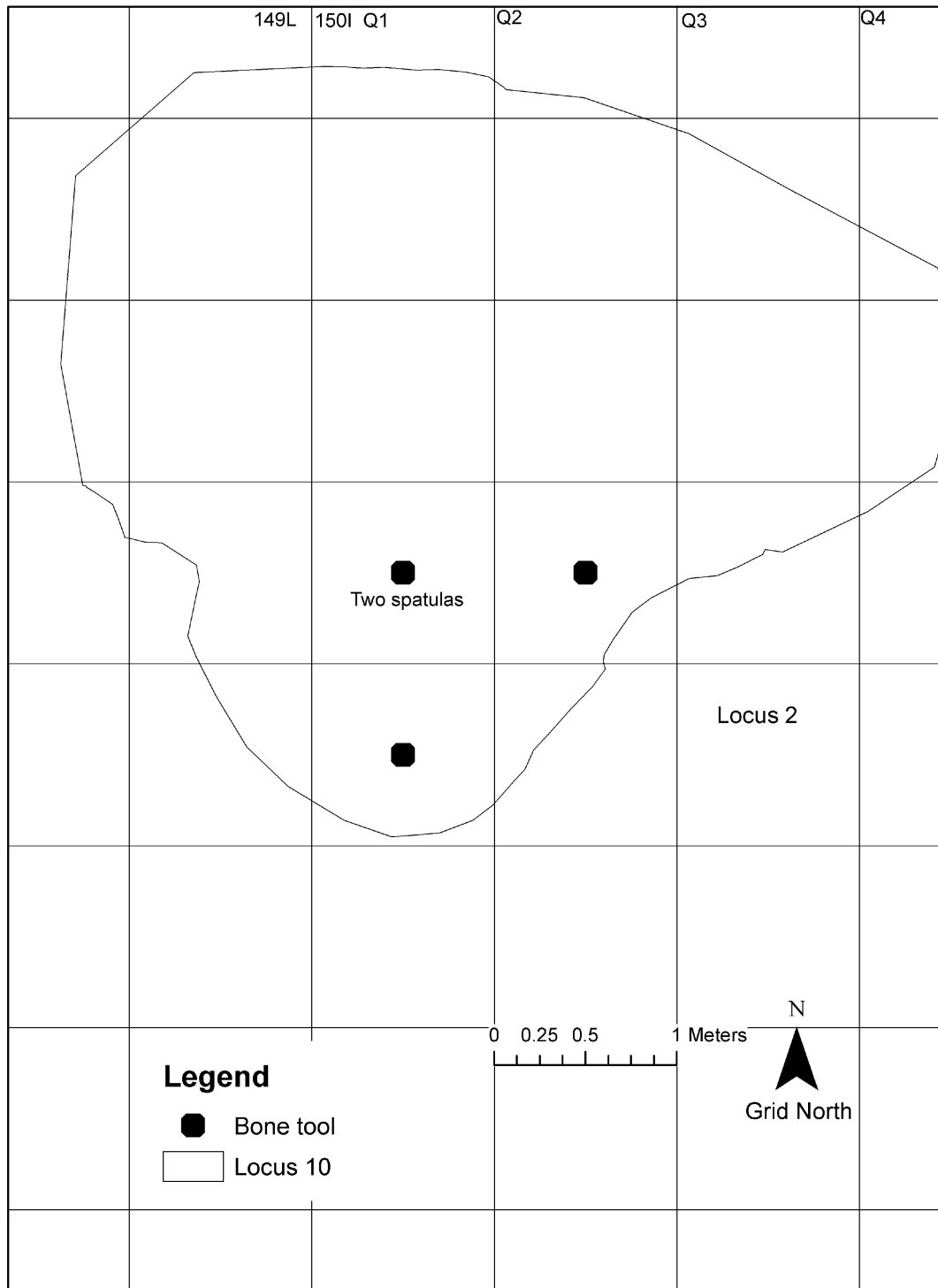


Figure 97: Centroid bone tool locaitons in Locus 10

Digitized Early Neolithic ceramics in Locus 10

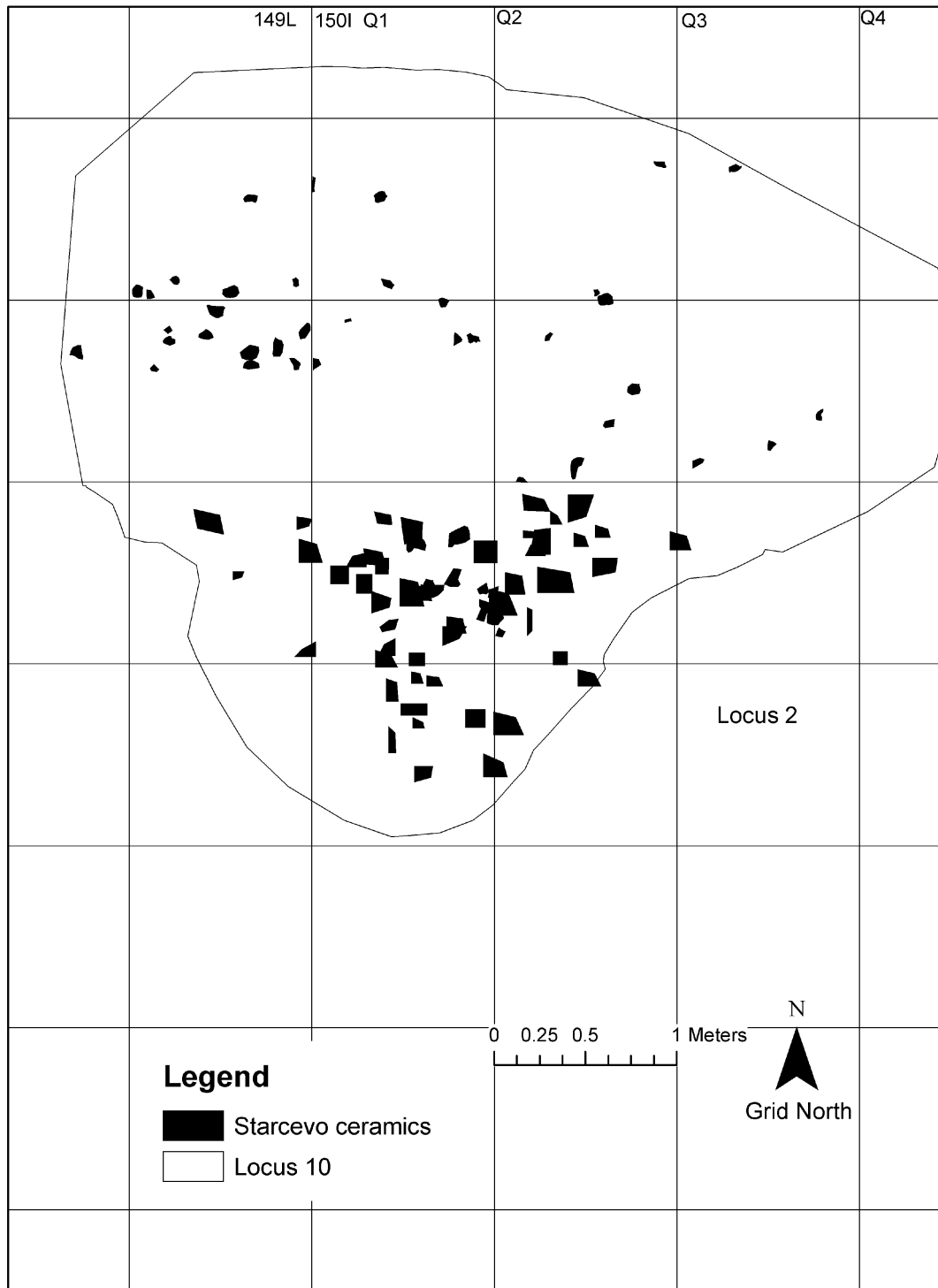


Figure 98: Digitized Early Neolithic ceramics in Locus 10

Artefact clustering in Locus 10

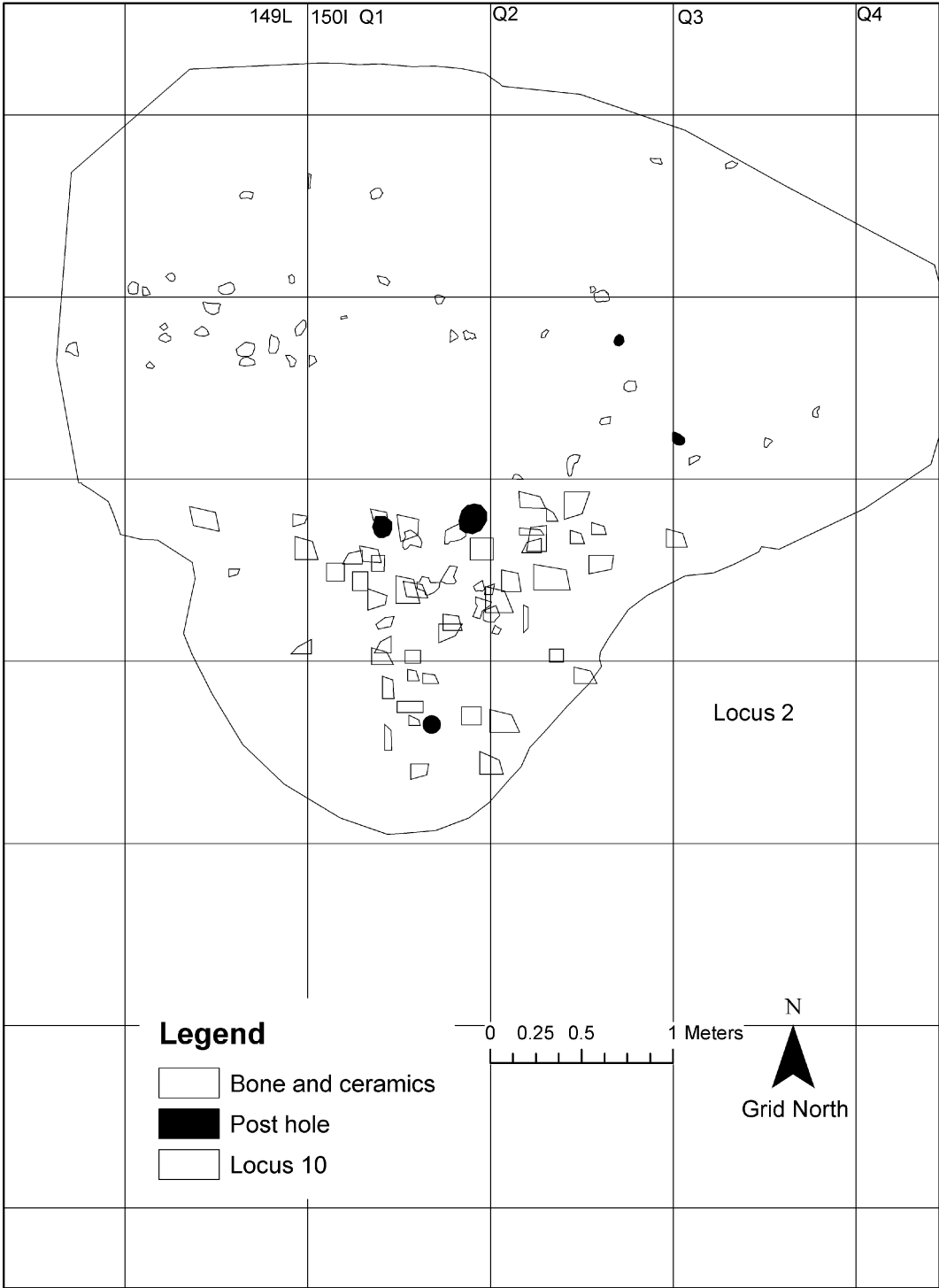


Figure 99: Artefact clustering in Locus 10

Digitized chipped lithic tool in Locus 10

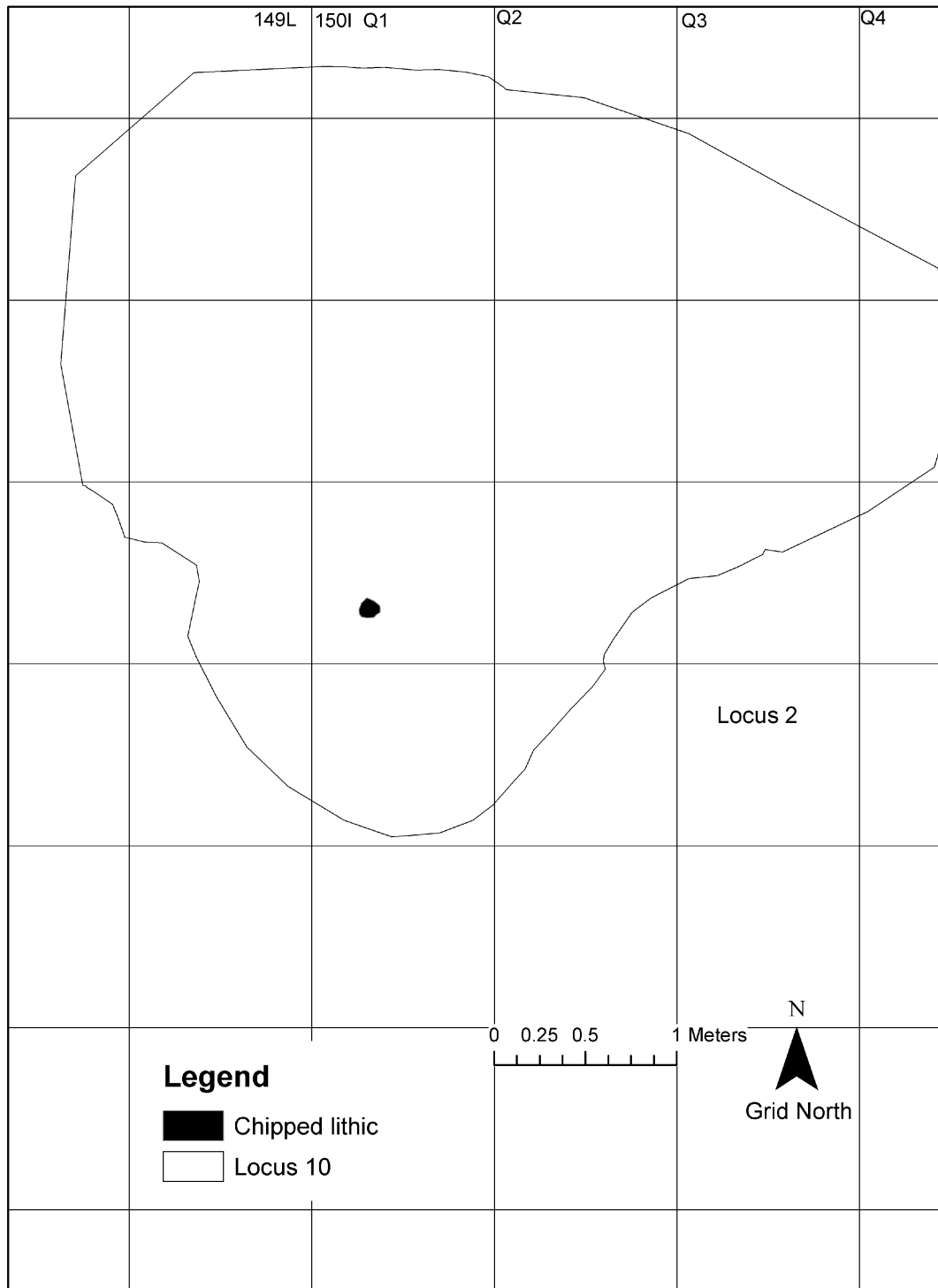


Figure 100: Digitized chipped tool in Locus 10

Digitized daub in Locus 10

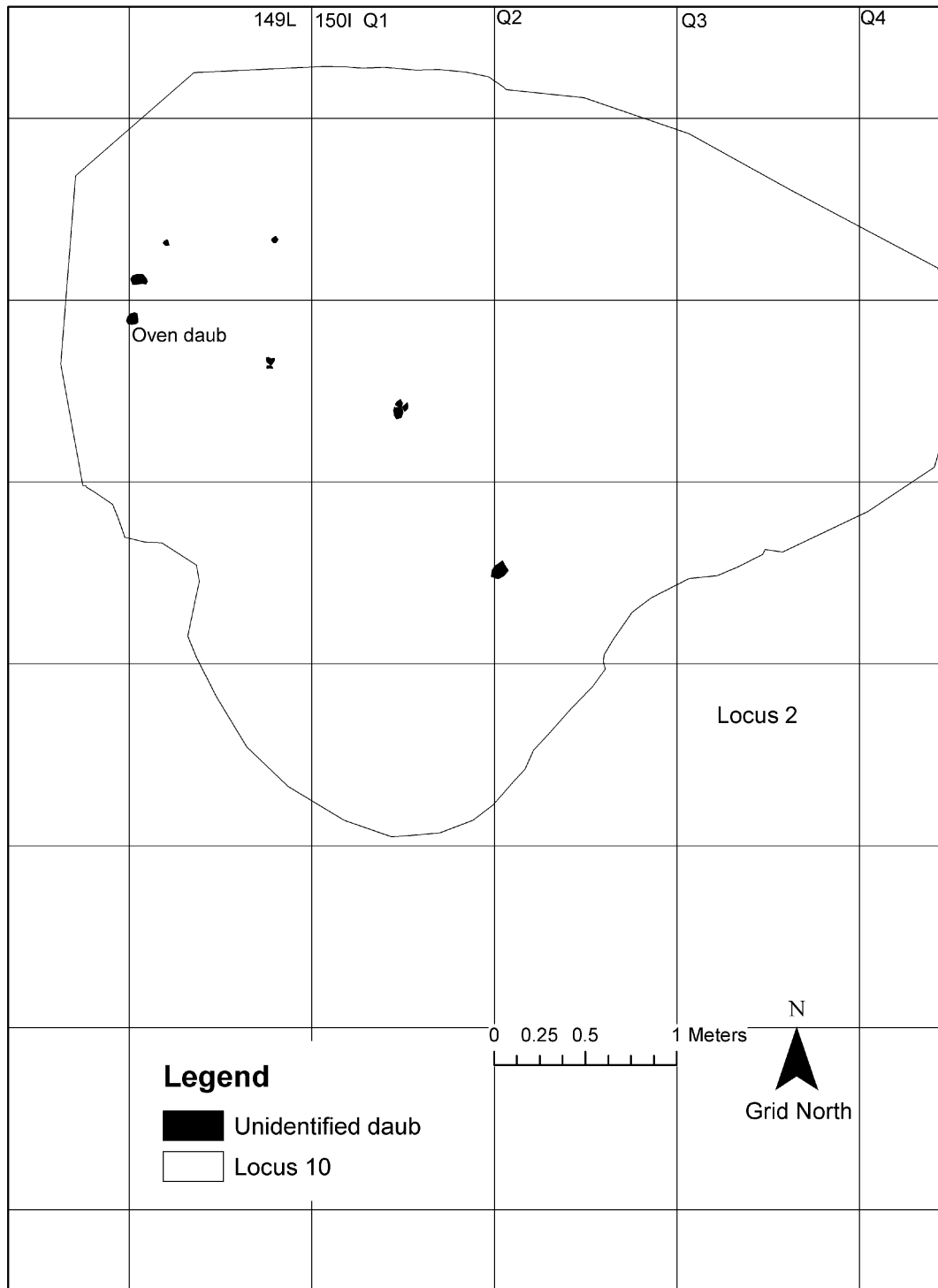


Figure 101: Digitized daub in Locus 10

Digitized bolla weights in Locus 10

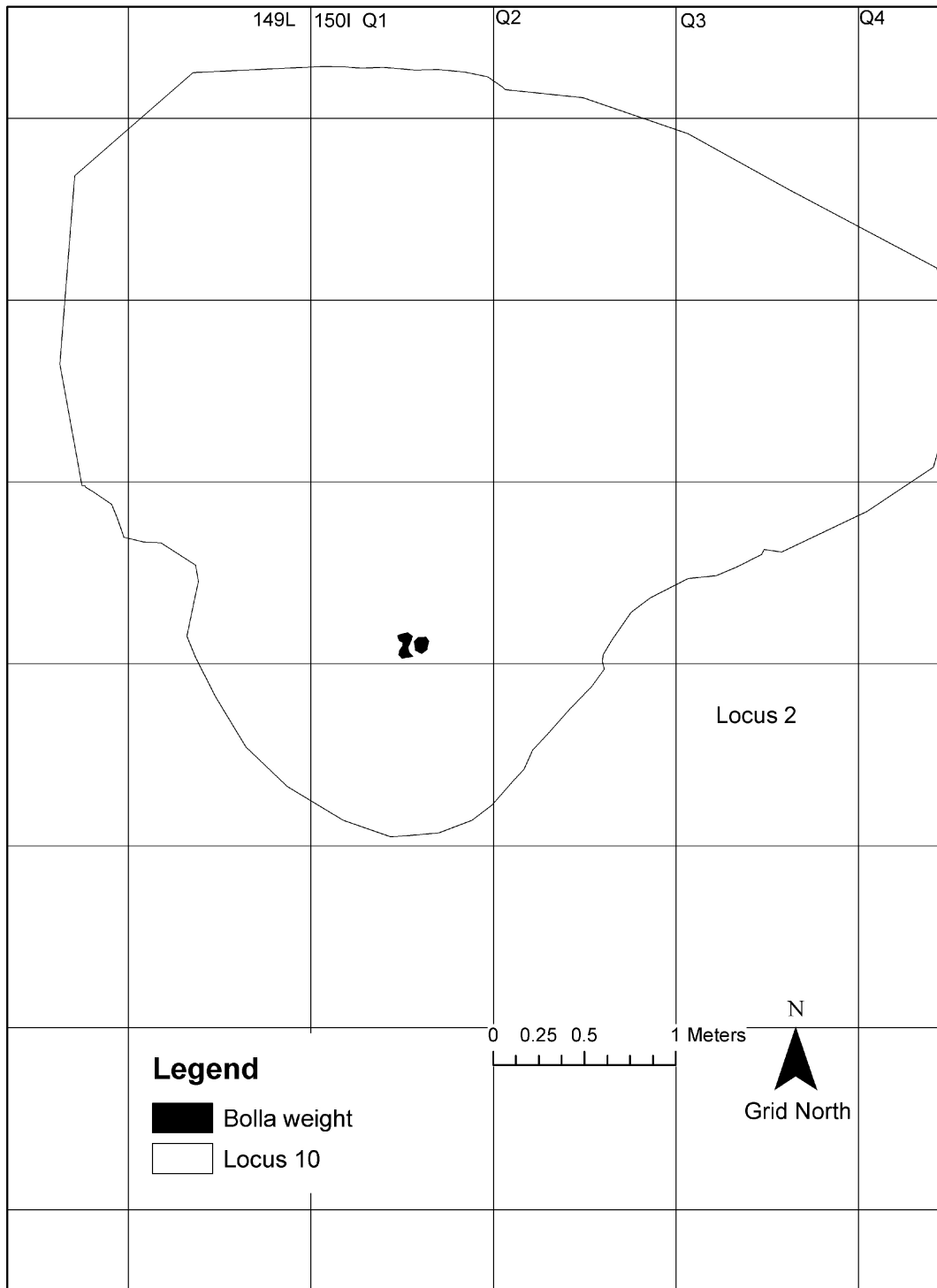


Figure 102: Digitized bolla weights in Locus 10

Post hole locations in Locus 10

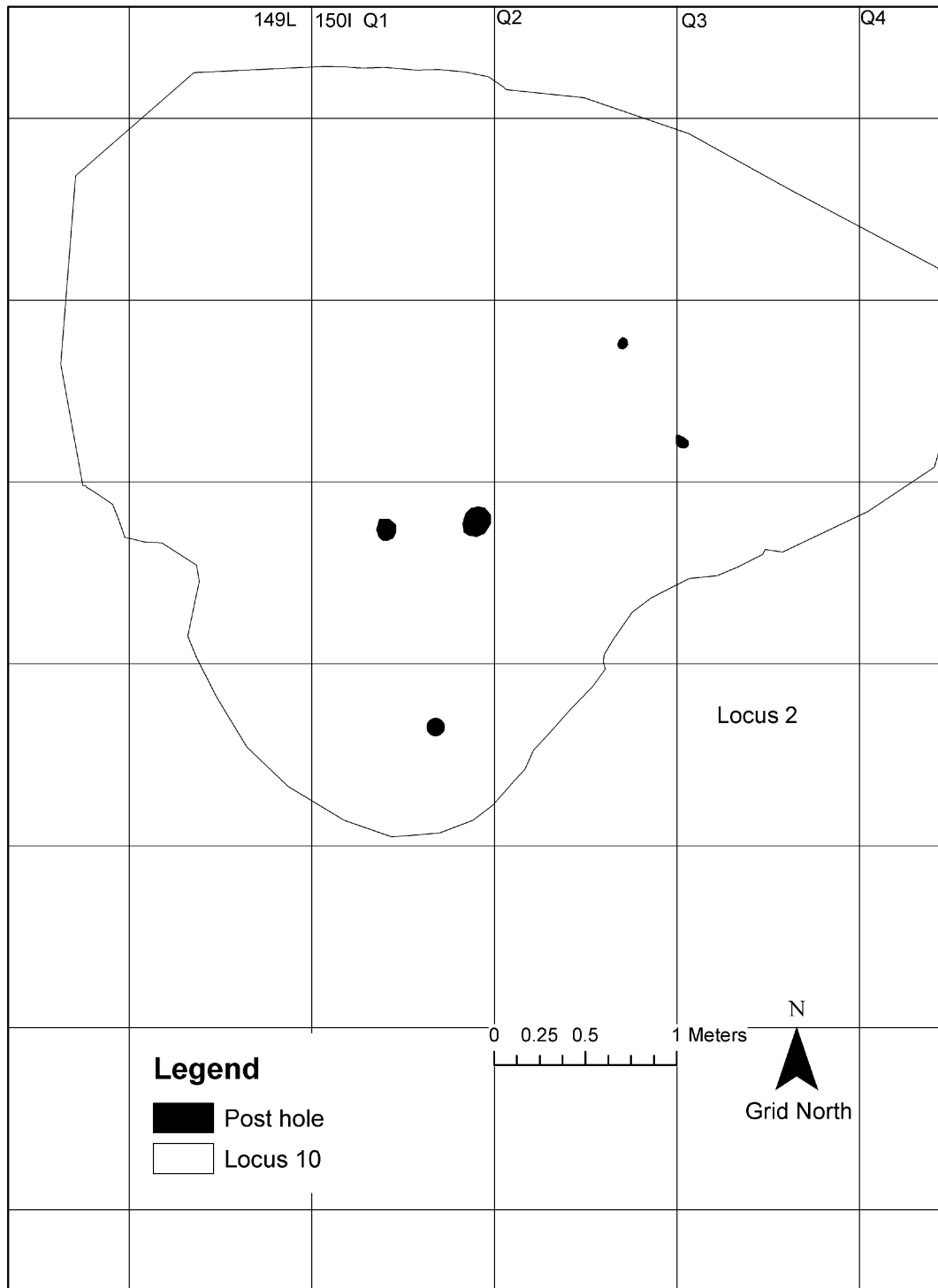


Figure 103: Post hole locations in Locus 10

Sub-strata of Locus 24

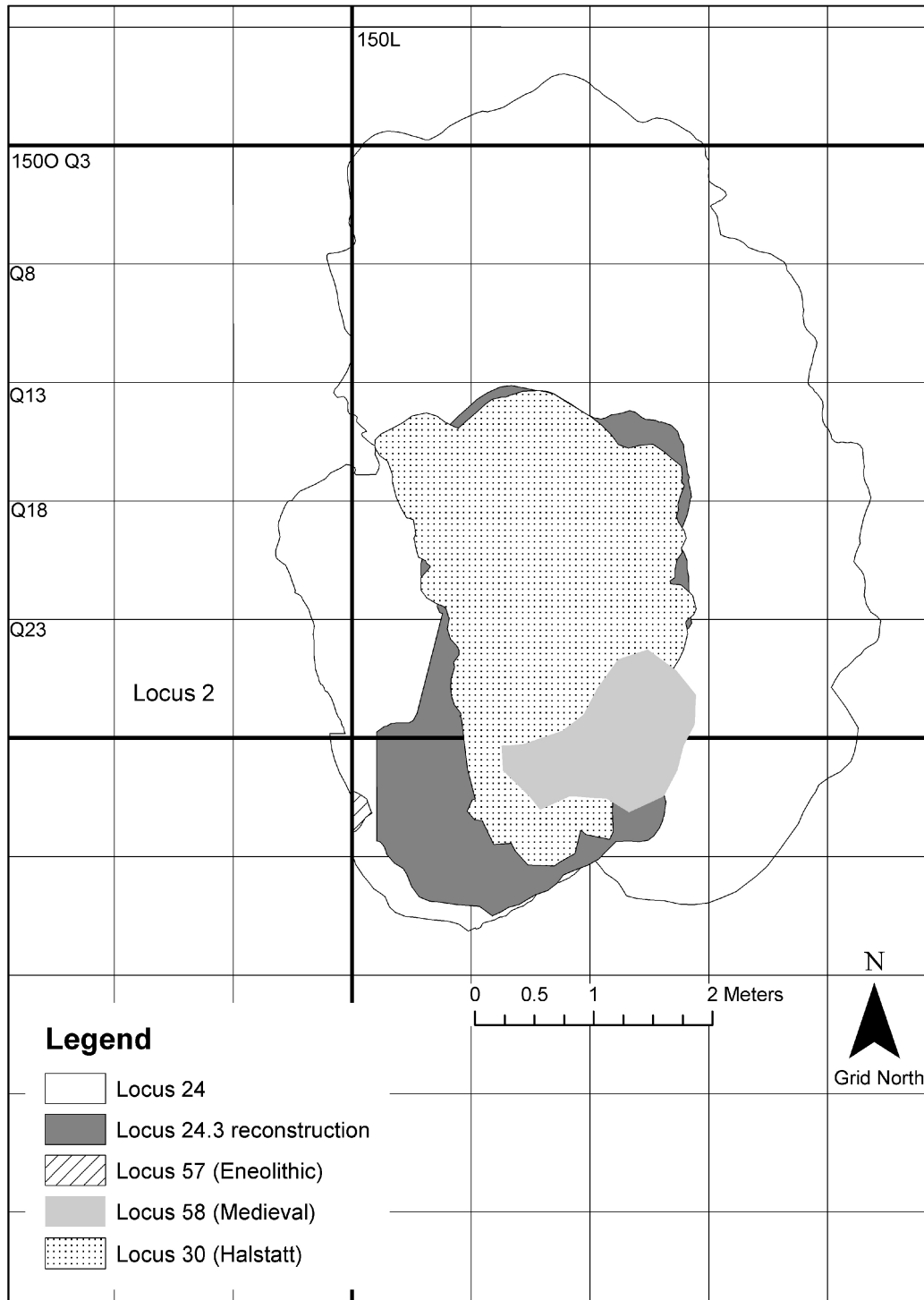


Figure 104: Sub-strata of Locus 24

Location of Locus 24

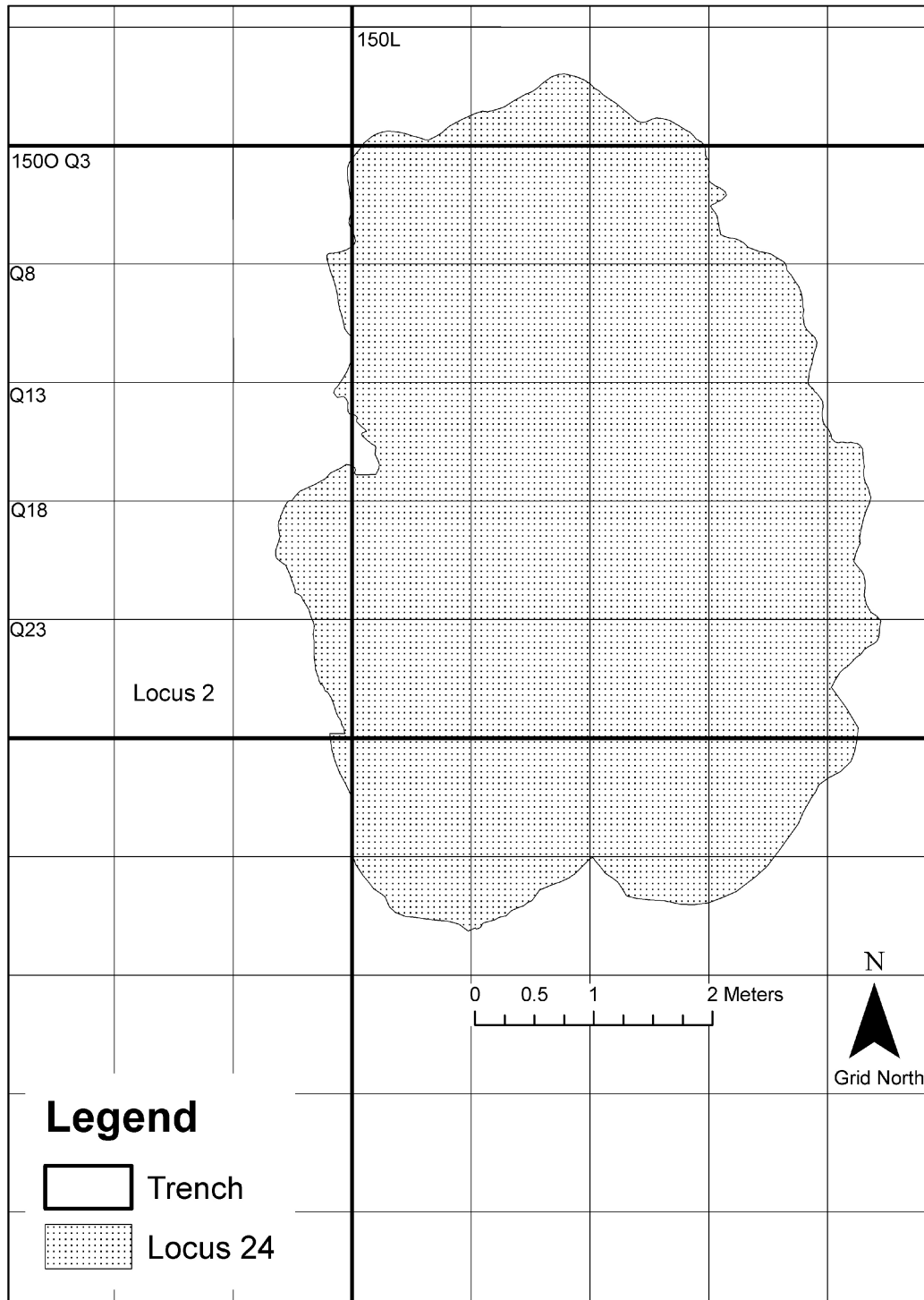


Figure 105: Location of Locus 24

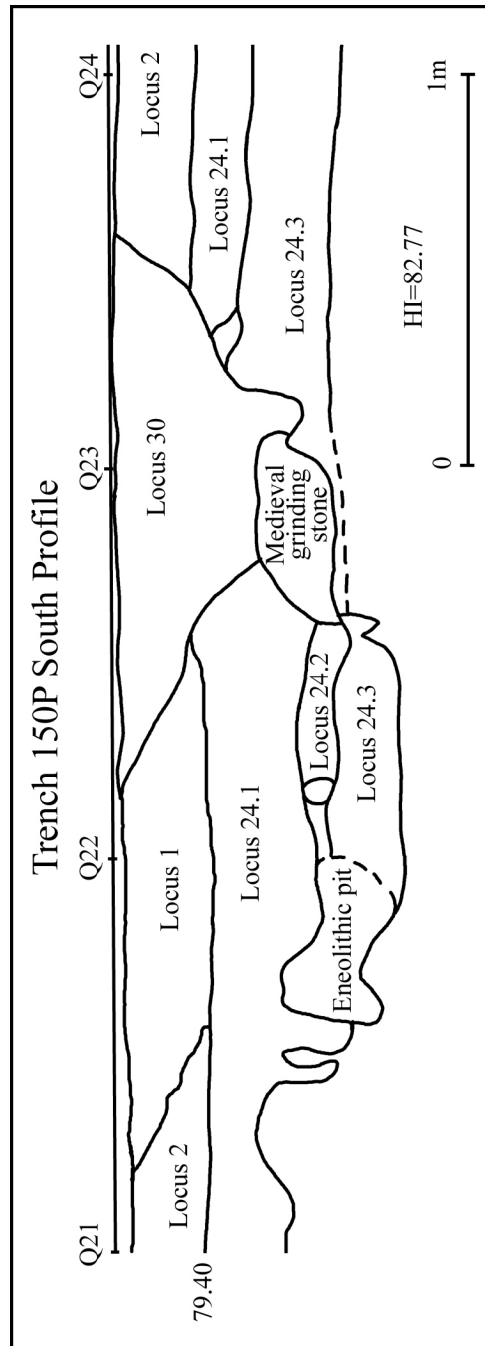


Figure 106: Trench 150P quads 21-24 South profile

Digitized altar locations in Locus 24.1

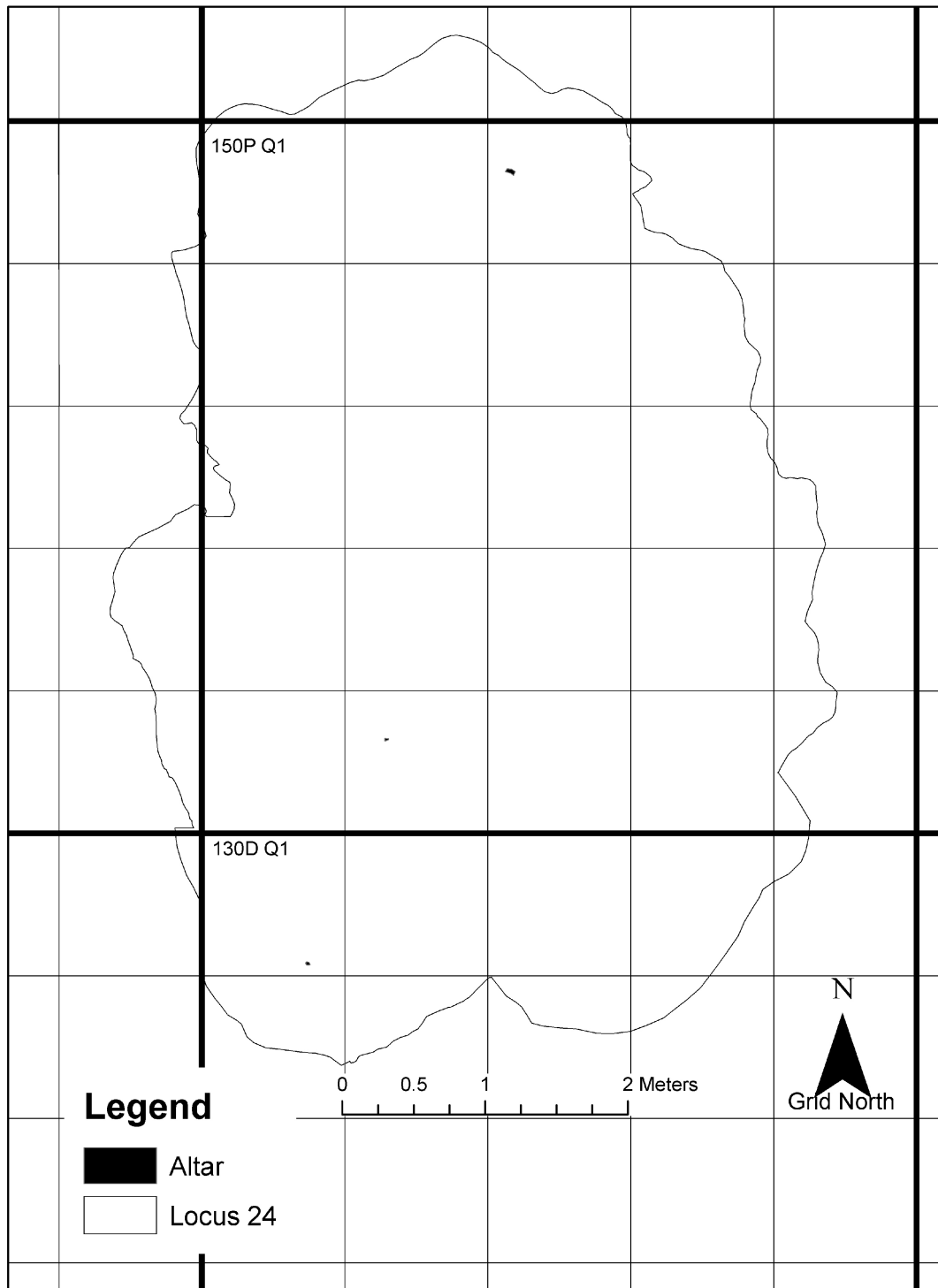


Figure 107: Digitized altars in Locus 24.1

Digitized bone in Locus 24.1



Figure 108: Digitized bone in Locus 24

Centroid bone tool locations in Locus 24.1

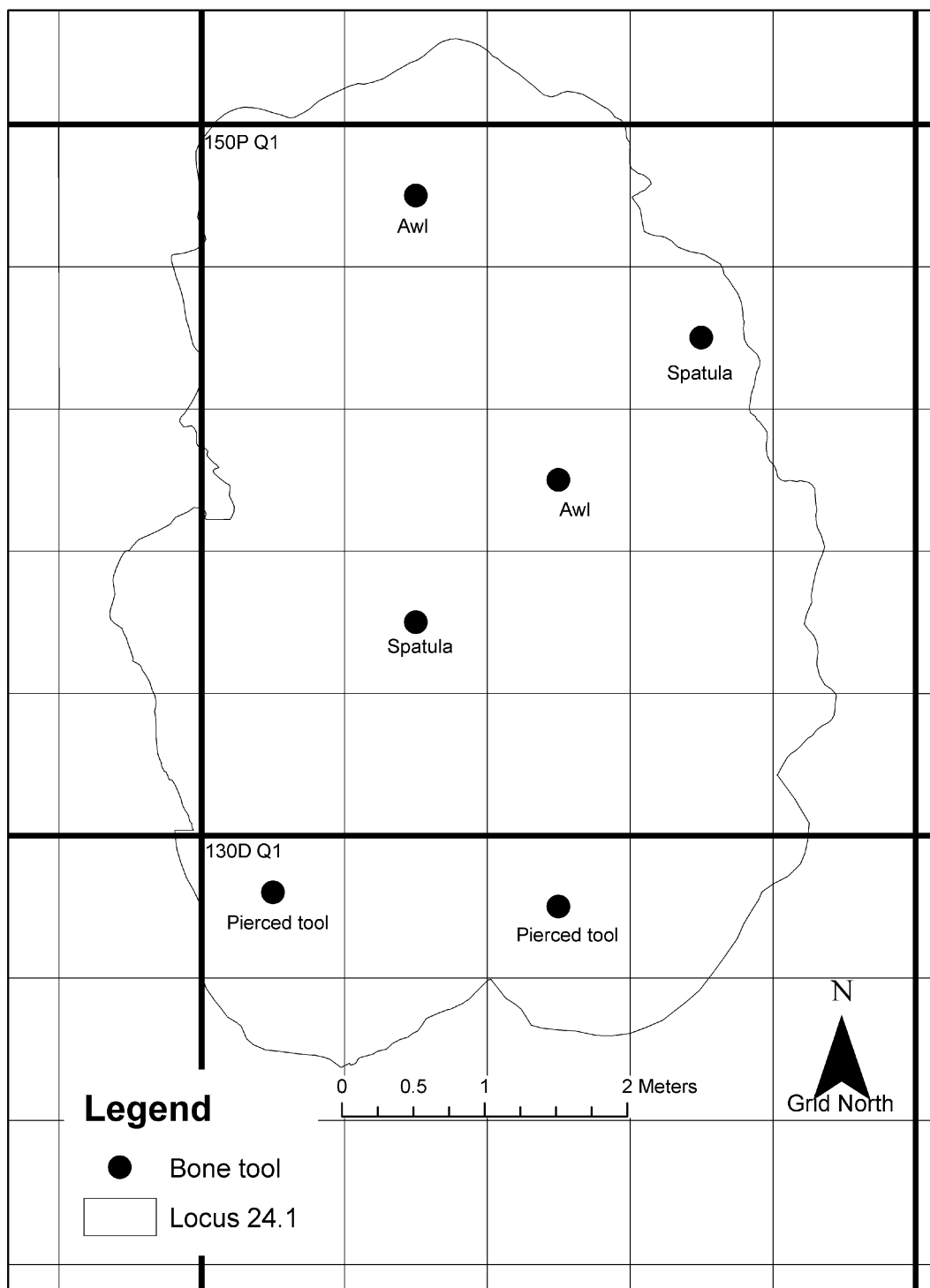


Figure 109: Centroid bone tool locations in Sub-locus 24.1

Early Neolithic ceramics in Locus 24.1

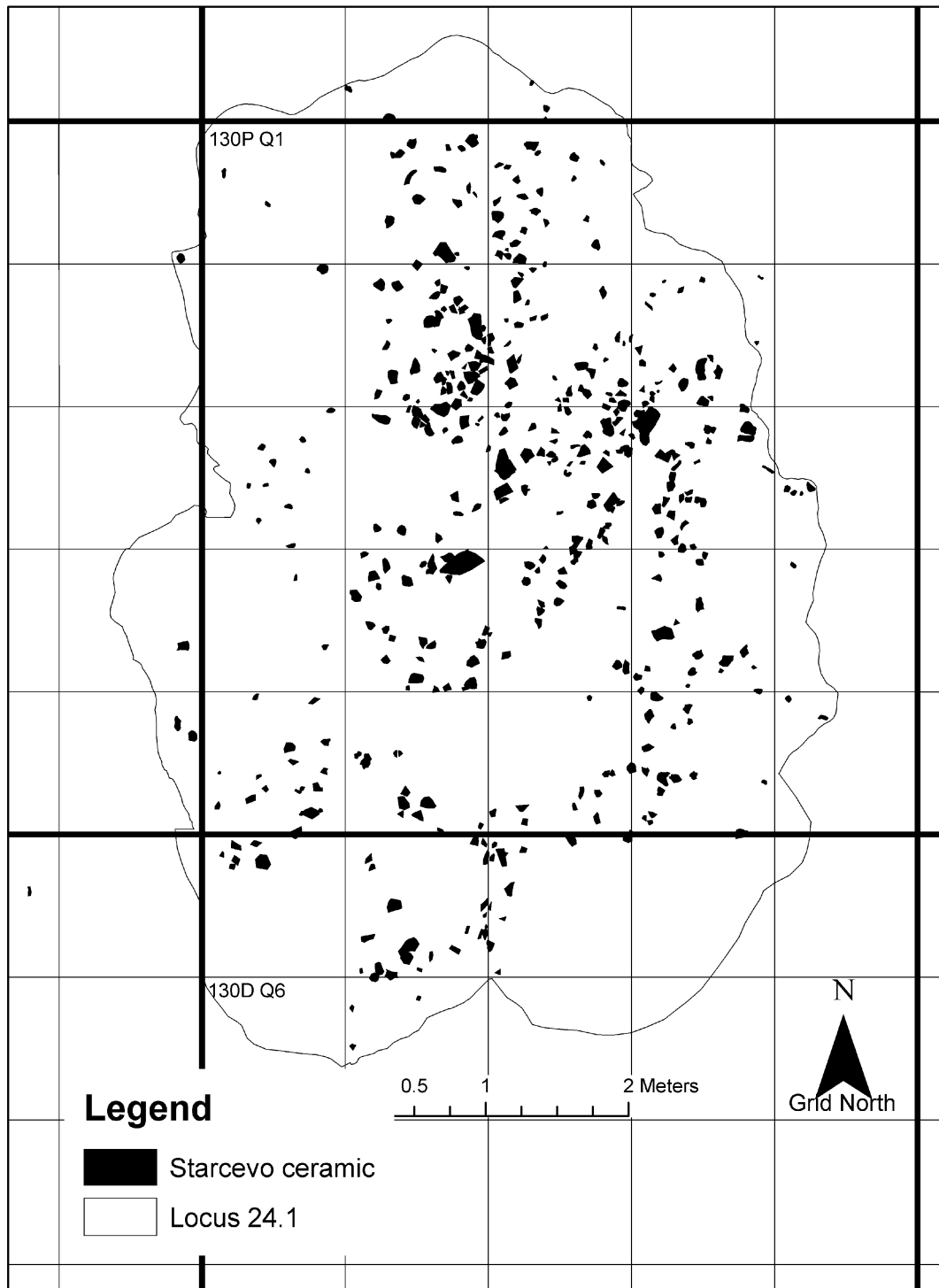


Figure 110: Digitized Early Neolithic ceramics in Sub-locus 24.1

Digitized chipped lithic and grinding stone in Locus 24.1

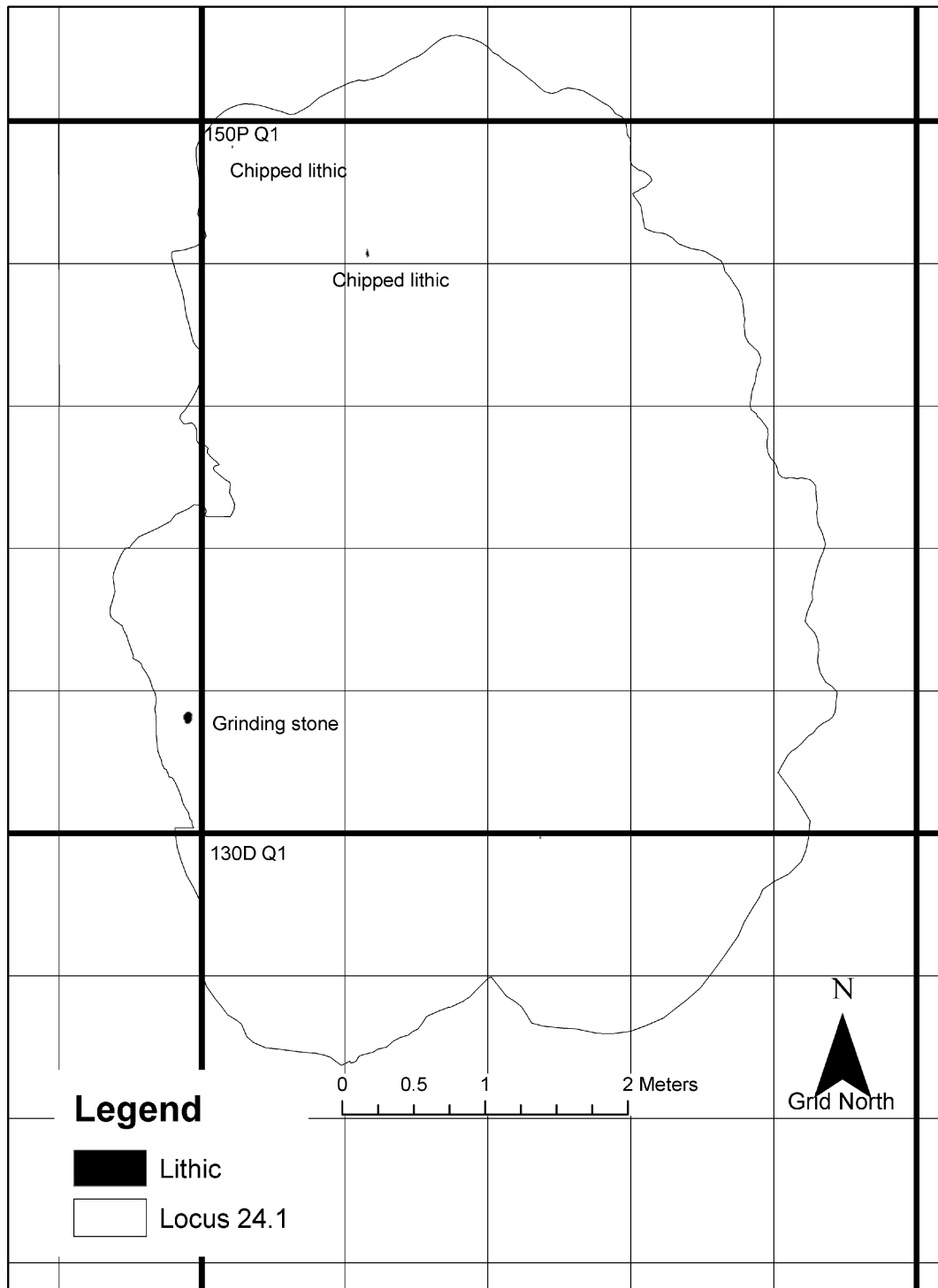


Figure 111: Digitized chipped lithic and grinding stone in Sub-locus 24.1

Digitized daub in Locus 24.1

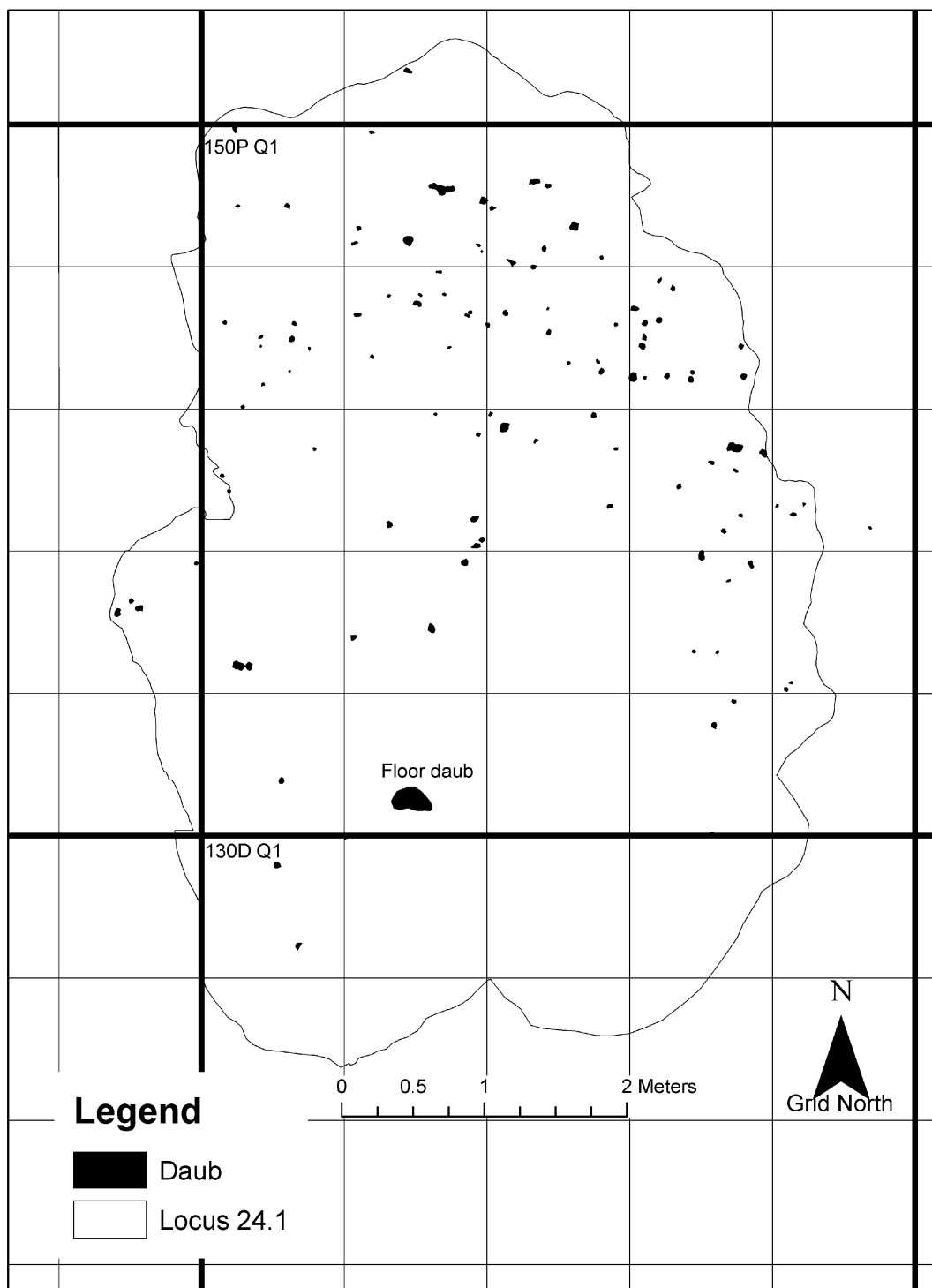


Figure 112: Digitized daub in Sub-locus 24.1

