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**IRON AGE AND ROMAN LANDSCAPES IN THE EAST
MIDLANDS: A CASE STUDY IN INTEGRATED SURVEY**

Jeremy Taylor

(Two volumes)

Volume 1

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Thesis submitted for the degree of Doctor of Philosophy

Department of Archaeology

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1996

10 MAR 1997

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Abstract

Iron Age and Roman Landscapes in the East Midlands: A Case Study in Integrated Survey

Jeremy Taylor

Primarily a theoretical and methodological study, this thesis sets out to show the reasons for, and advantages of, landscape-based approaches to the Iron Age and Roman period. An initial discussion of the theoretical background to defining archaeological approaches to landscapes is followed by methodological essays on four common survey techniques. The insights gained from the theoretical and methodological discussions are then assessed within the context of a case study. Focused on the county of Northamptonshire, the case study first concentrates on detailed studies of three areas in the Nene and Welland Valleys. By linking excavation with survey data a contextual approach is used to analyse the development of landscapes in the region from approximately the eighth century BC to AD350. In particular the study highlights the changing character of focal places and the use of architecture to illustrate the organisation of social space across the landscape from the fourth century BC to fourth century AD. These detailed studies are then compared with further excavated and field-walked data from the county in order to discuss the wider regional significance of the perceived variations through time and space. Placing special emphasis on the interpretation of field-walked data as material correlates of some of the focal places of the past, this section looks at the possibility of regional trends in landscape forms through time. These studies are then concluded with a discussion of some themes in spatial social interaction during the Iron Age and Roman periods that may help to explain some of the wider changes described.

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PART I THEORY AND PRACTICE

CHAPTER 1: INTRODUCTION

This thesis was intended to be primarily a theoretical and methodological essay on a relatively poorly studied area within later iron age and Romano-British archaeology; namely the study of its landscapes. It is in some ways sympathetic to the recent work of Chris Tilley (1994) on prehistoric landscapes (though mostly produced before its publication) in that it is partly a theoretical perspective on the significance of spaces, places and landscapes in the past and partly an empirical exercise that attempts to provide some insights into understanding the relationship between people and features of their landscape. Initially, a series of theoretical and methodological discussions identify the need for, and purpose of, archaeological approaches to landscapes of the past, and at defining some key concepts within them (section 1.2). The subsequent section (1.3) outlines some possible approaches to such a study through the adaptation of a time-space framework similar to that adopted for the study of earlier prehistoric monumental landscapes (eg. Barrett *et al.* 1991; Bradley 1993; Gingell 1992). This is then followed in chapters 2-4 by a series of reviews of certain commonly available techniques of archaeological survey aimed at suggesting how they can be used within the framework described in chapter 1. Special emphasis is placed on the understudied problems of inference from such survey data and certain areas for further study are identified.

The second half of the thesis is a case study of the iron age and Roman landscapes of the Nene and lower Welland valleys (chapters 5-8). This study concentrates on three areas within the region, partly using available information from excavation, but also integrating survey data in order to study aspects of the wider spatial organisation of the landscape. Particular emphasis is placed on the way settlements, pathways and boundaries are used to structure social space from the fourth century BC to the fourth century AD (chapter 6). The contrasting landscapes of these areas are then compared in order to assess the evidence for marked differences across the wider region (chapter 7). These trends are then compared with other sources of evidence in order to sketch some possible social explanations for change in the region during the iron age and Roman periods (chapter 8).

1.1 BACKGROUND

During the varied developments of archaeology in Britain over the last hundred years one discernible trend has been the drift towards a discipline focussing on the social and spatial contexts of human action. The rise of a 'social archaeology' (eg. Renfrew 1973; Bradley 1984; Barrett & Kinnes 1988) in which the wider context of archaeological material is studied, has led to burgeoning interest in approaches to the settings, environments or landscapes in which past behaviour was situated. Four themes in particular can be considered to have dominated much of this work since the 1970s.

Environmental approaches assessing the 'natural' background and resources available to groups or more commonly sites. Sites in this context are seen as locations of human activity and are plotted against their contemporary environmental conditions. The relationship between the two is, as Barrett has commented, 'analysed as if the site were the centre from which the resources in its immediate vicinity were exploited' (1993, 140). Conventionally this relationship is illustrated through the abstract modelling of site catchment analyses. Much of this work stems from the economic prehistory of Higgs (1972) and Vita-Finzi (1978) and in the study of Roman Britain can be seen in the works of Branigan (1977; 1988) and Miles (1988) in particular.