Digitized bolla weights in Locus 24.1

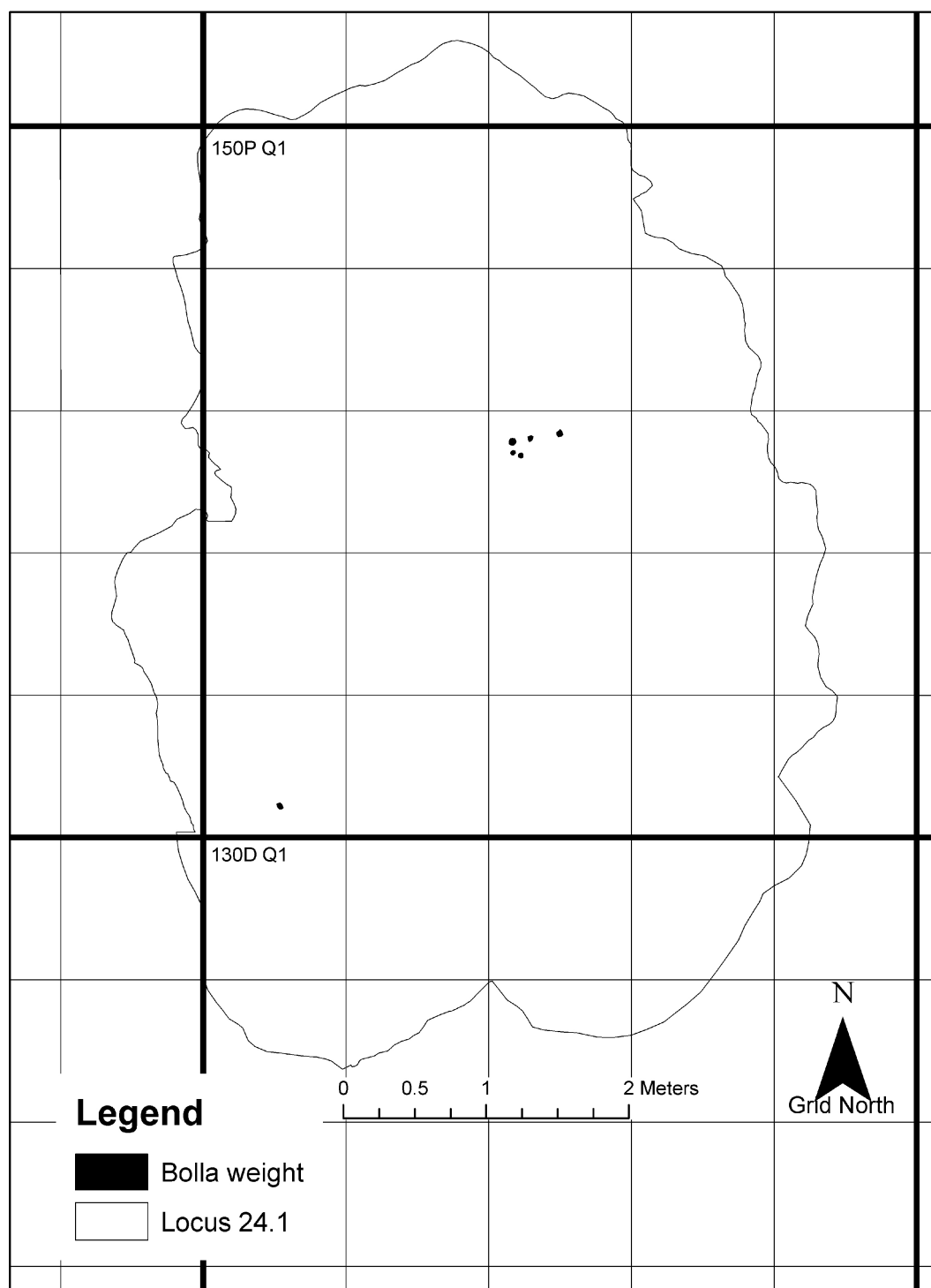


Figure 113: Digitized bollas in Sub-locus 24.1

Digitized loom and loaf weights in Locus 24.1

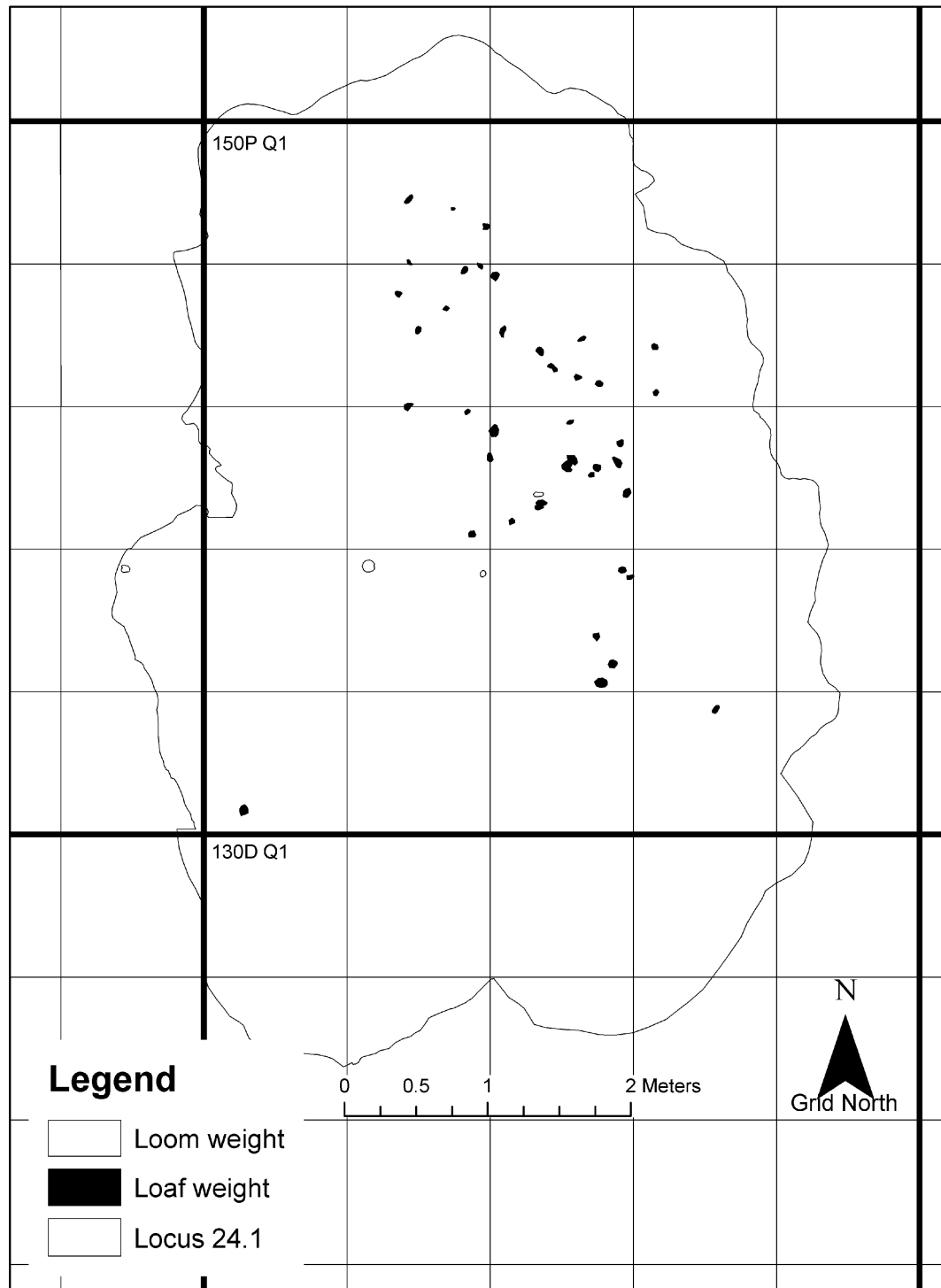


Figure 114: Digitized loom and loaf weights in Sub-locus 24.1

Post hole locations in Locus 24.1

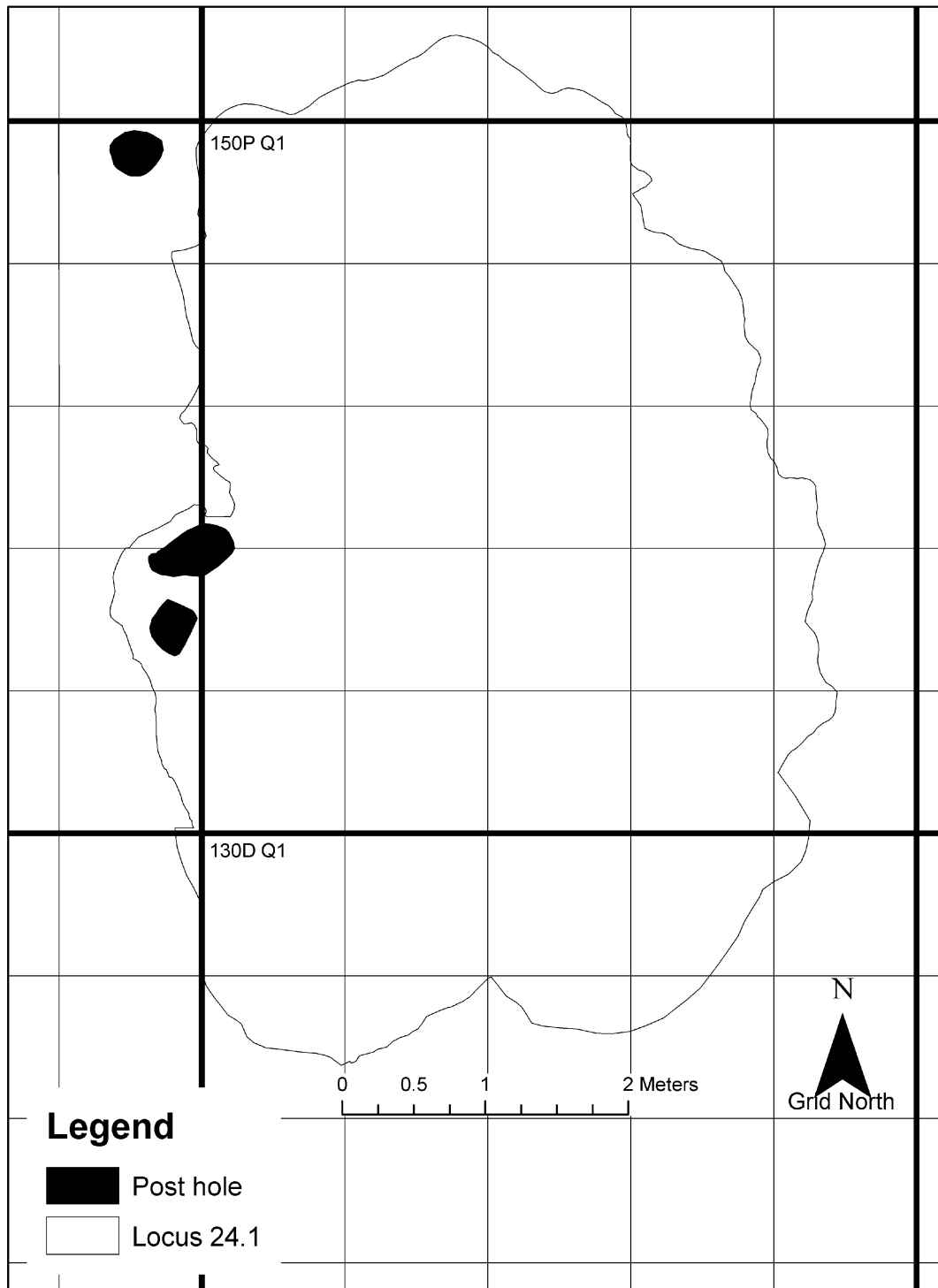


Figure 115: Post hole locations in Sub-locus 24.1

Digitized bone in Locus 24.2

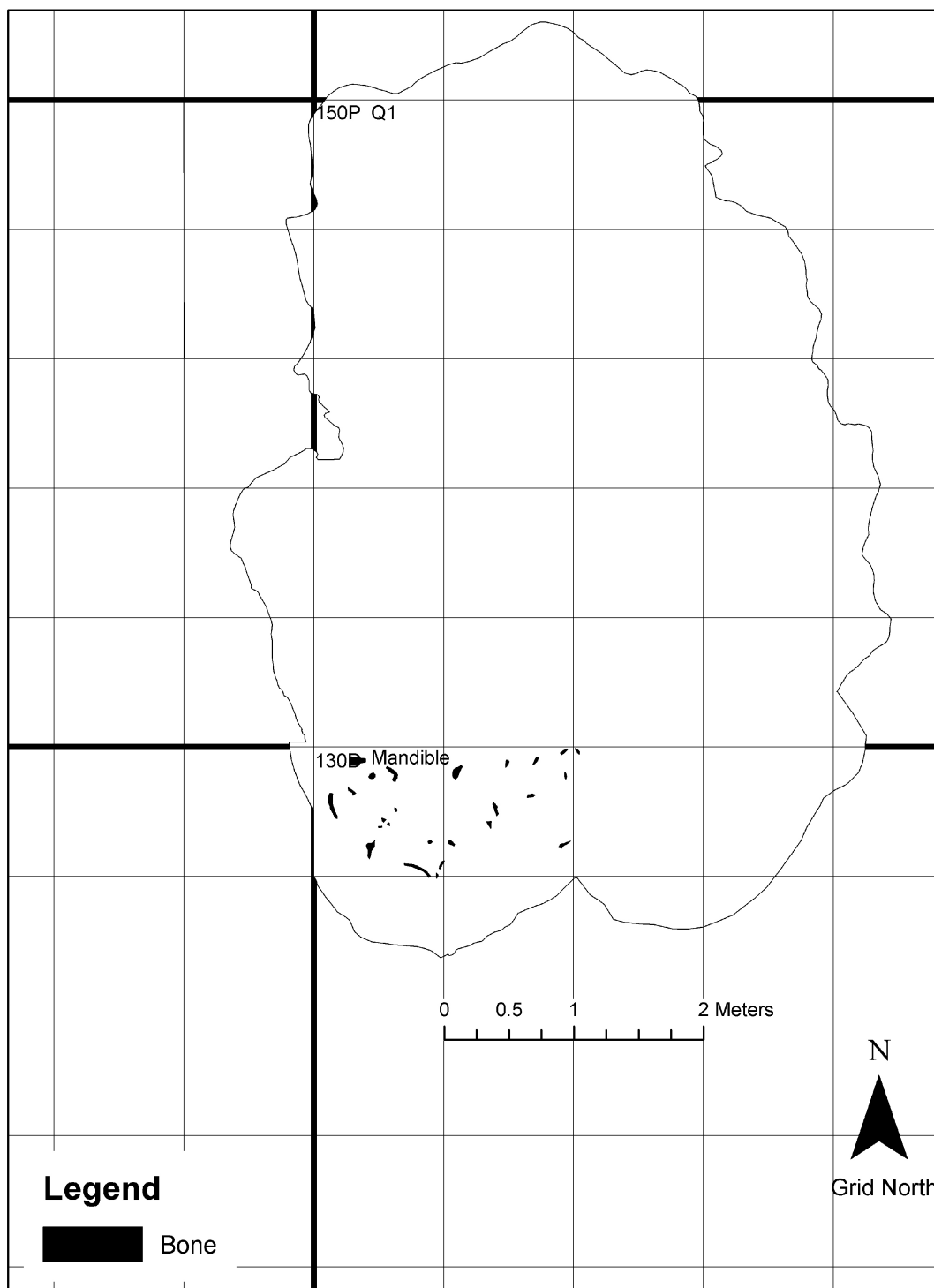


Figure 116: Digitized bone in Sub-locus 24.2

Digitized Early Neolithic ceramic in Locus 24.2

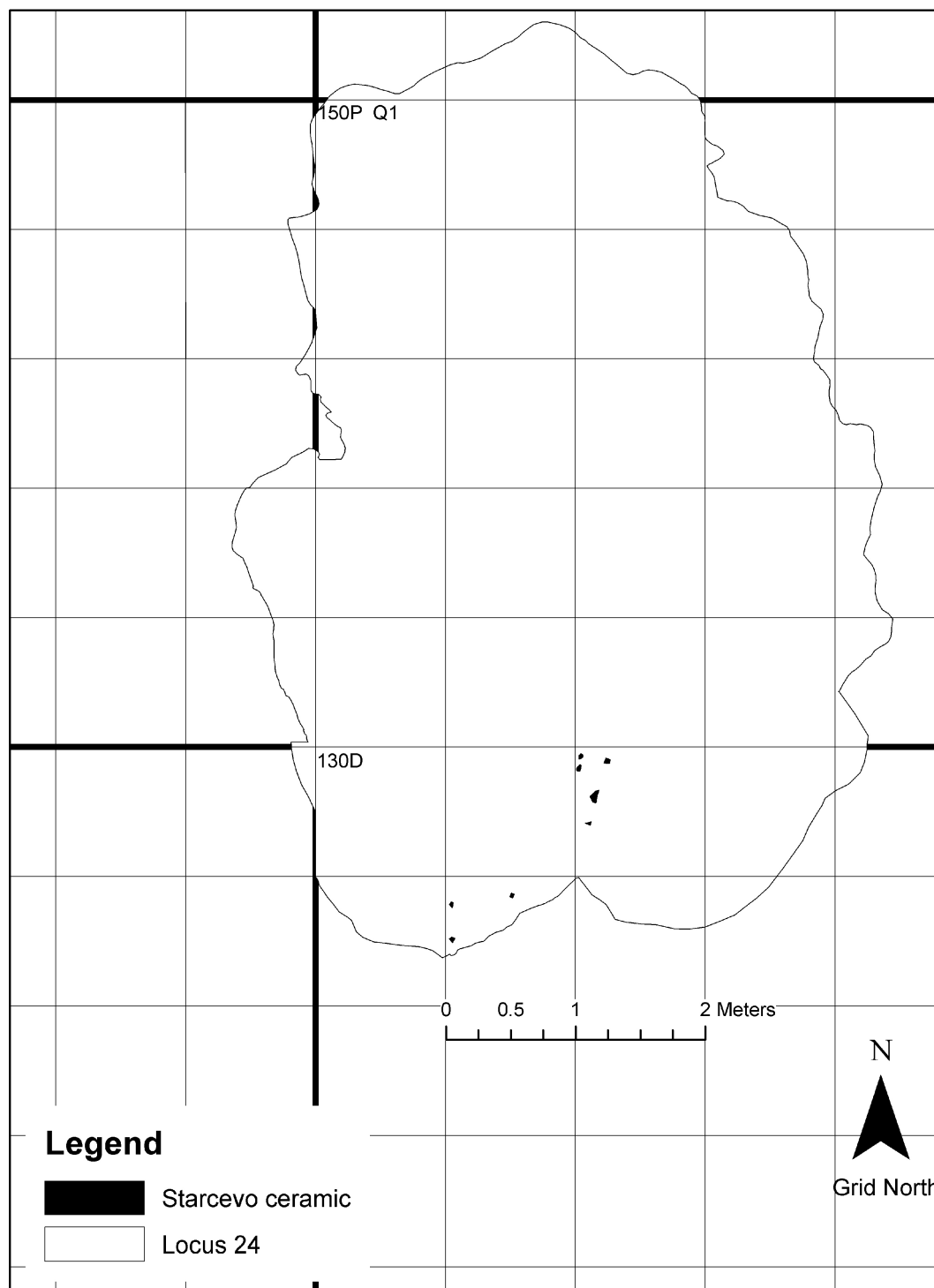


Figure 117: Digitized Early Neolithic ceramics in Sub-locus 24.2

Digitized unidentified daub in Locus 24.2

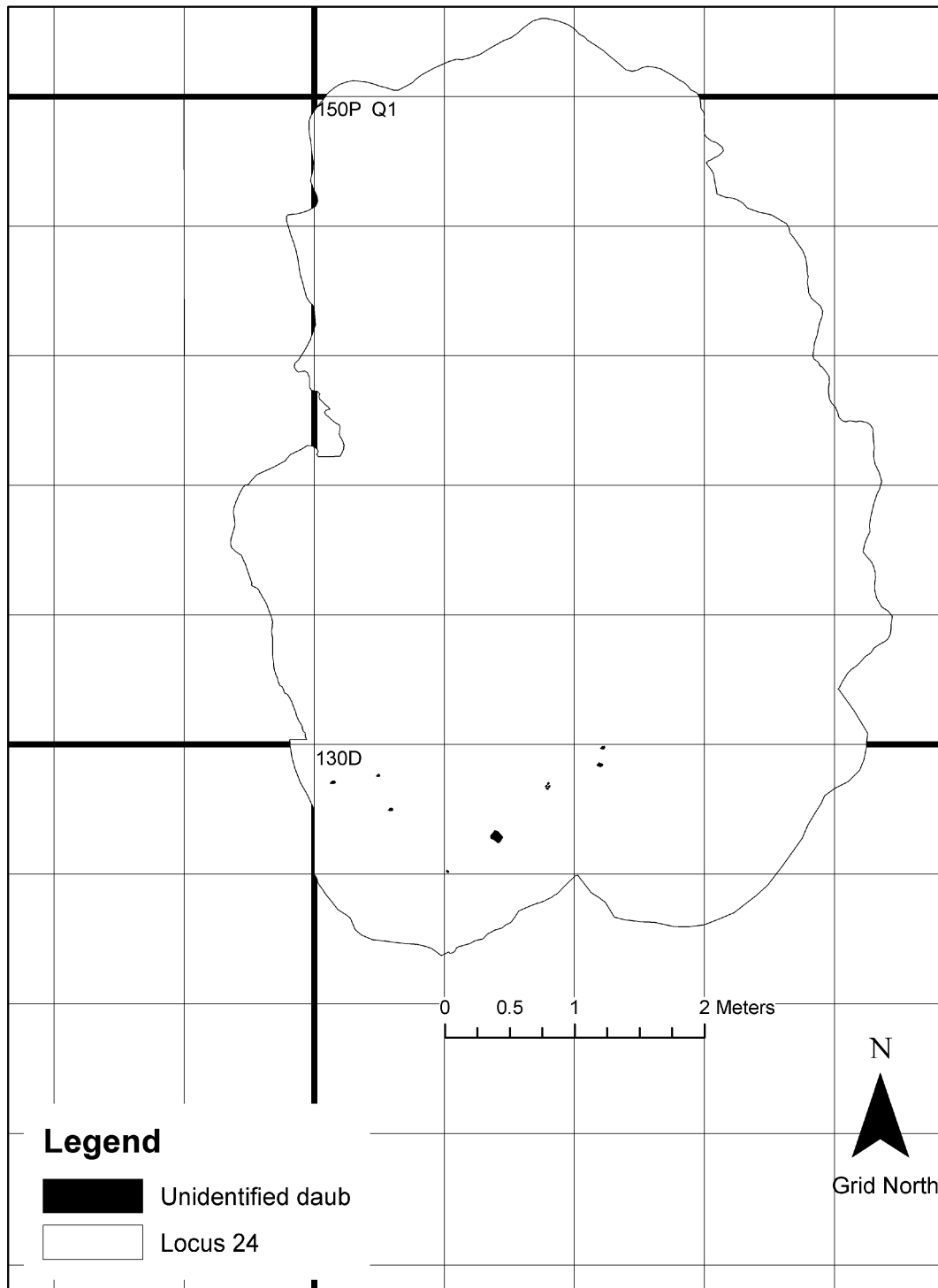


Figure 118: Digitized unidentified daub in Sub-locus 24.1

Centroid oven and wall daub locations in Locus 24

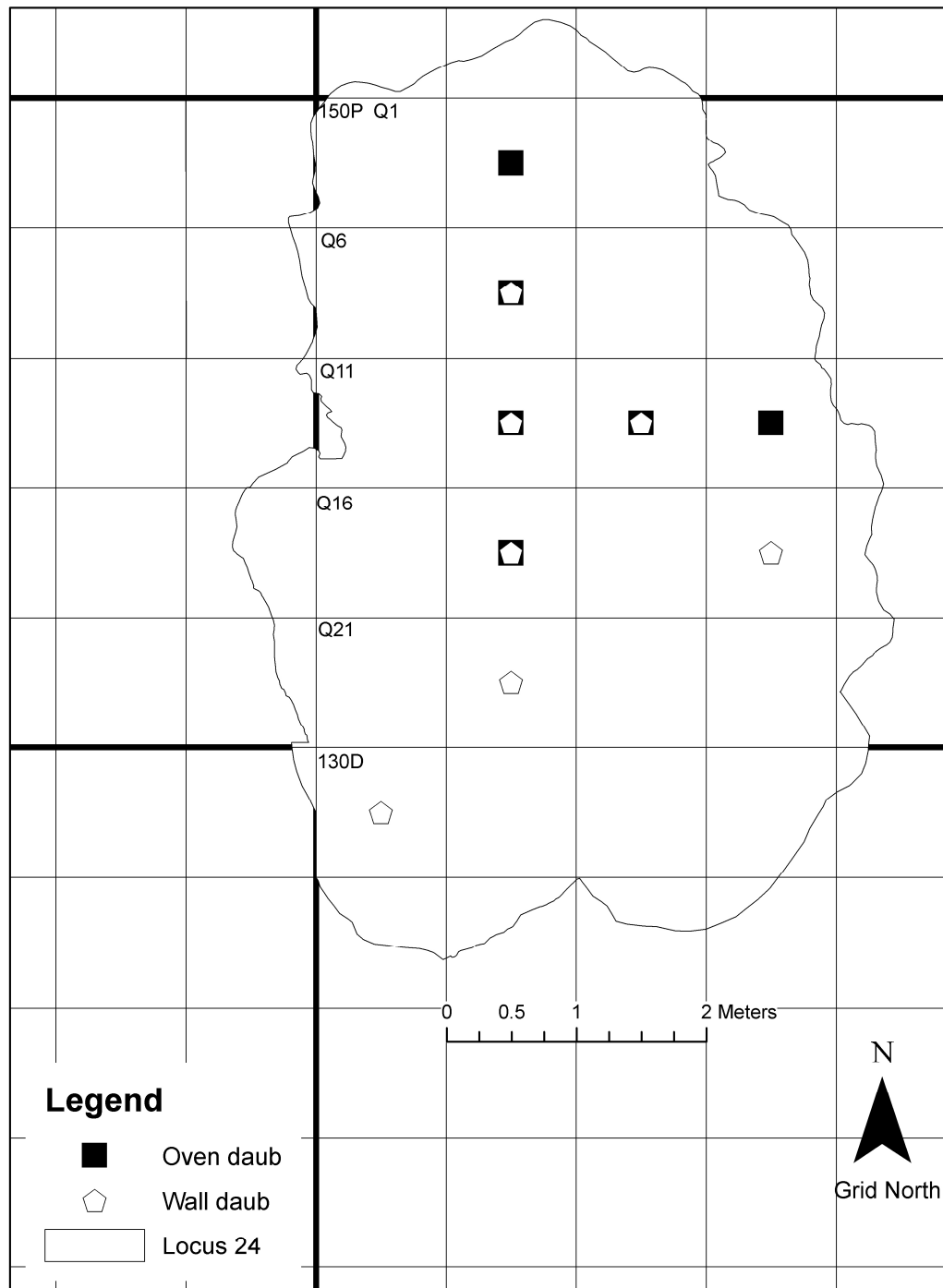


Figure 119: Centroid oven and wall daub in Sub-locus 24.1

Post hole location in Sub-locus 24.2

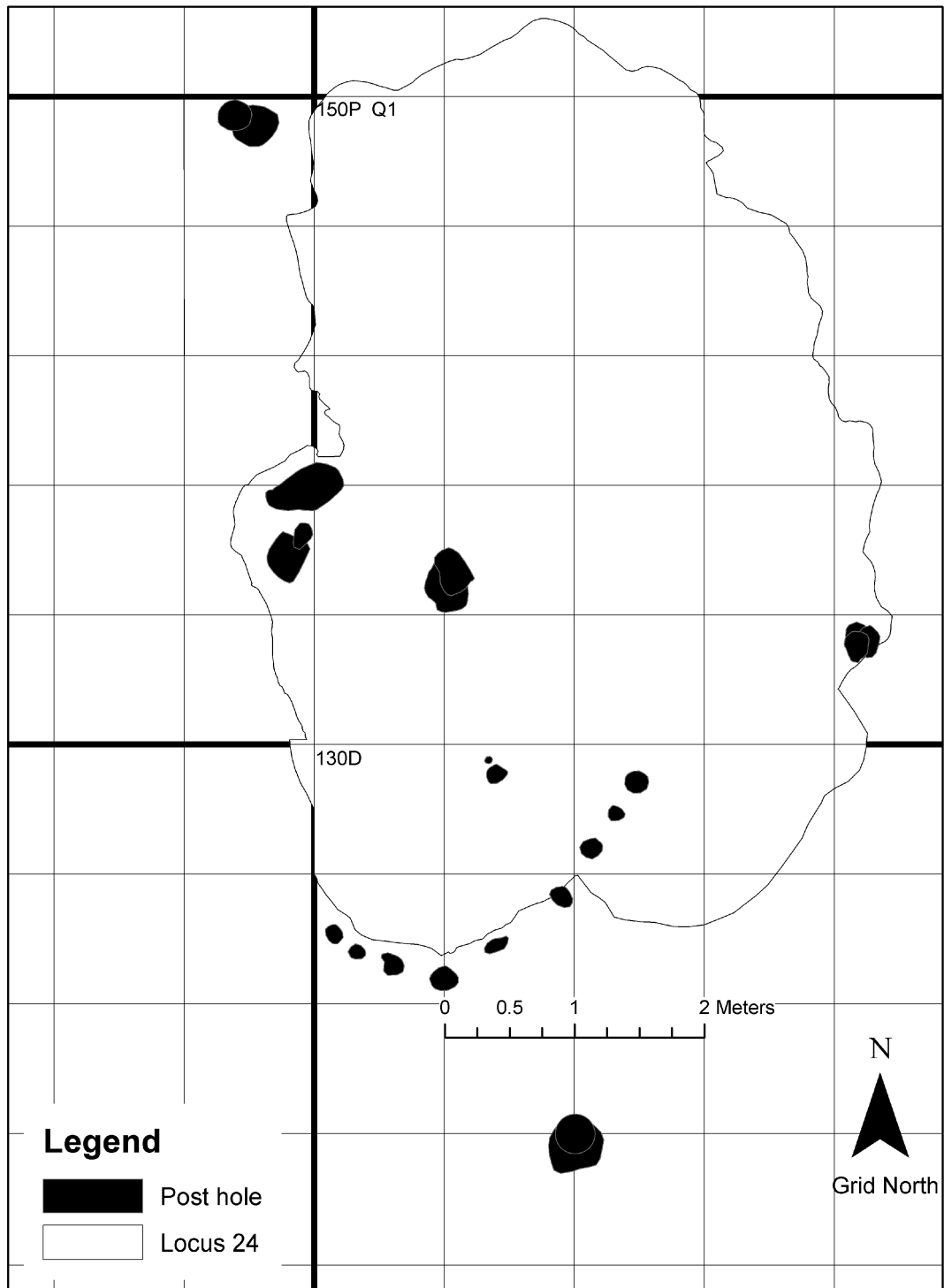


Figure 120: Post hole Locations in Sub-locus 24.2

Digitized figurine location in Sub-locus 24.3

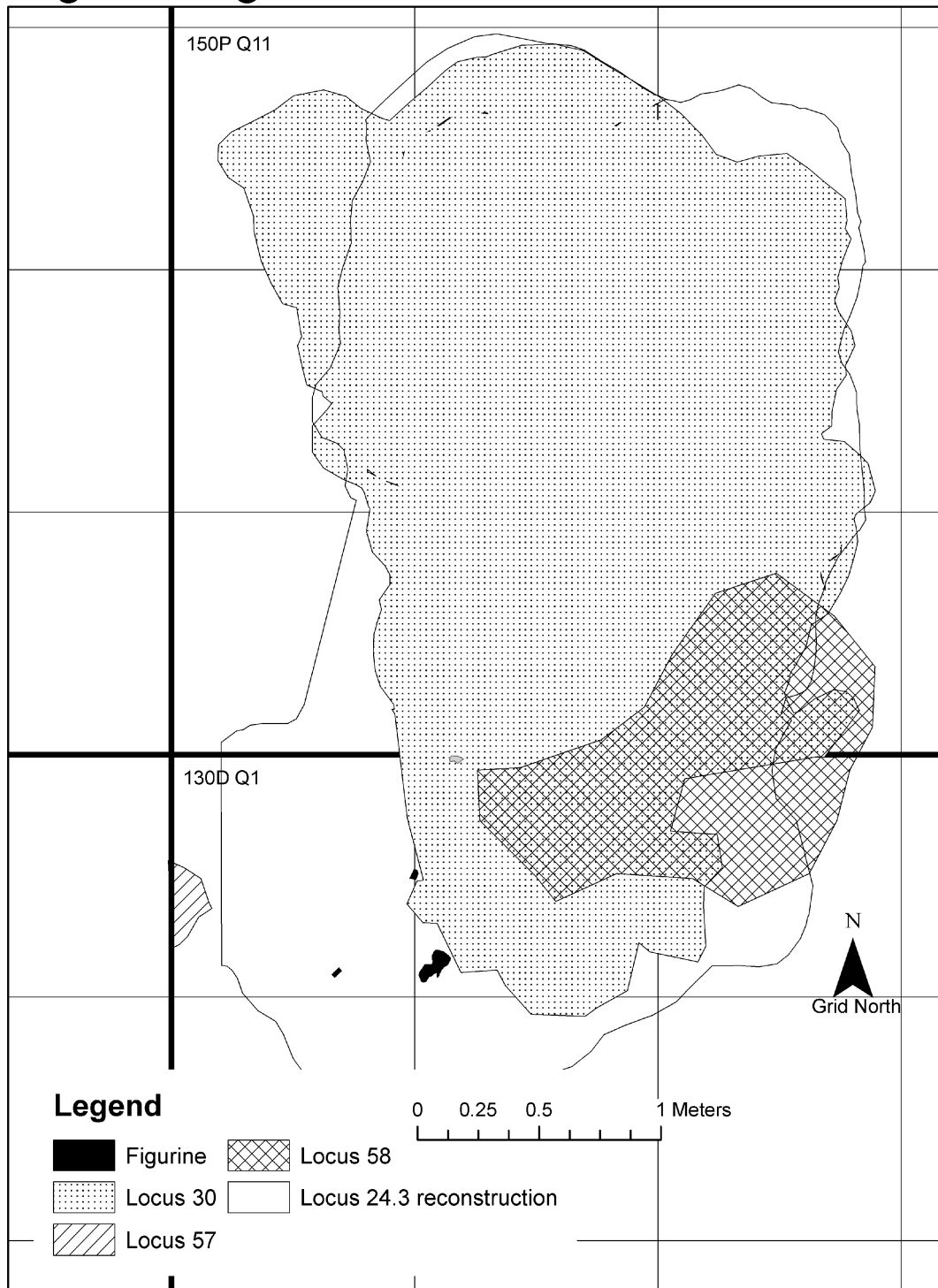


Figure 121: Digitized figurine location in Sub-locus 24.3

Digitized bone in Sub-locus 24.3

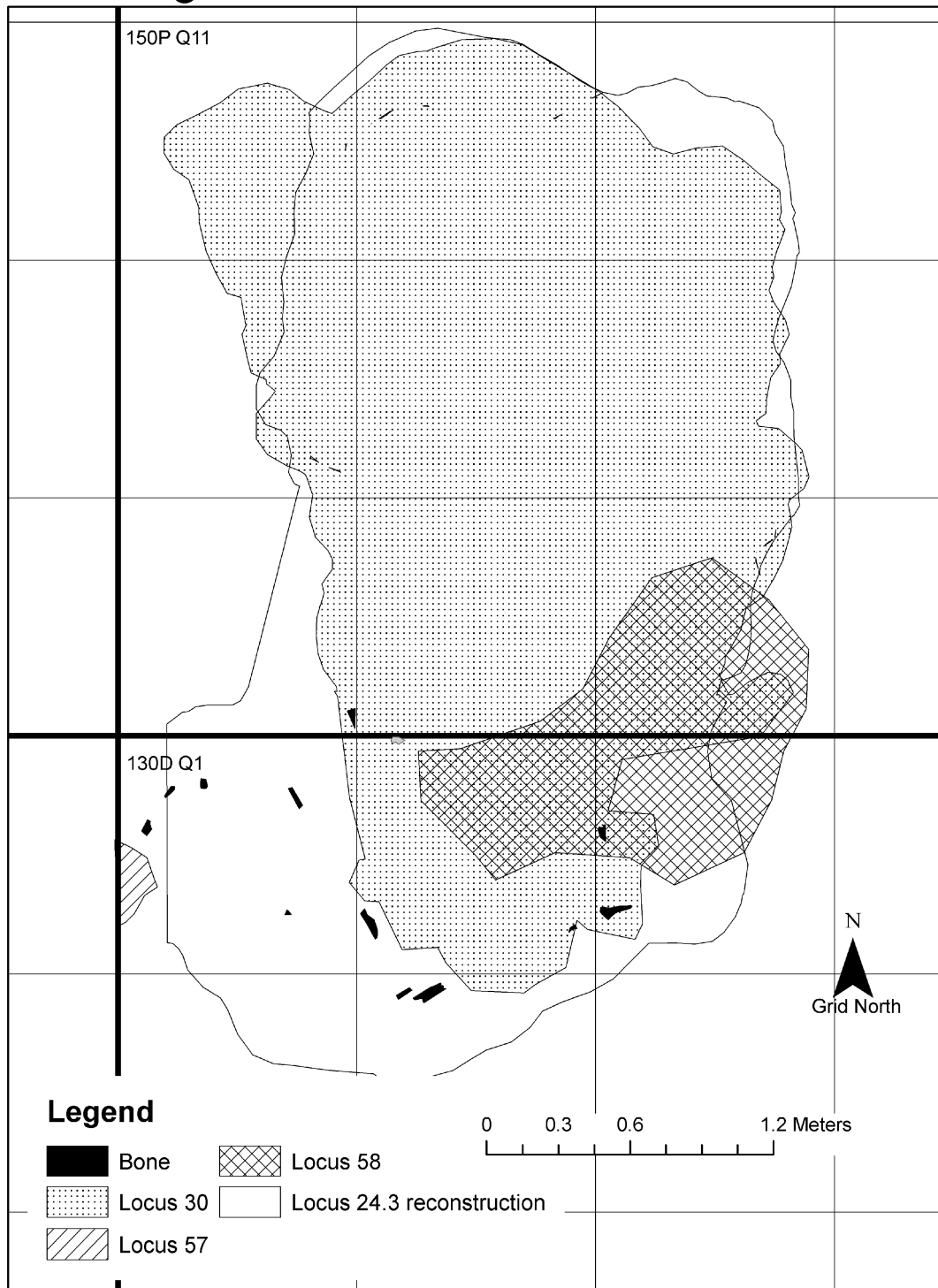


Figure 122: Digitized bone in Sub-locus 24.3

Digitized Early Neolithic ceramic in Sub-locus 24.3

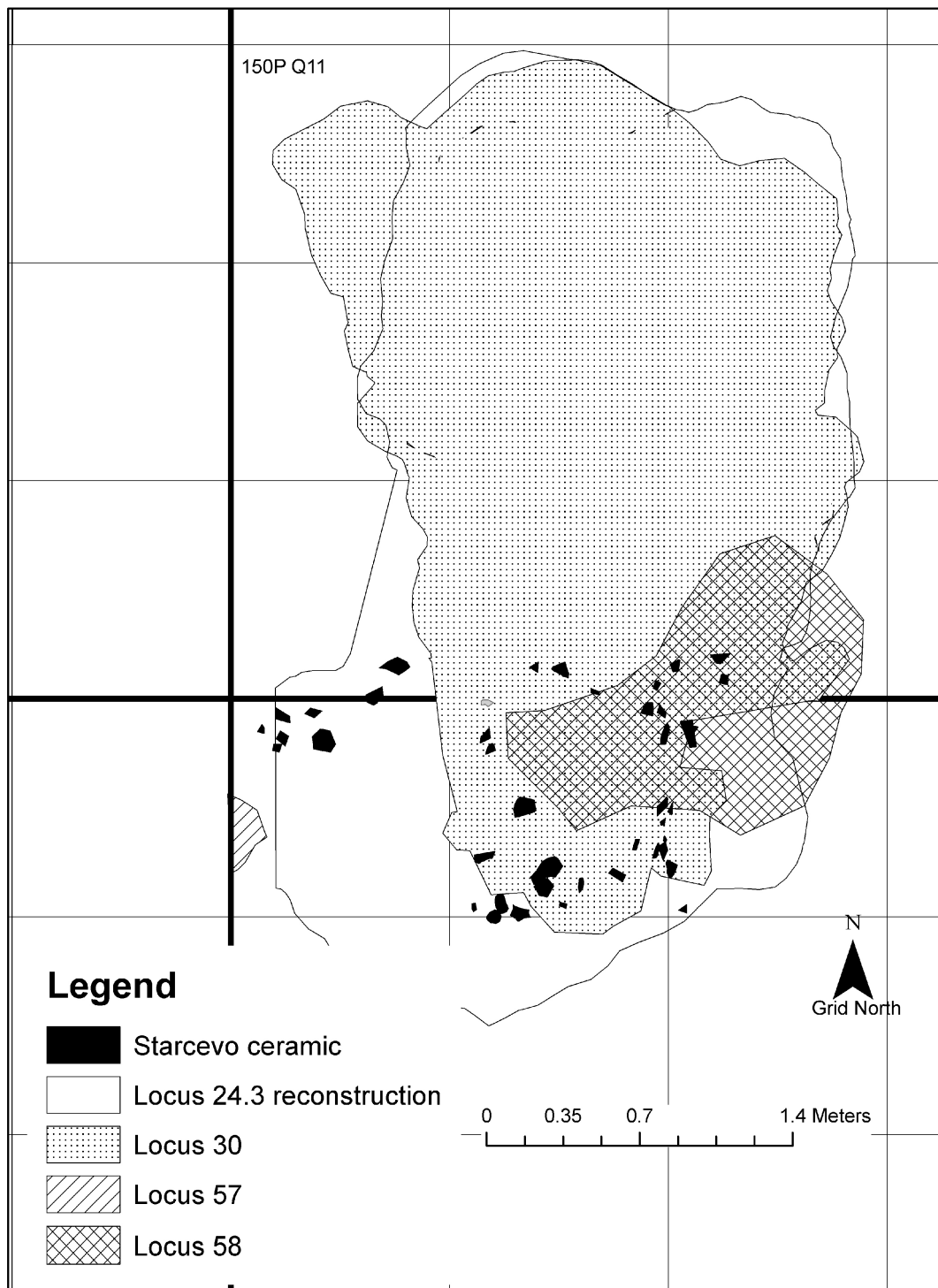


Figure 123: Digitized Early Neolithic ceramics in Sub-locus 24.3

Digitized daub in Sub-locus 24.3

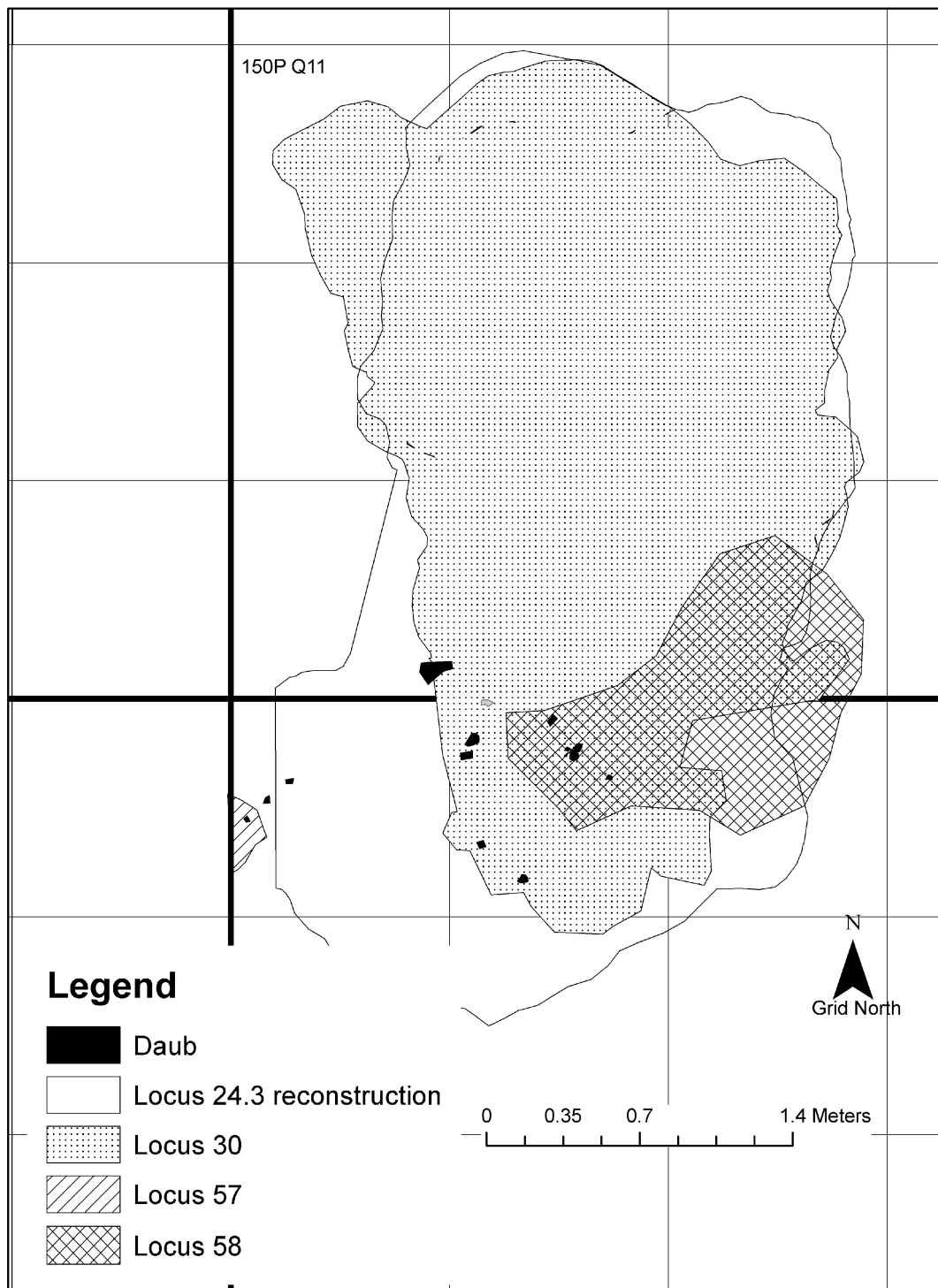


Figure 124: Digitized daub in Sub-locus 24.3

Post hole and digitized artefacts in Sub-locus 24.3

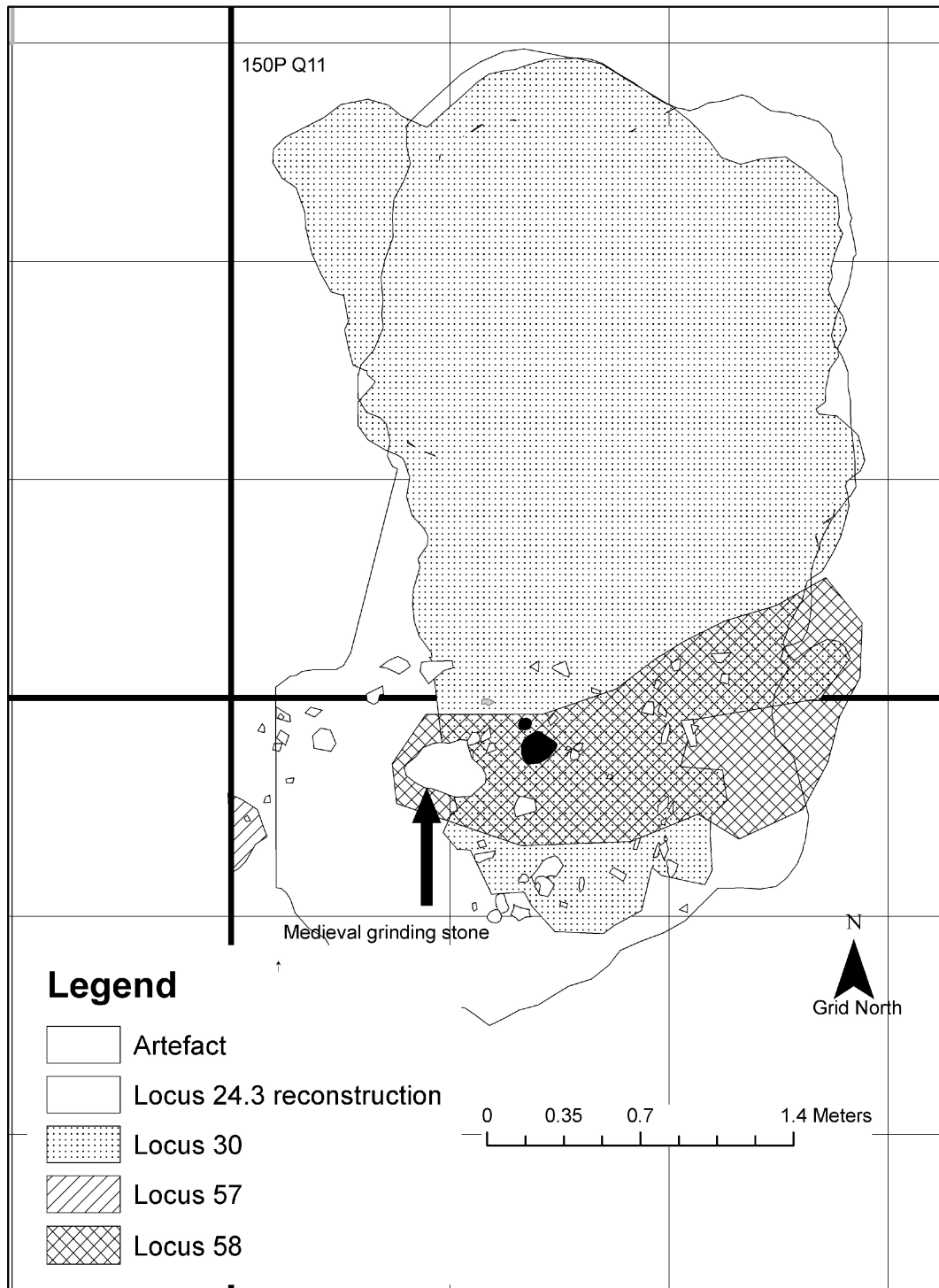


Figure 125: Post hole and digitized artefacts in Sub-locus 24.3

Possible entrances in Locus 24

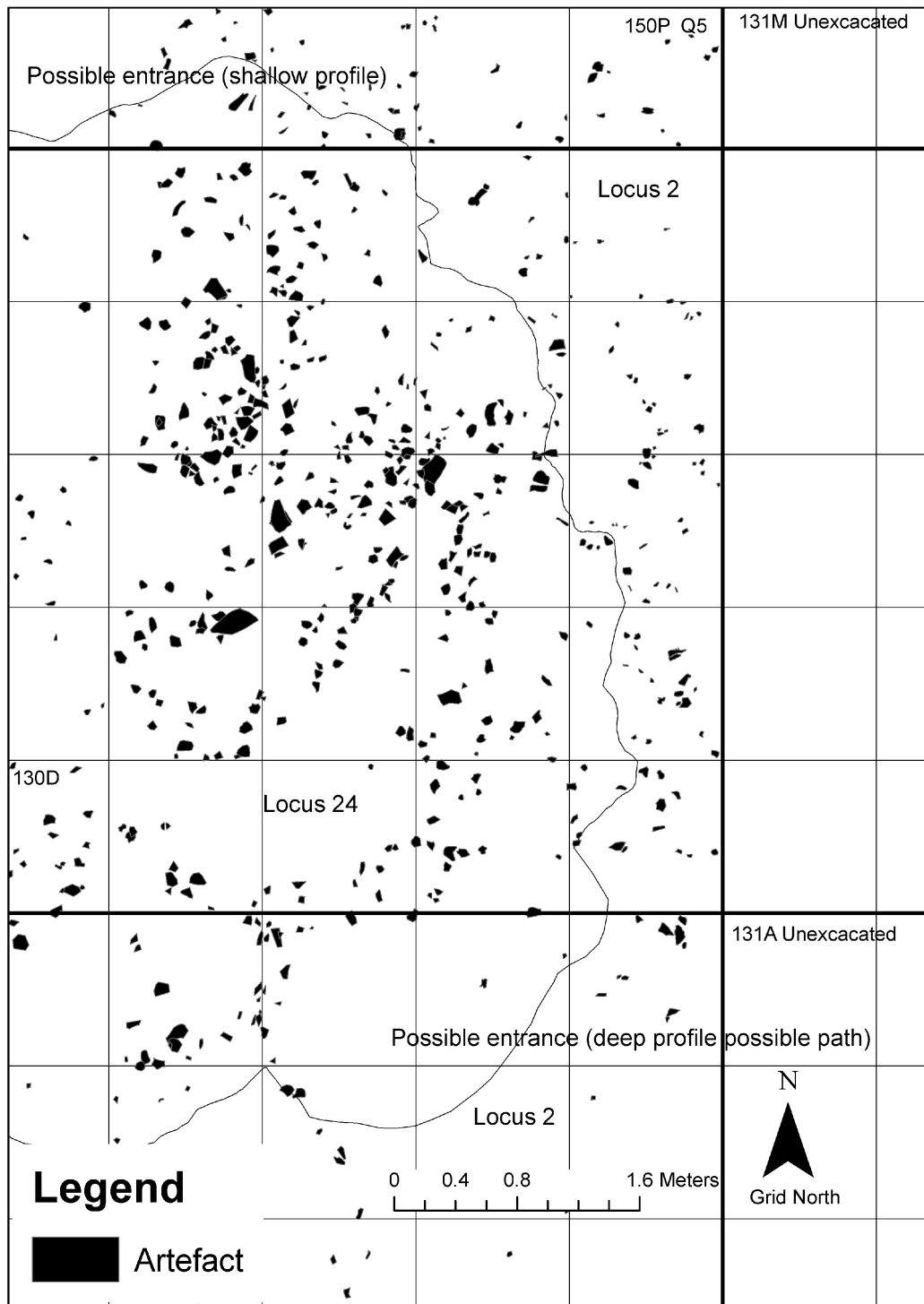


Figure 126: Possible entrances in Locus 24

Digitized Early Neolithic ceramics and bone in Locus 25

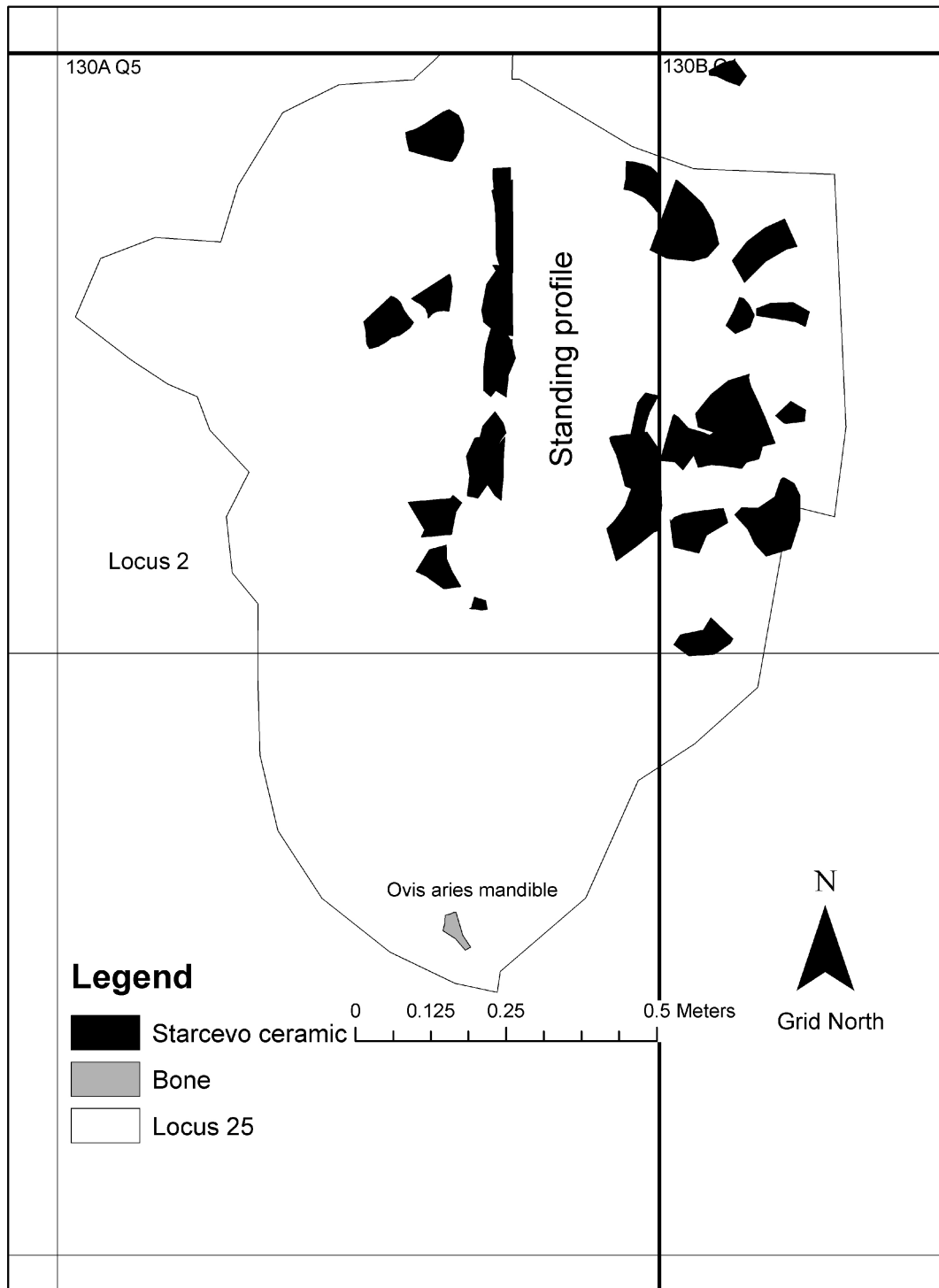


Figure 127: Digitized ceramics and bone in Locus 25

Digitized bone in Locus 41

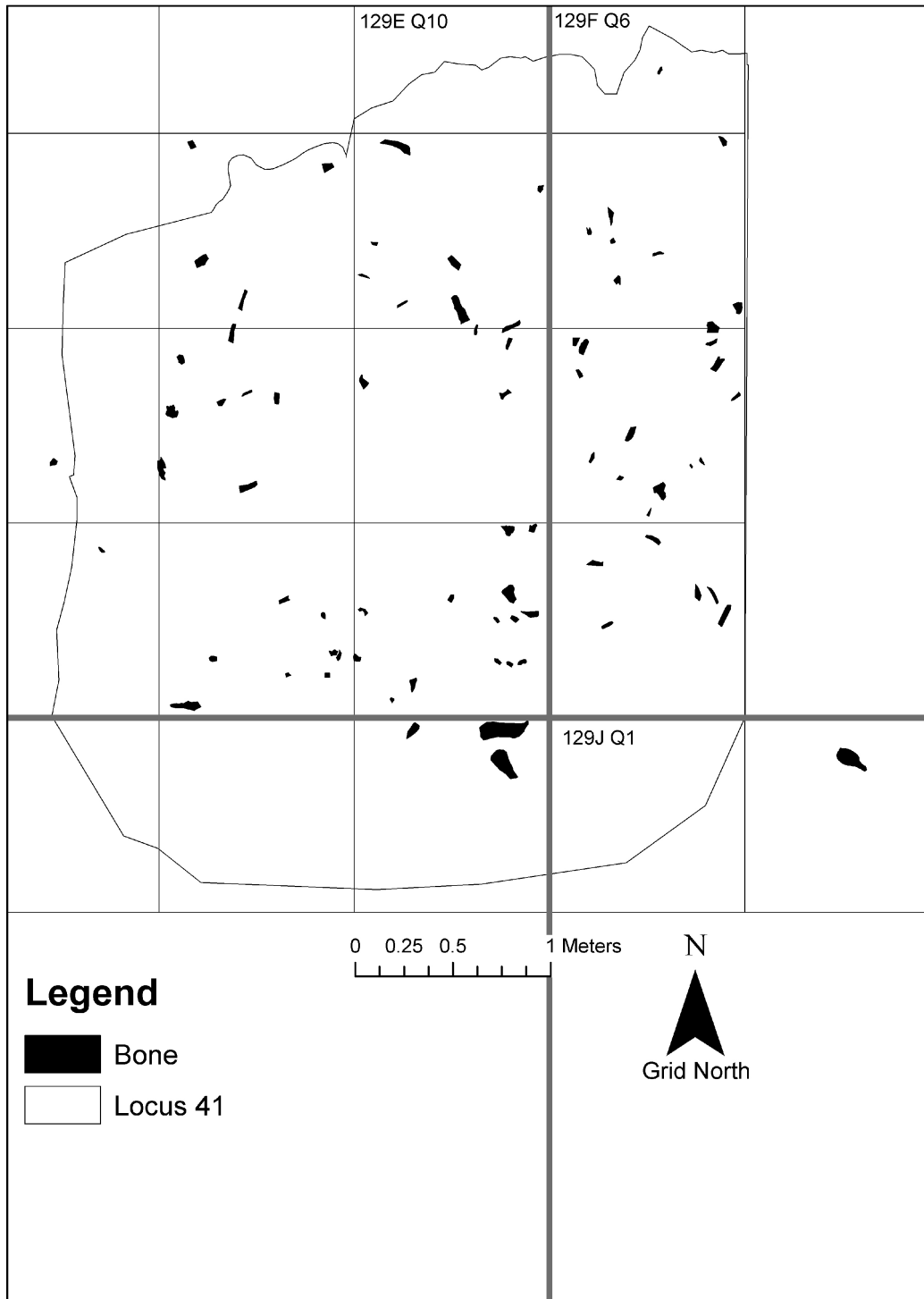


Figure 128: Digitized bone in Locus 41

Centroid bone tool and digitized chipped lithic tool location in Locus 41

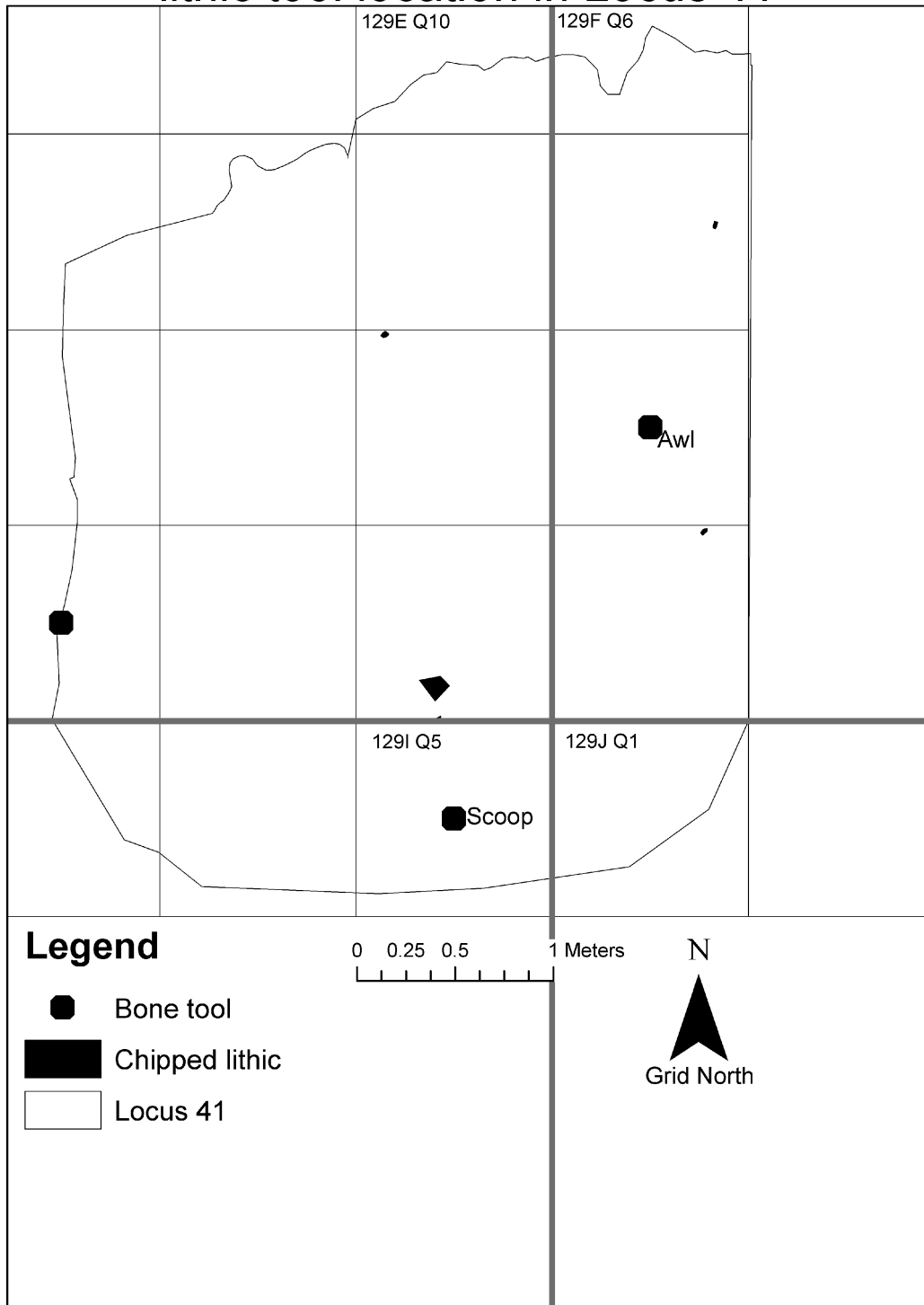


Figure 129: Centroid bone tool and digitized chipped lithic tools in Locus 41

Digitized Early Neolithic ceramics in Locus 41

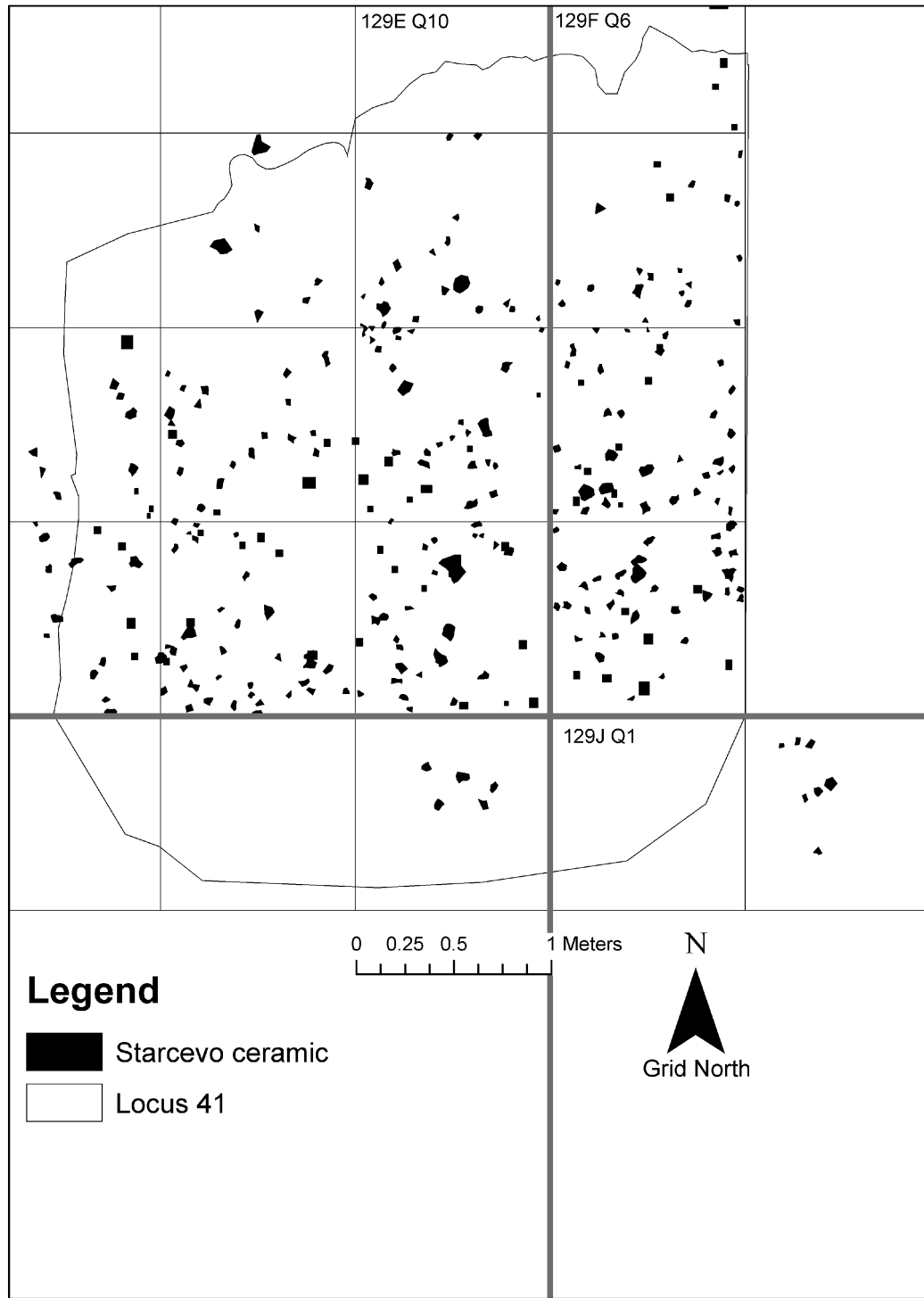


Figure 130: Digitized Early Neolithic ceramics in Locus 10

Top and bottom of Locus 25- storage pit

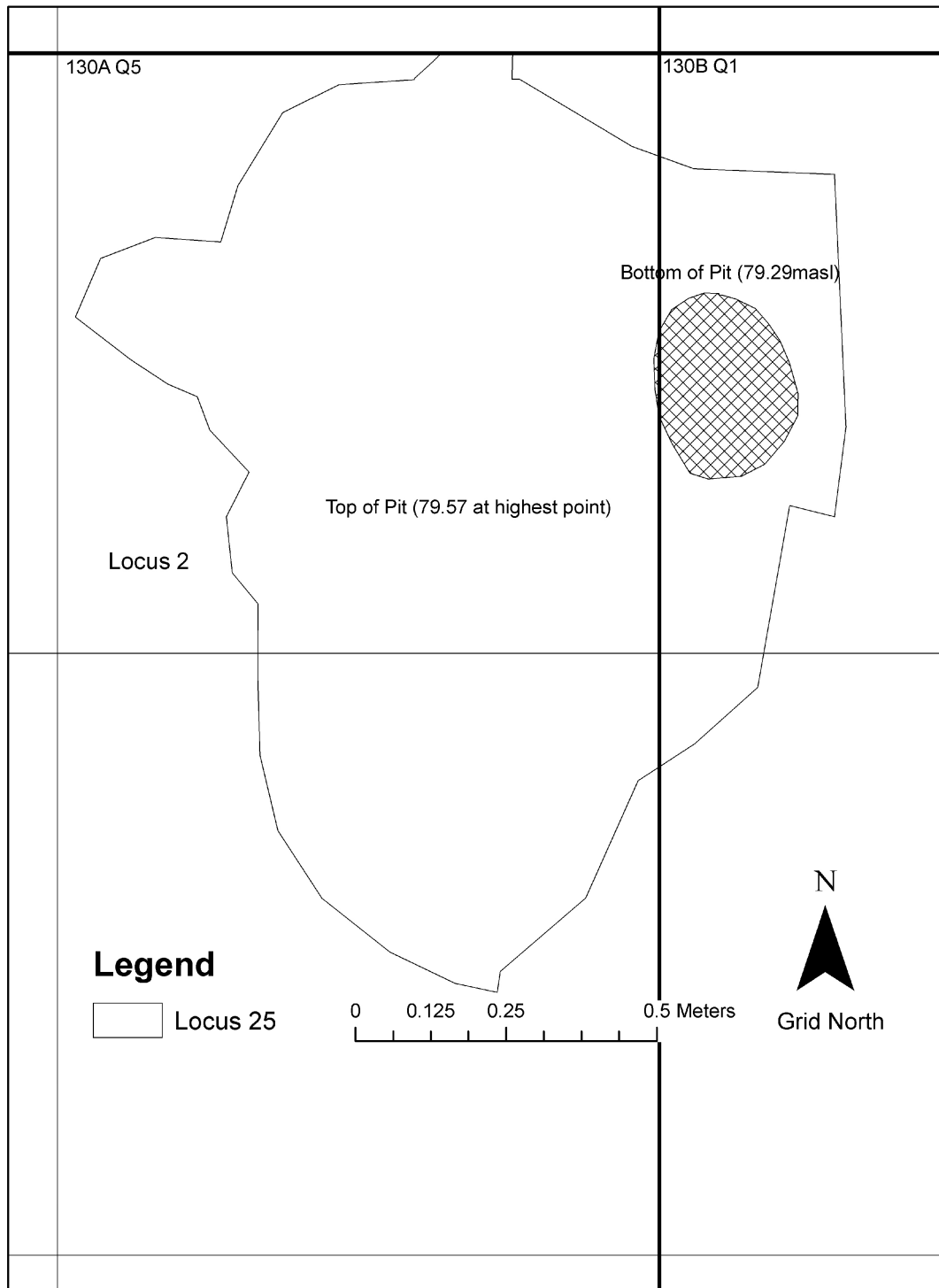


Figure 131: Top and bottom of Locus 25

Centroid grinding stones and digitized post holes in Locus 41

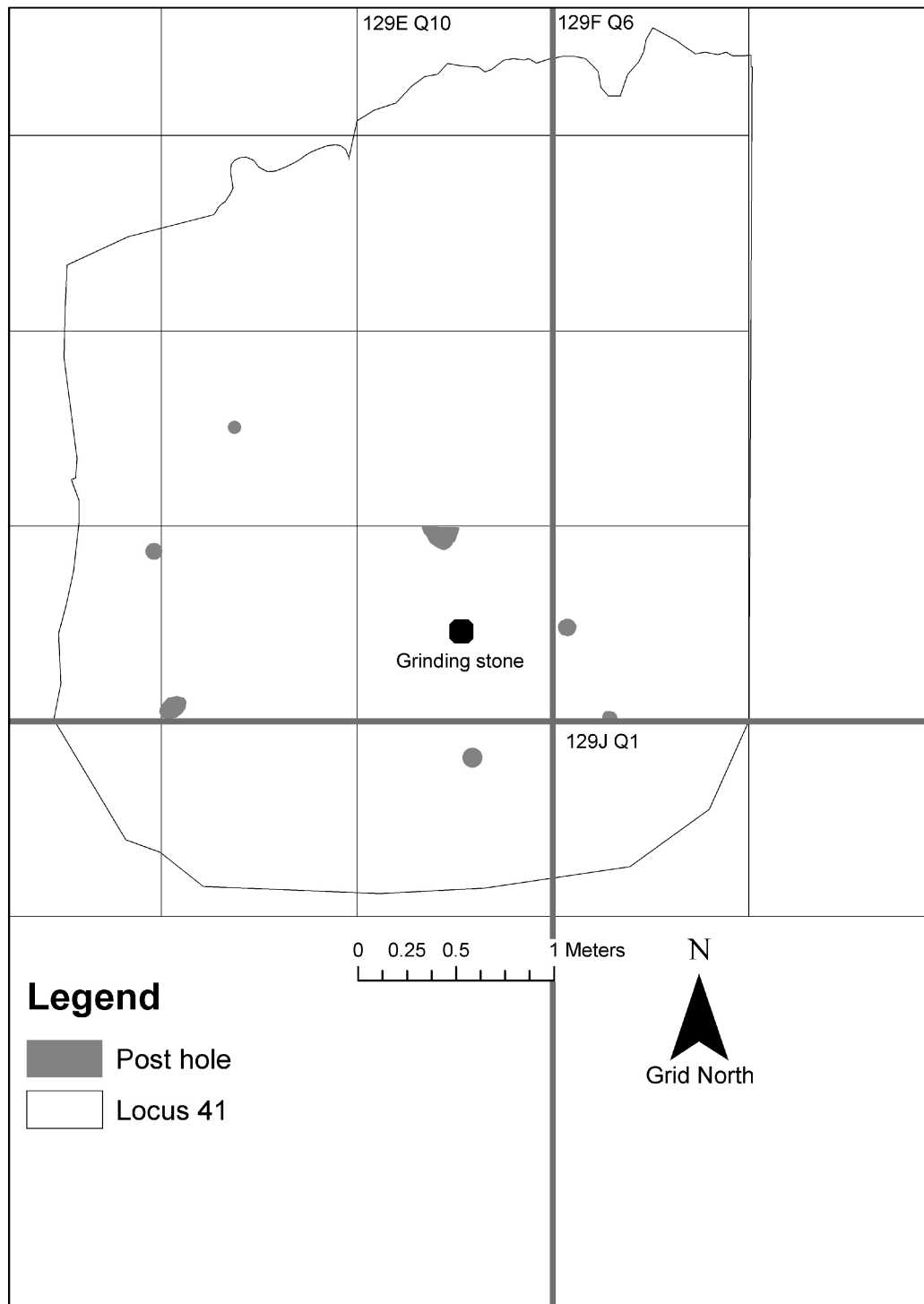


Figure 132: Centroid grinding stones and digitized post holes in Locus 41

Digitized floor and wall daub in Locus 41

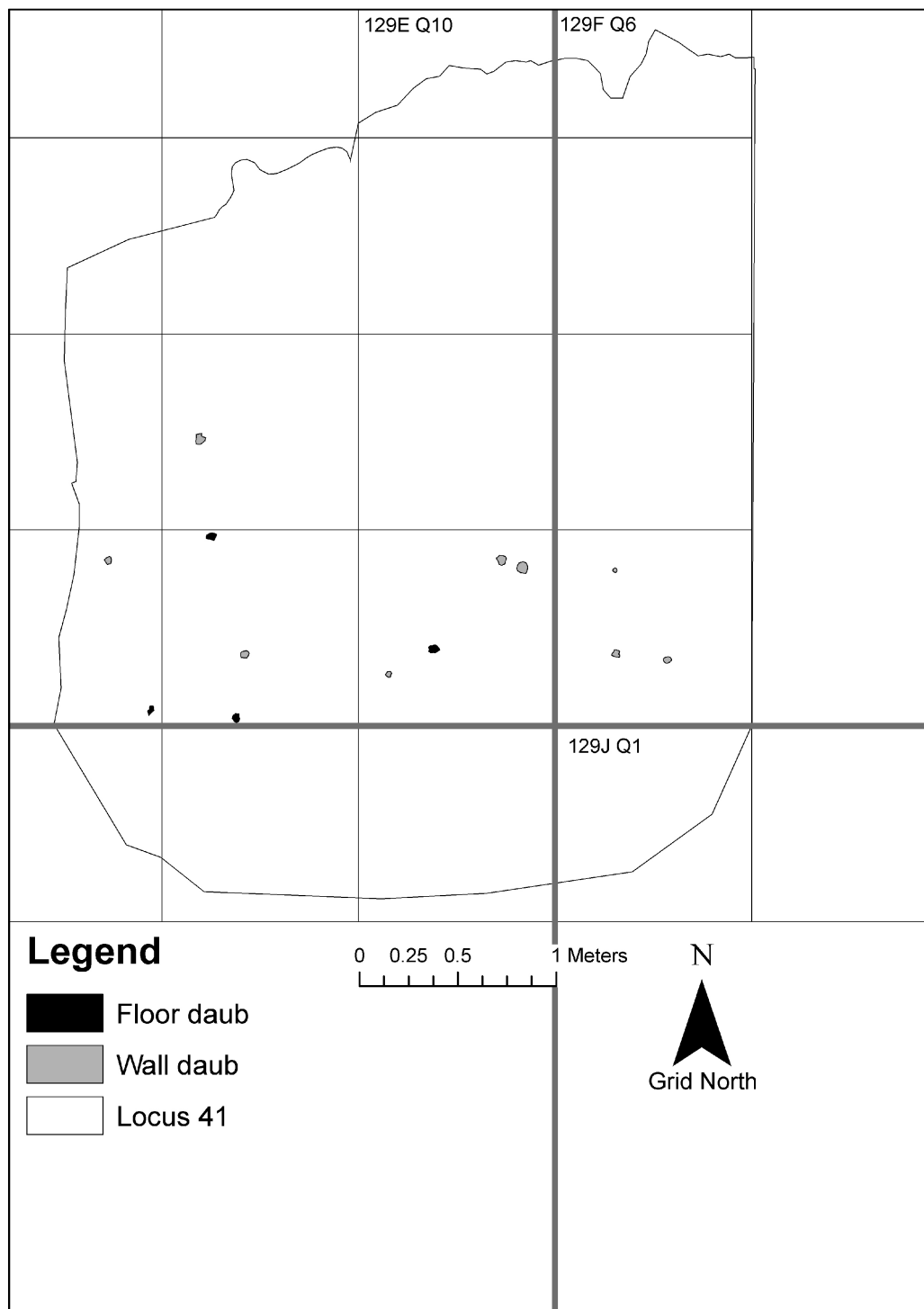


Figure 133: Digitized floor and wall daub in Locus 41

Digitized unidentified daub in Locus 41

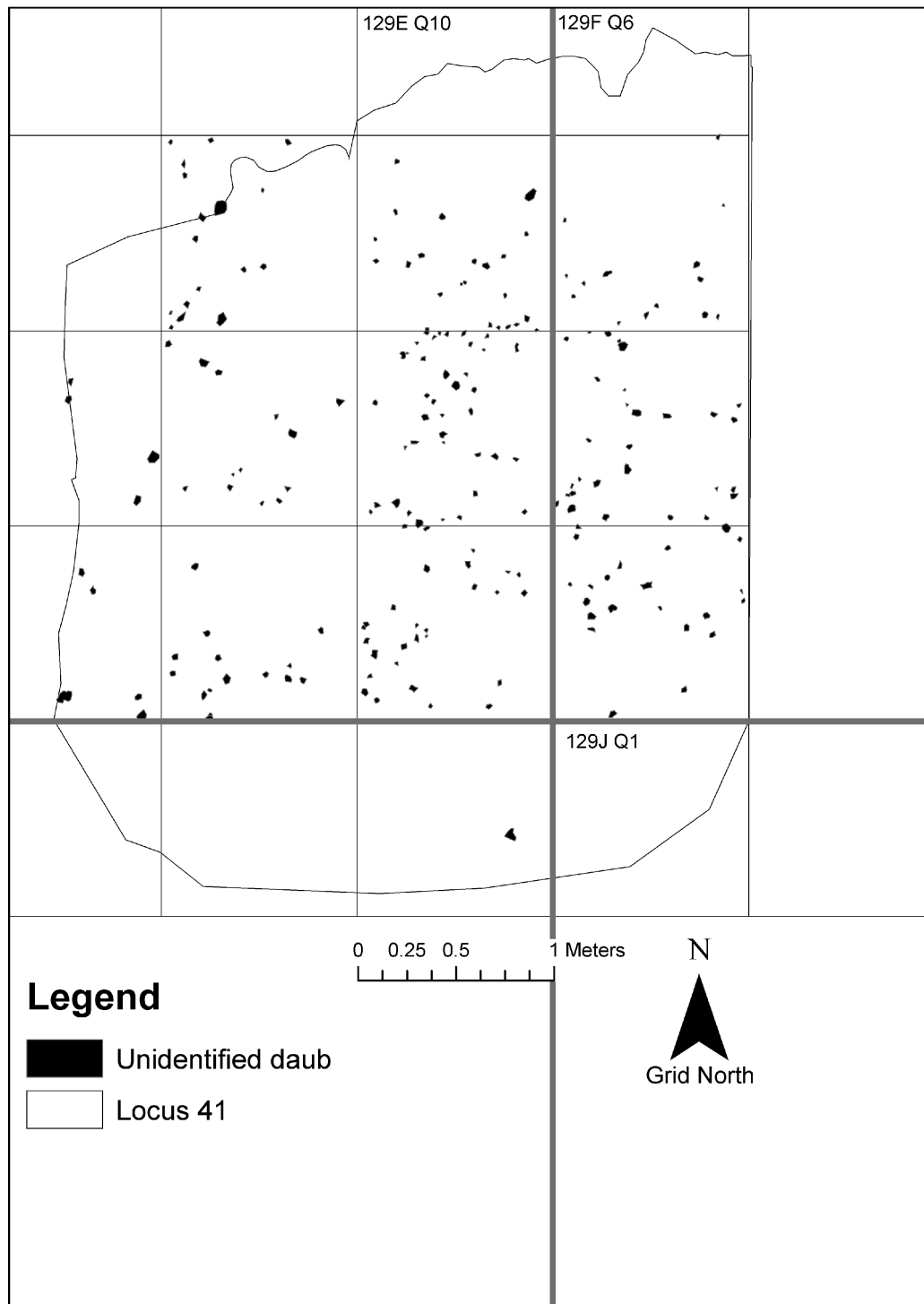


Figure 134: Digitized unidentified daub in Locus 41

Post holes, digitized floor and wall daub in Locus 41

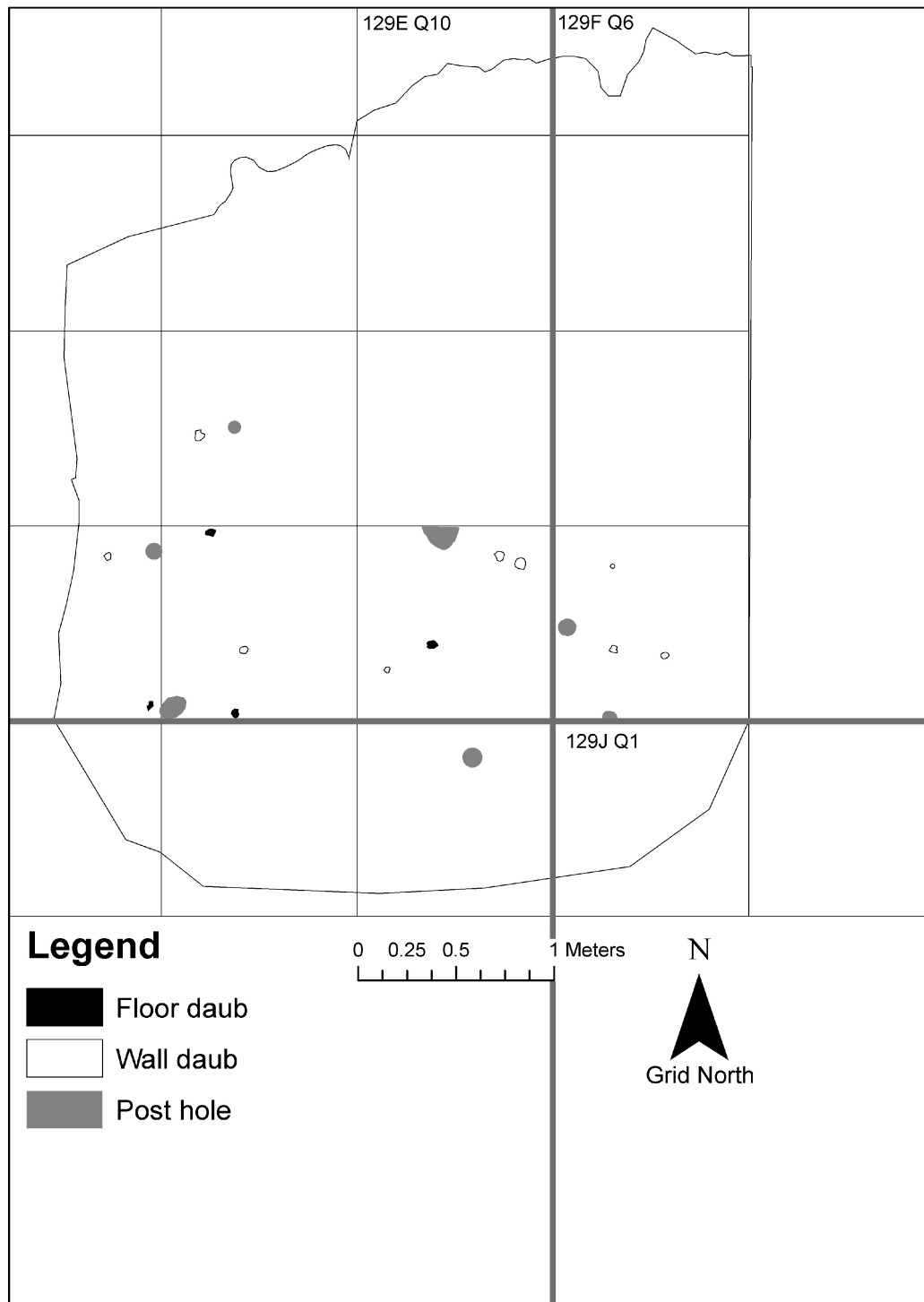


Figure 135: Post holes and digitized floor and wall daub in Locus 41

Post hole locations in and around Locus 51

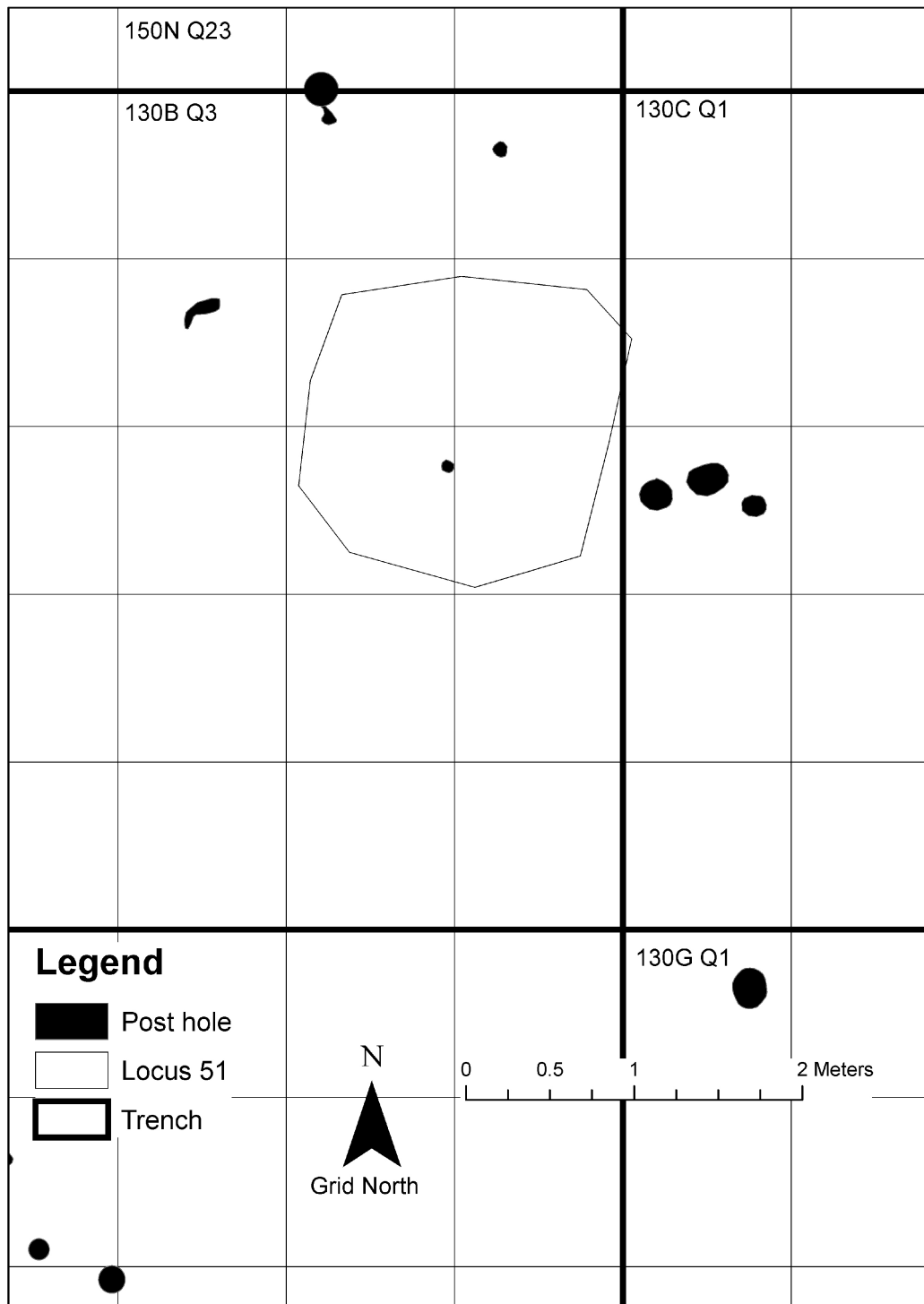


Figure 136: Post holes in and around Locus 51

All artefacts in Locus 23

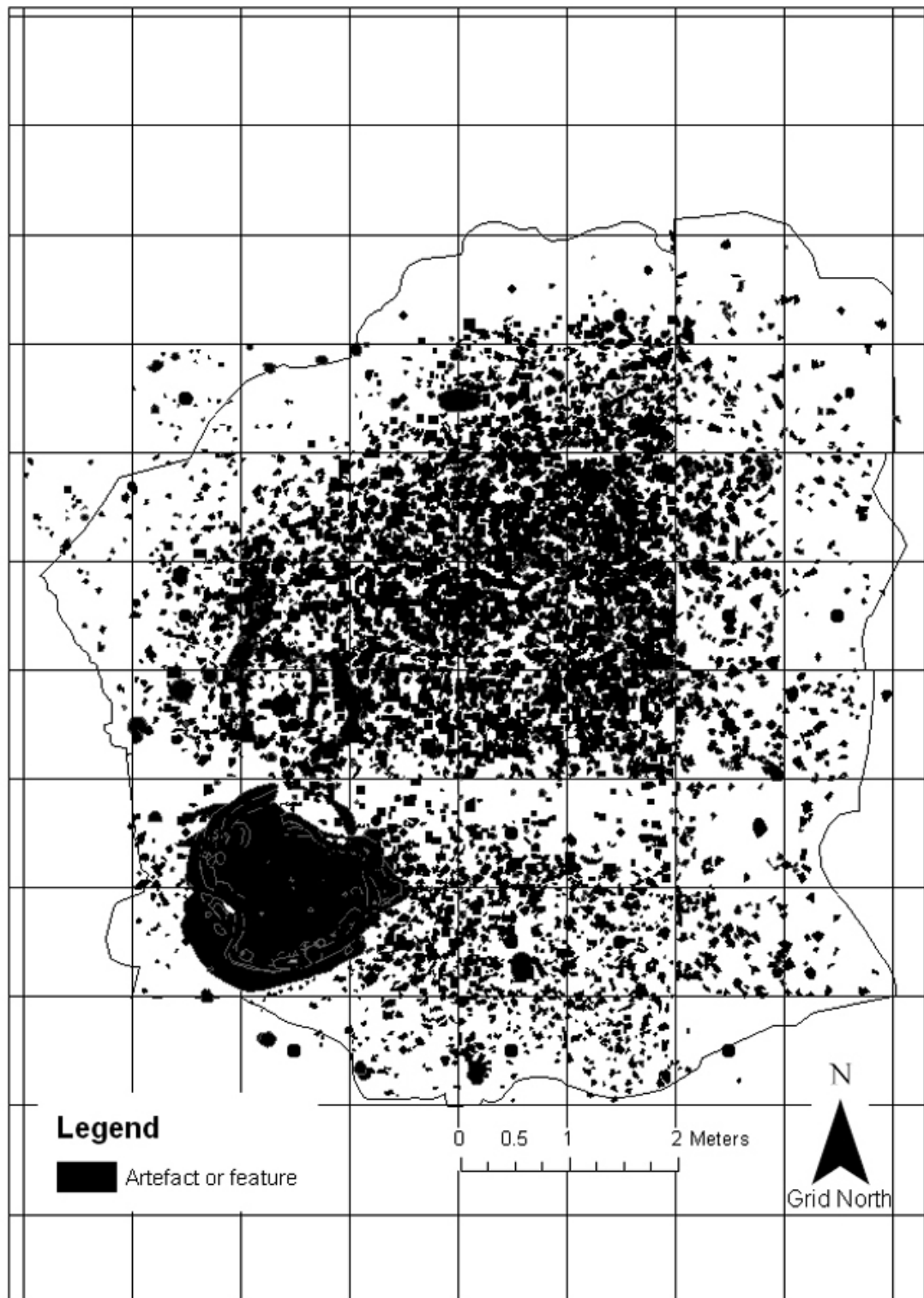


Figure 137: All artefacts and features in Locus 23

Location and size of Locus 50

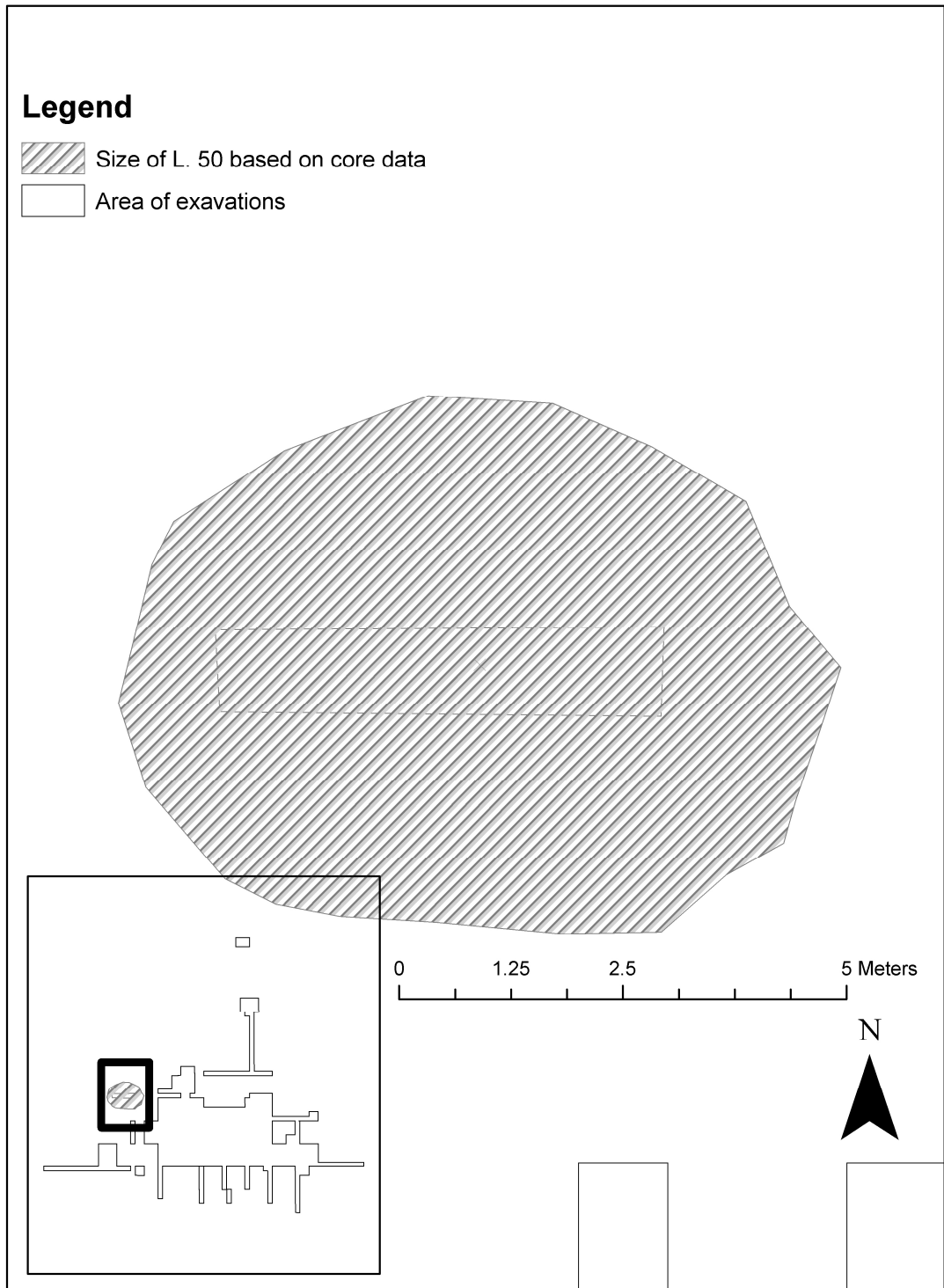


Figure 138: Location and size of Locus 50

Digitized loaf weights in Locus 2

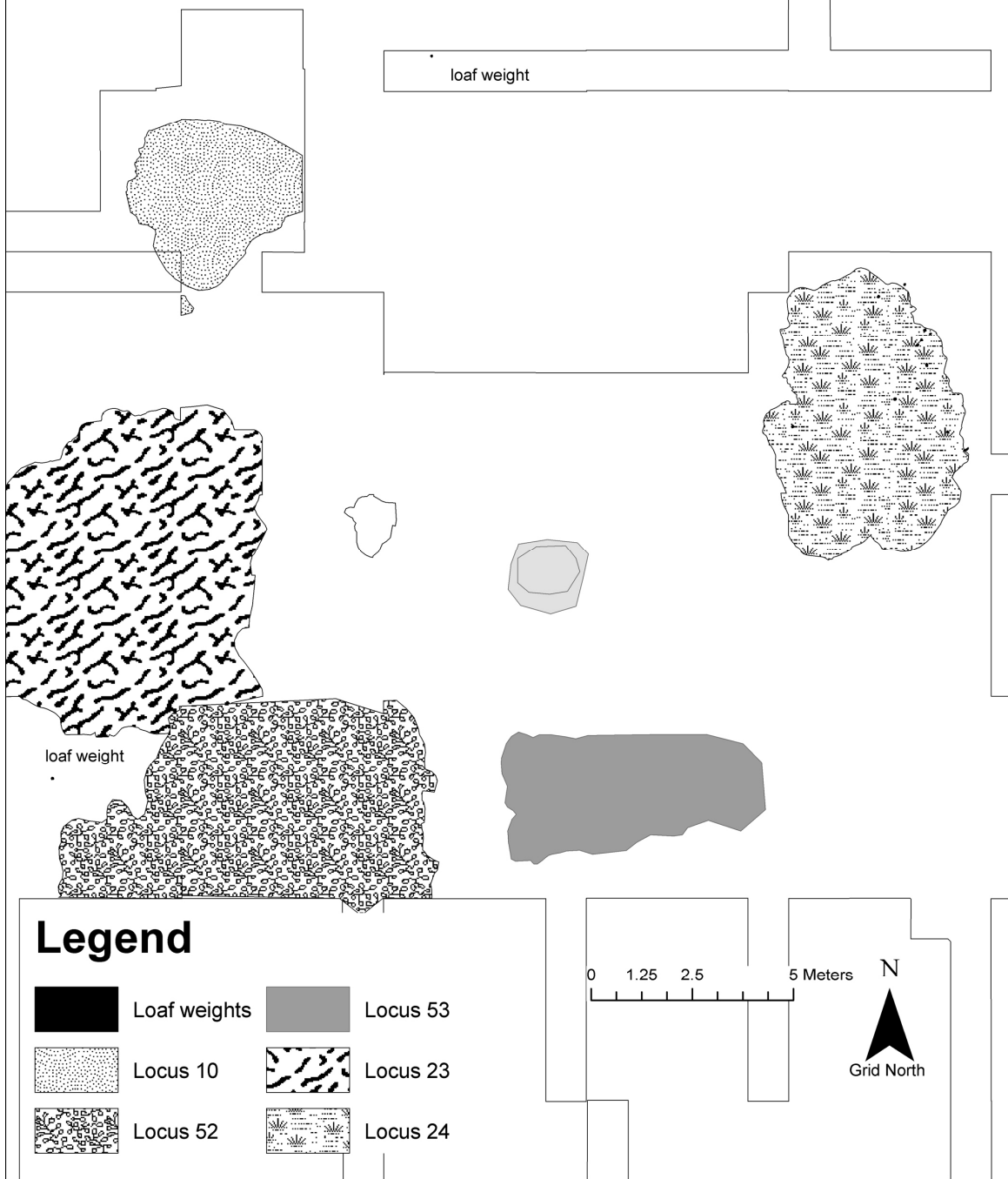


Figure 139: Digitized loaf weights in Locus 2

Centroid loaf weights in Locus 2