A second linked strand has been what Julian Thomas, in somewhat political vein, describes as a 'behaviouralist tendency' (1993, 19). As with many so-called schools or groups within the discipline, it is very difficult to present workers in this field as having a distinct identity, but Thomas' description is a useful label for a diverse range of studies that have attempted to shift the focus away from the site to a concern for off-site archaeology. In particular they have concentrated on responding to some of the lessons about the way groups act across wide areas of the land not just within the bounds of the 'site' (eg. Foley 1981a, 1981b; Hodder 1978; Schofield 1987; Gaffney & Tingle 1989).

Regional studies based upon fieldwork dedicated to the surveying and mapping of surviving features such as field boundaries also have a long history. In Britain this has developed as a highly empirical school filling in details of rural life not available from other sources (eg. Aston & Rowley 1974; Hall 1982; Foard 1981; Aston 1985). Much of this work builds on the tradition of landscape history best illustrated by the likes of Hoskins (1955),

Godwin (1975) and Williamson (Williamson & Bellamy 1987). Frequently this school has seemed to lack a theoretical basis for the collection of its data but recently 'the appearance of greater conceptual sophistication in this tradition has led to impressive results' (Thomas 1993, 20). Good examples of the latter include Williamson's accounts of Roman and Medieval settlement in East Anglia (1987; 1988) and Fleming's analyses of field systems on Dartmoor (1988).

Increasingly, these lines of enquiry have merged in recent landscape studies such that more and more sophisticated surface surveys using non-site and/or off-site strategies are used to map settlements, fields, enclosures and agricultural facilities. These are then used to test abstract models constructed from a detailed appreciation of the resources available in an area (eg. Schofield 1987) or, as so often happens, be brought together to provide a more impressionistic, descriptive reconstruction, sometimes based on the behavioural approach of Foley (eg. Gaffney & Tingle 1989). Much of the fieldwork and methodology is excellent and has considerably improved the sophistication of the subject but has been criticised as having one major drawback; its very objectivity (Bradley 1991). This is because attempts to objectify landscapes have invariably tended to concentrate on the effects of environment through climate, relief, soils and the availability of resources. These are usually related to external factors such as demography (Bintliff 1985), technology (Hayden 1979), transhumance and territoriality (Schofield 1987), and control over exchange or forms of social organisation that facilitate resource exploitation (Zvelebil *et al.* 1987). In this way the location of activity is explained as a result of 'rational' decision making involving some or all of these factors (Tilley 1994, 1-2).

During the course of the later 1980s and early 1990s, however, a series of works assessing earlier prehistoric monumental landscapes challenged this view on the basis that they are a form of contemporary mythmaking, imposing a modernist logic on the past (Tilley 1994). How people may have perceived and acted in regard to the landscapes in which they dwelt is largely seen as irrelevant. This is despite a number of examples in geography (Gregory 1978; Gregory & Urry 1985; Soja 1989), anthropology (Rappaport 1972; Morphy 1993), and archaeology (Hodder 1982; 1986; 1987; Miller & Tilley 1984; Shanks & Tilley 1987; Bender 1992; 1993) that challenge the idea of space as an abstract dimension. The latter allowing activity, event and space to be separated from each other. At a practical and interpretive level, the results of the post processual critique are best illustrated by a series of recent studies of

monumental landscapes (Barrett *et al.* 1991; Gingell 1992; Thomas 1991; 1993) and monumentality (Barrett 1993; Bradley 1993) in earlier prehistory, mostly centred on lowland Britain.

Through these arguments, the orthodoxy of disengaged interpretation that had tended to characterise many traditional approaches to landscape archaeology has been challenged on the grounds that methods cannot be so easily divided from context when dealing with the environments in which we have dwelt and still dwell. Landscapes, it is argued, are created therefore by people, through their experiences, attitudes and engagements with the world around them. As such, landscapes are a social construct, both intentionally and unintentionally.