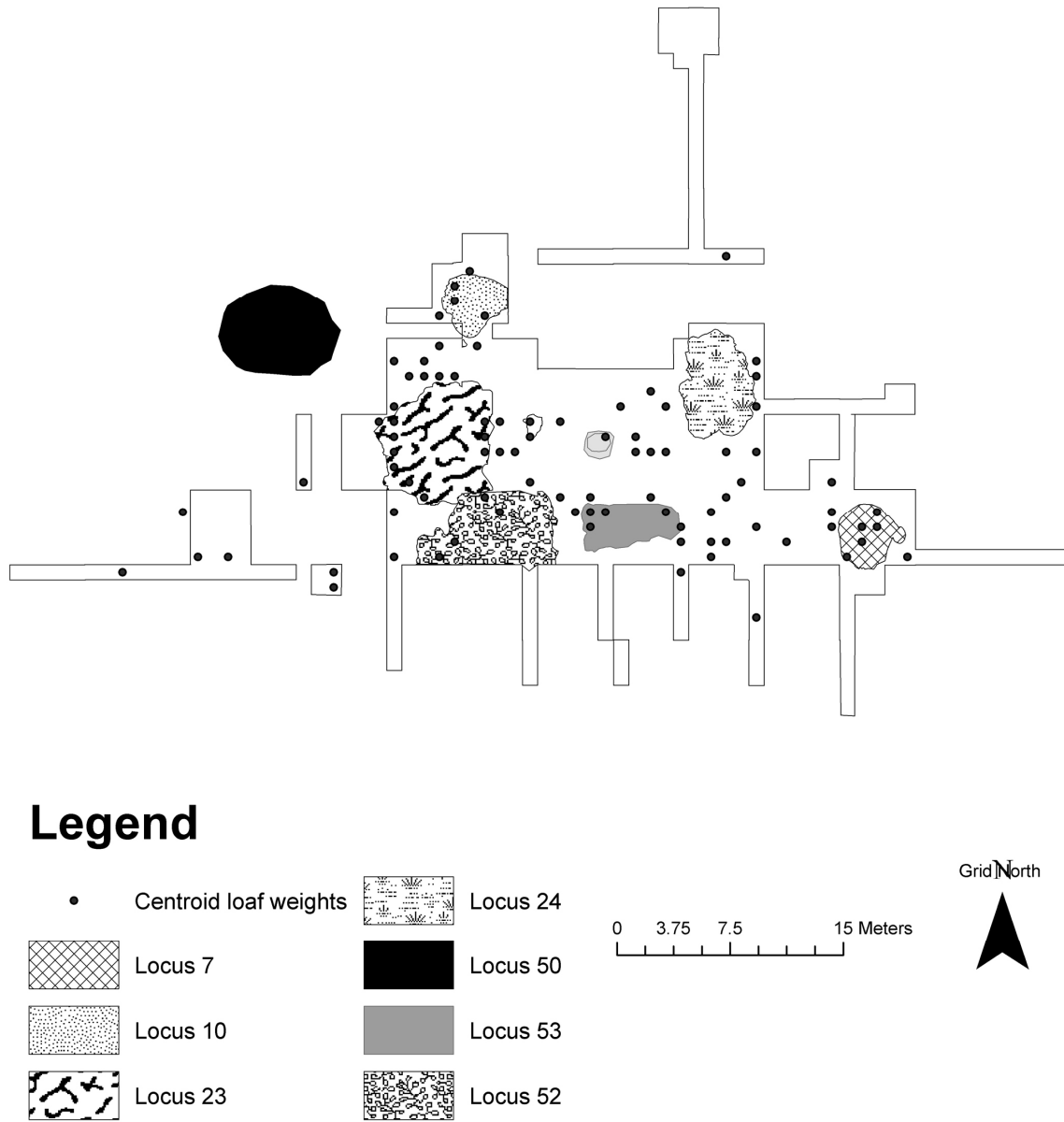


Figure 140: Centroid load weights in Locus 2

Activity Areas by Locus										
	Locus 2	Locus 7	Locus 10	Locus 23	Locus 24	Locus 41	Locus 50	Locus 51	Locus 52	Locus 53
Food Preparation		present		present	present					present
Consumption		present		present	present	present				
Secondary Butchery		present		present	present	present				
Hide processing				present	present					present
Lithic Production	present	present		present						
Ceramic Production				present						
Weaving				present	present			present		present
Interior Storage		present	present	present	present	present				
Exterior Storage	present	present		present				present		
Religion				present	present					present
Entrances	present	present	present	present	present					
Oven Present		present		present	present					
Hearth Present		present	possibly	present	present					

Table 2: Activity areas by locus

Pan- site statistical analysis results						
Item	Data type	Obs Mean Dist. / Exp Mean Dist.	Z score	P value	Critical Values	Pattern type
Lithics	Spreadsheet	0.32	-22.5	0.01	-2.58	clustered
	Digitized	0.63	-7.1	0.01	-2.58	clustered
Grinding stone	Spreadsheet	not possible				
	Digitized	0.57	-4	0.01	-2.58	clustered
All daub	Spreadsheet	0.06	-95.8	0.01	-2.58	clustered
	Digitized	0.19	-105.2	0.01	-2.58	clustered
Miscellaneous daub	Spreadsheet	not possible				
	Digitized	0.3	-81.7	0.01	-2.58	clustered
Oven daub	Spreadsheet	not possible				
	Digitized	0.48	-6.6	0.01	-2.58	clustered
Floor daub	Spreadsheet	not possible				
	Digitized	0.26	-18.2	0.01	-2.58	clustered
Wall daub	Spreadsheet	not possible				
	Digitized	0.29	-29.1	0.01	-2.58	clustered
Miscellaneous weight	Spreadsheet	not possible				
	Digitized	0.41	-16.1	0.01	-2.58	clustered
Loaf weight	Spreadsheet	not possible				
	Digitized	0.36	-16.8	0.01	-2.58	clustered
Loom weight	Spreadsheet	not possible				
	Digitized	0.64	-4.5	0.01	-2.58	clustered
Bola weight	Spreadsheet	not possible				
	Digitized	0.65	-2.5	0.05	-1.96	slightly clustered
Figurine	Spreadsheet	0.63	-3.6	0.01	-2.58	highly clustered
	Digitized	1.74	4	0.01	-2.58	dispersed
Faunal	Spreadsheet	0.03	-156.5	0.01	-2.58	clustered
	Digitized	0.33	-75.3	0.01	-2.58	clustered
Faunal tool	Spreadsheet	0.5	-10.2	0.01	-2.58	clustered
	Digitized	not possible				
Starčevo ceramic	Spreadsheet	0.05	-80.7	0.01	-2.58	clustered
	Digitized	0.33	-141.1	0.01	-2.58	clustered

Table 3: Pan-site statistical analysis results

Locus 7 statistical analysis results						
Item	Data type	Obs Mean Dist. / Exp Mean Dist.	Z score	P value	Critical Values	Pattern type
<u>All artefacts from all of Locus 7</u>						
Daub	Spreadsheet	0.04	-29.7	0.01	-2.58	clustered
	Digitized	0.58	-6.2	0.01	-2.58	clustered
<u>Sub-locus 7.1</u>						
Faunal tool	Spreadsheet	1.49	2.6	0.01	2.58	clustered
	Digitized	not possible				
Faunal remains	Spreadsheet	not possible				
	Digitized	0.98	-0.1	0	random	random
Miscellaneous daub	Spreadsheet	0.4	-23	0.01	-2.58	clustered
	Digitized	0.7	-2.8	0.01	-2.58	clustered
Starčevo ceramic	Spreadsheet	not possible				
	Digitized	0.82	-2.6	0.01	-2.58	clustered
<u>Sub-locus 7.2</u>						
Faunal tool	Spreadsheet	0.78	1.5	0	random	slightly clustered
	Digitized	not possible				
Faunal remains	Spreadsheet	not possible				
	Digitized	0.75	-3.3	0.01	-2.58	clustered
Daub	Spreadsheet	not possible				
	Digitized	0.8	-1.8	0.1	-1.65	slightly clustered
Starčevo ceramic	Spreadsheet	not possible				
	Digitized	0.8	-1.8	0.1	-1.65	clustered
<u>Sub-locus 7.3</u>						
Faunal tools	Spreadsheet	1.73	3.9	0.01	2.58	dispersed
	Digitized	not possible				
Faunal remains	Spreadsheet	not possible				
	Digitized	0.38	-10.3	0.01	2.58	clustered
Daub	Spreadsheet	not possible				
	Digitized	0.99	-0.1	0	random	random
Starčevo ceramic	Spreadsheet	not possible				
	Digitized	0.61	-12.4	0.1	-1.65	clustered
Grinding stone	Spreadsheet	not possible				
	Digitized	1.42	-1.6	0	random	slightly clustered

Table 4: Locus 7 statistical verifications

Locus 23 statistical analysis results						
Item	Data Type	Obs Mean Dist. / Exp Mean Dist.	Z score	P value	Critical Values	Pattern type
<u>Artefacts from all of Locus 23</u>						
Daub	Spreadsheet	0.01	-55.6	0.01	-2.58	highly clustered
	Digitized	0.67	-16.2	-0.01	-2.58	highly clustered
Faunal tool	Spreadsheet	0.89	-1.2	between .1 and 0	random	slightly dispersed
	Digitized	not possible				
Lithic tools	Spreadsheet	0.37	-10.7	0.01	-2.58	highly clustered
	Digitized	1.13	1	0	random	slightly clustered
Figurines	Spreadsheet	1.09	0.5	0	random	random
	Digitized	not possible				
Faunal remains	Digitized	0.77	-11.9	0.01	-2.58	clustered
	Spreadsheet	not possible				
Starčevo ceramic	Digitized	0.7	-37.4	0.01	-2.58	highly clustered
	Spreadsheet	0.7	-38.4	0.01	-2.58	highly clustered
Wall daub	Digitized	0.67	-4.7	0.01	-2.58	clustered
	Spreadsheet	not possible				
Loaf weight	Digitized	0.79	-3.5	0.01	-2358	highly clustered
	Spreadsheet	not possible				
Miscellaneous weight	Digitized	0.88	-2.4	0.05	-1.96	slightly clustered
	Spreadsheet	not possible				
<u>Sub-locus 23.1</u>						
Faunal tool	Spreadsheet	1.49	2.5	0.05	1.96	dispersed
	Digitized	not possible				
Faunal remains	Digitized	0.83	-2.3	0.05	-1.96	slightly clustered
	Spreadsheet	not possible				

Starčevo ceramic	Digitized	0.68	-15.7	0.01	-2.58	clustered
	Spreadsheet	0.32	-13.8	0.01	-2.58	clustered
Miscellaneous daub	Digitized	0.74	-5.2	0.01	-2358	clustered
	Spreadsheet	not possible				
Loaf weight	Digitized	1.23	1.2	0	random	random
	Spreadsheet	not possible				
Miscellaneous weight	Digitized	1.04	0.2	0	random	random
	Spreadsheet	not possible				
<u>Sub-locus 23.2</u>						
Faunal tool	Spreadsheet	1.42	2.5	0.01	2.58	dispersed
	Digitized	not possible				
Faunal remains	Digitized	0.84	-5.4	0.01	-2.58	clustered
	Spreadsheet	not possible				
Starčevo ceramic	Digitized	0.73	-24.2	0.01	-2.58	clustered
	Spreadsheet	not possible				
Carbon	Digitized	0.76	-3	0.1	-2.58	clustered
	Spreadsheet	not possible				
Floor daub	Digitized	1.16	1.2	0	random	slightly clustered
	Spreadsheet	not possible				
Miscellaneous daub	Digitized	0.66	-11.3	-0.01	-2.58	clustered
	Spreadsheet	not possible				
Wall daub	Digitized	1.13	1.1	0	random	slightly clustered
	Spreadsheet	not possible				
Loaf weight	Digitized	0.89	-1.1	0.05	random	slightly dispersed
	Spreadsheet	not possible				
Miscellaneous weight	Digitized	1.04	0.5	0	random	random
	Spreadsheet	not possible				
<u>Sub-locus 23.3</u>						
Faunal tool	Spreadsheet	1.2	1.6	0.1	1.65	random
	Digitized	not possible				
Faunal remains	Digitized	0.79	-7.7	0.01	-2.58	clustered
	Spreadsheet	not possible				
Starčevo ceramic	Digitized	0.83	-12.4	0.01	-2.58	clustered
	Spreadsheet	0.28	-16.4	0.01	-2.58	clustered
Carbon	Digitized	0.78	-2.4	0.05	-1.96	slightly clustered
	Spreadsheet	not possible				
Miscellaneous	Digitized	0.76	-7.6	0.01	-2.57	clustered

daub	Spreadsheet	not possible				
Oven daub	Digitized	1.19	1.4	0	random	slightly clustered
	Spreadsheet	not possible				
Wall daub	Digitized	0.68	-5.5	0	random	clustered
	Spreadsheet	not possible				
Loaf weight	Digitized	0.92	-1	0	random	random
	Spreadsheet	not possible				
Miscellaneous weight	Digitized	0.85	-2.3	0.05	-1.96	clustered
	Spreadsheet	not possible				

Table 5: Locus 23 statistical verifications

Appendix 1: Georeferencing images

I. Overview

Georeferencing is the process of scaling, rotating, translating and deskewing an image to match a particular size and position. The georeference process simply involves selecting a pixel on the raster image and specifying what coordinate it represents for your vector drawing. When you have picked at least 3 pixels and specified their vector coordinates, the georeferencing wizard calculates the correct mapping for every pixel in the image.

The extension tool Register and Transform is used to register scanned tif image files for use in ArcView™. This extension georeferences an image.

This tool can be used to define source and destination coordinates for registering one data set to another, perform transformations on shape files and create world files for CAD files and images.

This extension has several features. It can handle conformal and affine transformations. It immediately shows RMS errors, residuals and approximate scale and rotation as registration points are added. Registration points can be placed on more than one view. Pairs of registration points can be “tested” and temporarily removed to see the effects on RMS errors and residuals. Source coordinates are read in the coordinate system of the source (image pixels, CAD file units etc...), regardless of ground coordinates.

II. Interface

There are some features on the georeferencing wizard interface that need definition for clarity and understanding.

- Source X/Y – lets the user key in source coordinate values and acts as the column header for all source coordinates.
- Destination X/Y - lets the user key in destination coordinate values and also acts as the column header for all destination coordinates.
- RMS Errors - show the root mean squared errors in source and destination units for the current transformation. Each control point has an RMS Error value. RMS stands

for Root Mean Square, that refers to a distance. The RMS Error value is the distance of the georeferenced control point from the vector coordinate that you specified for it. The user wants to have control points with the lowest RMS Error values.

- Scale and Rotation - shows approximately how much the source will be scaled and rotated to fit the destination registration points.
- Test - flags a registration point pair as suspect and removes it from the calculations of RMS errors, residuals, scale and rotation without deleting. Hit this button again to restore the source and destination point.
- Delete - removes a single registration point pair from the list.
- Clear - removes all registration points from the list.
- Write World File - creates a world file based on the current registration points and transformation type. Conformal world files are written in ArcView CAD Reader™ format and contain two source/destination coordinate pairs. Affine world files are written in ARC/INFO Image Integrator format and contain the six transformation parameters. You will be allowed but warned if you attempt to write a CAD world file for an image or an image world file for a CAD file, both of which are invalid. The World File contains the georeference calculation results to enable another system (such as ArcGIS™) to reproduce the same coordinate transformation. By convention, the world file extension is comprised of the first and last letters of the raster file name extension, and the letter w. For example, for a TIFF file image.tif the world file name would be image.tfw.
- Source theme - specifies the feature, CAD, or image theme containing the source data.
- Transform Theme - runs the selected features in the source theme.

III. Instructions

The following is step-by-step instructions for how the scanned Foeni maps in tif raster format were georeferenced in order to digitize over top of them.

1. Make sure transform.avx is in the ESRI™ directory in the EXT 32 file.
2. Open Arcview™ and set a new view.
3. Go to File > Extensions and check Register and Transform.
4. Add new theme (s) and add all the tif files that need georeferencing.

5. Make sure that the tif file in the view and the file match in Source Theme. If you are registering a CAD file or image, select the theme before entering registration points.
6. Go to View > Register and Transform (this is what the extension adds).
7. In the Register and Transform dialogue that appears, click on Source point. It is the button with the red dot and S.
8. Pick source points. When you click on the pixel with a mouse it will be marked with a cross symbol. You can type in source points but the mouse method is easiest. The point and its ID number will appear in red.
9. Make sure the dialogue box is in fill mode. Under destination put in E (X) and N (Y) coordinates for each point. At least 3 source points are needed for an accurate georeference. 4 or more are better. The destination point and its ID number will appear in blue.
10. Tab over and add coordinates until each column is full. Note: nothing goes under source points. The source points are the points you selected with the mouse.
11. If the RMS value is too high than re-select the points and check the coordinates to make sure they are correct.
12. Click store control points. This creates a text file with all the points listed.
13. Click Write World File. The theme will disappear.
14. Go to view and add the now georeferenced theme back.
15. Save.

Appendix 2: The original map legend and legend for digitizing themes

I. Overview

This section serves to explain how the maps were interpreted for digitization. It lists the different the different short hand codes and legends that were used in drawing the original maps. The different theme names that are based on the artefact codes are also included.

II. Original maps

On most of the original hand drawn maps the following information was provided. Some maps that did not have all the information necessary for digitizing. In these cases field notes and were referred to.

- Elevation - as measured from the site datum or metres above sea level (MASL).
- Quad elevation, - usually represented as a center point within quad and measured in MASL.
- Artefact elevation - The specific elevation of a single artifact, artefact cluster, feature or other phenomenon.
- Unexcavated - represents an area that was never excavated
- Quads - represent the 1x1m individual units
- Profiles - represents an area where a profile was taken. This is often drawn separately.
- Block – part of the grid system used. A 20x20 metre area. For example, Block 150
- Trench - part of the grid system used. A 5x5 metre area. Trench A-P were used
- Quad - part of the grid system used. A single 1x1 metre area. Each trench was divided into quads 1-25.

When drawing the maps a shorthand code was used. The legend for the original maps is reproduced here. Sometimes different codes were used for the same type of object. All codes that were encountered are included here.

III. Field map legend

C - Ceramics

- C-S Early Neolithic (Starčevo) (variation: C-ST)
- C-L Late Neolithic (Vinča, Petresti)
- C-E Eneolithic (Baden, Tiszapolgar) (variation: C-EN)
- C-BA Bronze Age
- C-V Middle Bronze Age (Vatin)
- C-IA Early-Middle Iron Age (Halstatt)
- C-LT Late Iron Age (La Tene)
- C-R Roman
- C-4 3-5th century AD (Daco-Roman)
- C-SA Sarmatian
- C-M Medieval
- C-ML Late Medieval (15-18th century)
- C-T Turkish
- C-C Contemporary or modern (19-20th century) (variations: C-M)

D – Daub

- D-W Wall daub (must have evidence of wattling)
- D-F Floor daub (tends to be thick, relatively flat on one side, but poorly fired)
- D-O Oven daub (highly fired, with a sandy temper to withstand high temperature)
- D-D Disintegrated daub flecks
- D-DE Decorated daub (incisions, paint, etc.)
- D-WP Wall plaster (lime-based)

B - Bone

- B-? Unidentifiable bone
- B-T Bone tool

Note: Bones had different identification codes. For example, BT LB stands for Bos Taurus Long bone.

F - Figurine

F-A Anthropomorphic figurine

F-Z Zoomorphic figurine

A - Altar

L – Stone and lithics

L-C Chipped stone (silex) tool

L-G Ground stone tool

L-MS Mica schist

L-GS Grinding stone

W - Weight

W-F Fishing net weight

W-L Loom weight (for weaving)

W-H Bread/loaf

W-B Bola

W Miscellaneous Weight

M - Mollusc

M-S Snail shells (*Helix* sp.) univalve

M-C Clam shells (*Unio* sp.) bivalve

M-B Coring/boring (corkscrew) shaped shells

Holes

RH - Rodent hole

PH - Post hole

L - Locus

IV. Legend for digitized maps

When naming themes the first term is the artefact type (ceramic or daub), and the second, term is a descriptors (Starčevo, floor). Separate terms are separated by an underscore. All themes are polygons unless otherwise indicated. When selecting theme names it was desirable to be descriptive. This is why all ceramic themes are called ceramic_*****. This type of name tells the user what type of artefact it is and the period

in which it belongs. Further detailed information such as elevation, locus or level is to be found within the attributes tables (see Appendix 3).

A. Theme and layer legend for Foeni-Salaş

1. Artefacts

Bone . In the attribute table, for bone, the following fields must be present even if there is no data to be inserted: Z-coord, Taxon, Element and Comment.

Ceramic	Ceramic_Starcevo (Early Neolithic)
	Ceramic_EN (Eneolithic)
	Ceramic_EN_Tiszapolgar (Eneolithic)
	Ceramic_EN_Baden (Eneolithic)
	Ceramic_vatin (Middle Bronze Age)
	Ceramic_iron-age (Halstatt is Early Iron-Age)
	Ceramic_daco-roman (Late Roman)
	Ceramic_EN (if not specified as to which culture)
	Ceramic_EN_Baden (only if specified as Baden)
	Ceramic_EN_Tiszapolgar (only if specified as Tiszapolgar)
	Ceramic_Late-Medieval
	Ceramic_modern
	Ceramic_misc
Clay	Clay_unburned
	Clay_burned
Daub	Daub_floor
	Daub_wall
	Daub_misc
	Daub_ring
	Daub_disintegrated
Figurine	Figurine_zoomorphic
	Shell (point theme)
	Shell_snail
	Shell_mollusc
	Shell_corkscrew (point theme)

Shell_clam
 Altar Altar
 Lithic Lithic_grinding_stone
 Lithic_mica-schist
 Lithic_chipped_stone
 Calcium_carbonate
 Metal Metal_tool (variation: Tool_metal)
 WeightWeight_bolla
 Weight_loom
 Weight_loaf
 Weight_fishing_net
 Weight_miniature
 Weight_misc
 Wood Wood (unburned)
 Carbon (CC=carbon concentration. Burnt organic- wood) (point theme)
 Soil_sample (point theme size 16 pts)
 Core (point theme size 16 pts)

2. Features

Ash_patch
 Clay_floor_burned
 Clay_floor_unburned
 Compact_soil_area
 Cut#_boundary
 Dark_soil_area
 Foundation_ditch
 Grave_#
 Hard_packed_clay
 Hard_soil_area
 Loess (also called soil clump/hump)
 Plow_mark
 Posthole

Rodent_hole
Secondary_deposit_soil_area
Soil_burned
Soil_unburned
Zone_yellow_soil
Pit_edge
Pit
Locus_#
Grid
Bedding_trench
Test_trench
Unexcavated (filled with black)
Grid_trench
Grid_quad
Grid_overlay (using script)
Elevation_quad
Contour_line

As digitizing progressed there were some deviants from the standards laid out and described above. These have been included (see below) for purposes of clarity and recreation. In most cases they have been corrected and assimilated into the standard file names. In some cases further clarification with made making a notation under COMMENT in the layer's attribute table. The author would like to note here that it is best to go through the data briefly before digitizing or incorporation into a database to decide what methods, techniques, names, and attributes are most appropriate. These include but are not limited to shape type, spelling, file name, file location, attribute field names and type and object type. This can save much time and clarify the data. A brief list of these deviants follows.

Cliff

Test_pit (assimilated into test_trench)

Test_pit date (if known: ex. Test_pit1998) (assimilated into test_trench)

Elevation_point (point theme) (assimilated into artefact Z_coords if applicable)

Excavation_date (for example excavation_1988 to delineate multiple year excavations etc...). Not assimilated as is unnecessary for analysis.

posthole_reconstruction (assimilated into posthole in applicable cases)

Appendix 3: Attribute tables

I. Overview

When digitization of the Foeni-Salaş maps began there was no standard of what attributes should be included in an Artefacts attribute table or even if it should have one at all. This created great discrepancies in the field names of the attribute tables even within the same type of artefact. For example, Starčevo ceramics had the following field names: Z_COORD ZCOORD, ELEVATION, ELEV, DESCRIP, TYPE, COMMENT, PERIOD, X_COORD, Y_COORD, AREA, PERIMETER, CUT, LOCUS, SUB-LOCUS, HECTARES. There are four descriptions just for artefact elevation!

A need for standardization was recognized early on in the author's involvement with the project. In order to correct for these errors it was decided that it was more expedient and efficient to note all the different names that are present in every type of file. Some, such as AREA and PERIMETER, could be discarded outright, being products of experiments with various extensions.

All the field names were added into the empty attribute table in the merging blanks for each artefact. These merging blank files were created as a template in which all the shape files and the accompanying attributes would eventually merged into without dropping any data despite discrepancies. In this matter every field name used was part of the file in which every single shape file and data would be eventually placed. This would ensure that no information is dropped.

Data are lost if a field name for an artefact does not exist inside the file in which it is to be merged. When the merge was completed, the information was put into the proper field and extraneous fields deleted. For example, all the information from the various attribute fields that were used for elevations were put into one attribute field instead of spread across many. This produced a clear, cohesive, tightly organized data set that is much more easily understood and analyzed.

Appendix 4: Merging and appending in ArcGIS™

I. Overview

In ArcGIS™, the tool Append combines an unlimited number of coverages (in the case of this thesis these are shape files) into a single coverage (shape file). The Append tool is used when two or more adjacent layers are being combined into one large layer that contains all their features and associated attribute tables. Input features from all the input feature classes remain intact in the target feature class.

The Append function in ArcToolbox > Data Management Tools > General > Append does not append two or more like feature classes of different schemas by default. All input features must be of the same feature type (all area features, or all line, or all point). Append does not planarize the input features into a single output. Append does not perform edge matching. There will be no adjustment to the boundaries of features. Edge matching can be performed through ArcMap™ (or ArcINFO Workstation™) only.

It is often necessary to specify the schemas of all the feature classes involved, in the new output feature class. Any feature class (shape file, personal geodatabase, or SDE geodatabase) can be used.

II. Instructions

Instructions provided here are to append feature classes that have different schemas. These instructions will create a new shape file that will store the output of the appended shape files. By following the steps the user will match the schema of this shape file so that it matches the schemas of the input shape files.

1. Create a new shape file using the Create Feature Class tool. This tool allows you to specify that the template of the new feature class will be a combination of the shape files you are appending. It is a good idea to make sure the attribute table of the shape file has all the possible fields needed before proceeding to the next step.
2. Open Data Management Tools > General > Append. Specify the input shape files that you are appending into the new shape file. Navigate to the file locations.
3. Select the output feature. This is the shape file created in Step 1.
4. Select NOTEST. This specifies that input schemas are not to be transferred to the target feature class unless they match the schema of the target. If you select TEST

the field definitions of the feature classes must be the same and in the same order for all appended features.

5. A window will open that displays the progress of the append. When it is done, click Okay. The merge is completed.

Appendix 5: Starting an ArcView™ Project

I. Overview

In ArcView 3.X™, a project file lets the user create and store documents for GIS work. All activity in ArcView 3.x™ takes place within project files that use five types of documents to organize information: views, tables, charts, layouts, and Avenue scripts.

II. Interface

There are some features and specific functions that are mentioned in the step-by-step instructions. They are briefly defined here to make the instructions clear. For a more detailed view of how these features can be utilized in ArcView™ see the ArcView™ and ArcGIS™ help topics.

- **Map Units-** Map units are the units that the data are being projected with. ArcView™ uses the map units setting to determine the correct scale of your view. If your map units are incorrect so will the scale.
- **Distance Units-** Distance units are the units used by ArcView™ to display or indicate several things including: the results of measurements you make on a view with the Measure tool; the dimensions of shapes you draw on a view with the Draw tool; the dimensions of the selection box you define when selecting features in a particular area on a view with the Select Feature tool; the distance tolerance specified in the Select By Theme dialog box for selecting one set of features from another.
- **View Properties-** This lets you review and change the properties of the view you are working on. View Properties include the view's name, the units used by the spatial data in the view, the units in which you want distances and areas to be reported, the map projection used by the view.
- **Extensions-** Extensions extend ArcView™ and ArcGIS™ allowing you to enhance your working environment with additional objects, scripts and customization independent of the current project. You can use extensions provided by ESRI and you can also create your own.

III. Instructions

Starting a project in ArcView™ is relatively simple.

1. Set the working directory. Click File and navigate to the file where you want all the data to be saved.
2. Under View/Properties make sure the Map Units and Distance Units are filled in. Map Units refers to what the distances are on the map. Distance Units are the same. Therefore, both distance units and map units usually will have the same Id.
3. Under File > Extensions make sure that digitizer, port project, register and transform and any necessary extensions are checked.
4. Under View, make sure that “digitize as mouse” is visible. This is the option to use if the digitizing is done on a tif. If a scanning board is being used change it to “digitize as puck”. Proceed to step 6. If digitizing as a puck with a digitizing board go to step 5.
5. Under View, go to “digitizer setup”. In digitizer set up, make sure puck is highlighted. Enter in previous corner coordinates. Digitize them in with the puck if calculator is greater than previous number, there is a problem and re-enter in the coordinates with the puck. The number has to be close or less than the calculator.
6. View the New theme.
7. If using puck.... Press O to start digitizing. Press 3 to stop. If using the mouse, click at each point to create a vertice in the desired shape. Double click to close the shape. Make sure there are no ‘bow ties’ created by overlapping vertices.
8. When finished, stop editing under Theme
9. Save in correct directory, change default name to xxx.apr.

IV. Troubleshooting and tips

Keep all themes/ layers in one master project because they can always be added to other projects. Create New View from main menu and then choose Add theme, under Theme to make specific maps. An alternative is to make a folder for each project and copy/paste the specific files you want to use and manipulate. This is the best option if the files are going to be changed in anyway.

If trying to edit a table and the “Start editing” option is not available it is usually because the table is in a delineated format. (The other reason may be because the theme is a read only file, check before trying this!). The delineated format is not editable. It is not precisely known what causes this. The user forums at ESRI™ are silent on the subject. The author suspects that the files have been saved as READONLY file that has the property that it cannot be changed into a changeable format. Another possibility is that a source or destination name or file is incorrect or absent. In order to edit the table, it must be put into a format that can be edited. The reader is encouraged to find a simpler technique of fixing this problem. It is possible that there are better methods. What follows are instructions to begin editing delineated tables in ArcView™. This is the solution used during the Foeni-Salaş project when some files were discovered to have this problem.

A. Editing delineated tables

1. Open up the problem table.
2. Under file, go to export and select DBASE. Make sure it is saving the new file in the same folder all the other project information is. Make sure the name is descriptive of the original file. For example, ceramicStarčevo can become ceramicStarčevorevz. Remember it all has to be lowercase.
3. Go to the project window and click on ADD TABLE.
4. Select the appropriate table (it will have a .dbf ending). The table will appear in the project manager.
5. Click on it and add it.
6. Now you can edit that table and add or delete whatever is needed. Once you are finished editing it, it needs to be added as a theme to the project.
7. To add the edited table to the project, go to Theme, click on Add Event Theme and select the appropriate theme and it will appear in the legend to the left of your view.

If everything was done correctly, when the theme is turned on it will appear as a point theme with the points in the centre of the polygons. The table can still be edited and if more edits are done it can be done the usual way by clicking on the start editing option instead of exporting and importing.

Appendix 6: Converting table data to shape data.

I. Overview

It is often useful to have tabature data displayed as a point form. This is possible if within the tabature data X and Y coordinates are present. Tabature data exists in many forms; word documents, Excel™ and digital databases to name a few. To get shape files from Microsoft Excel™ it must be converted to a dbase file. The easiest way to do this is in Microsoft Access™. (Note Microsoft Access™ is able to be linked to ArcCatalogue™ for viewing only). In order to display the provenience data along with other data fields in a table the following steps should prove useful.

II. Instructions

What follows is the process the author used to obtain shape data from the Foeni database in Microsoft Access™ and Excel™ files.

1. Import the excel file into Microsoft Access™. There is a wizard that does this.
2. Export the excel table as a database file (.dbf). A database file is called a DBASE file. It shows up as DBASE I, II, I, or IV (at time of writing).
3. In ArcVIEW™ start a new project and a new view.
4. Go to tables under the project window. ADD a table.
5. Navigate to the table you want to add. The table should display.
6. Go to VIEW.
7. Navigate to THEME and select NEW EVENT THEME.
8. Navigate to the database and click on it. A wizard will open up and you have to select which fields have your X and Y data. Finish and your data should display.
9. In order to edit the data you have to convert to shape file. This is done under THEME. Click Convert to Shape file. Your Excel™ or Access™ document is now completely converted to a manipulatable shape file with all the fields intact in its attribute table.

Appendix 7: Nearest-Neighbor instructions

I. Overview

The Nearest Neighbor [sic] tool is within the ArcGIS™ suite of statistical tools for analyzing patterns. It is used to test for randomness. Note that although this tool will work with polygon or line data, it is really only appropriate for event, incident, or other fixed-point feature data. For line and polygon features, feature centroids are used in the computations.

II. Instructions

To conduct a Nearest Neighbor test in ArcGIS™, the following steps must be followed.

1. Open ArcMAP™
2. Add the data you want to run a Nearest Neighbor test on (this is not necessary but it helps to have your layer displayed while you are using it).
3. Click the red tool box icon to open ArcToolbox.
4. Scroll to the tool box called Spatial Statistics Tools. Open it.
5. Click on the red tool box called Analyzing Patterns.
6. Average Nearest Neighbor should be the first tool listed. Double-click on it.
7. A dialogue will open. Under Input Feature Class click on the downward arrow to the layer you want to run the analysis on. If the layer is not listed you can navigate to it by clicking on the folder to the right of the dialogue.
8. Set Distance Method. This specifies how distance will be calculated.
9. Check Display Output Graphically (optional). Check this to bring up an easy to read output of your calculation and a graphic of how dispersed or clustered it is.
10. Set area (optional). Most of the time this is left blank. The default area value is the feature class extent.
11. Click OK and the function will execute.
12. The results will display. The output of the tool within ArcGIS™ gives the following: Observed Mean Distance / Expected Mean Distance, Z score, Significance level and Critical Values. It is possible to cut and paste results from the dialogue into a document (this is not possible with the graphic output).
13. If there are no results displayed click on the button that says Details.

14. Close

For further details and help about using this tool and others in ArcGIS™ see ArcGIS™ help or see the online help and customer support at www.esri.com.

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