It is partly from this perspective that this thesis takes its inspiration and through which it attempts to study past landscapes and regions. It is not intended as an attack on the 'traditional' approaches stemming from positivist and functionalist ideals, but rather attempts to provide a different direction for study that may complement existing interpretations. It is not designed to polarise opinion between economic rationality and social or cultural symbolism but highlight the possibility that both are a key part of human rationale. I do not believe that people deliberately inhabited inhospitable locations because of a 'slavish accommodation to a symbolic scheme' (Tilley 1994, 2) but do feel that the places they occupied were imbued with particular sets of meanings that are too important to be ignored and are partially, at least, interpretable from archaeological evidence.

In the discussion that follows I hope to identify some rarely considered areas of the discipline in the context of iron age and Roman archaeology in Britain. Section 1.2 focuses on some of the concepts commonly used but little regarded within the subject, and defines differences in their use and meaning in order to elucidate the divergence in interests of the two approaches. The following section (1.3) then outlines some useful approaches to empirical analysis of the questions arising from section 1.2 through a consideration of different forms of space.

1.2 PLACE, SPACE, LANDSCAPE, AND REGION

Region

The rapid development of theory and practice in field survey in the 1970s, epitomised by *Sampling in Contemporary British Archaeology* (Cherry *et al.* 1978) and Foley's behavioural or off site archaeology (Foley 1981a; 1981b) had its roots in New Archaeology (eg. Binford 1964). Ever since the 1960s, surveys, particularly those in America, have been dominated by concerns over the academic purpose of survey and its methodology, and in particular with sampling strategies (eg. Plog *et al.* 1978). The adoption by American archaeologists of the geographical definition of region, soon followed in Britain, led to a string of papers during the 1980s on the value of regional sampling (eg. Mills 1985; Shennan 1985).

The acceptance of regional sampling theory was, as Gaffney and Tingle (1989, 5) recognised, a significant step forward for survey but not without its negative effects. Most important in these has been the overwhelming concentration of surveys aimed at the study of regional settlement patterns to the detriment of theory and methodology focussed on other scales of action such as more intensive surveys (Gaffney, Gaffney & Tingle 1985). The persistence of attempts to solve problems through regional sampling surveys that has emerged through the course of the 1980s has largely ignored the fact that many important aspects of human action operated at smaller, more complex scales. Although most archaeologists now understand that surveys aimed at such levels could have an important contribution to make, few recent works appear to try to address the problem (exceptions include Gaffney & Tingle 1989; Tingle 1991; Parry forthcoming).

The concentration of survey-based archaeology on regional sampling strategies has raised two problems of significance to this study, one at a conceptual level and (partly in consequence) a second, at a practical one. Conceptually, surprisingly little discussion has surrounded the term region and its definition in the context of archaeological surveys in Britain. Regions, micro or macro, have long been considered the ambit of survey archaeologists and yet most discussions have concentrated on sampling problems within regions chosen at the outset for a wide variety of reasons. Most commonly the region is taken from a geographical definition

based on soils, topography, modern political boundaries or even personal preference (cf. Cherry *et al.* 1978; Keller 1983).

In geography a region has long been defined as a part of the earth that is distinctive from other areas and which extends as far as that distinction extends (Hartshorne 1969, 130). It can be characterised by internal similarities of landforms, cultural history, settlement forms, climate or all of these (Relph 1985, 21). In short, the region is a particular way of classifying information. Many archaeological surveys, however, appear to have satisfied themselves with simply describing the boundaries of a region imposed for the purposes of the survey without ever addressing the question of what this 'region' is intended to represent in human terms. In human experience it can be argued that it is possible to identify oneself with a region and that this implies something about attitudes, speech or cultural practice. Identifying with a region in this sense can of course be rather superficial and usually involves simplification of localised differences of person and place. It does, however, focus attention on the definition of what we might term human, social or cultural regions rather than those based on physical or modern political geography.

It is therefore possible to recognise at least three different forms of region that need to be considered in survey-based archaeology. There are the modern geographical regions which are often chosen as the background area into which particular surveys are placed. There are the regions of a survey; the geometrically delimited areas of investigation usually designed to include a cross-section of the different characteristics of a geographical region. Then there are the so-called archaeological regions, zones defined by the presence of particular styles of material culture or settlement type which appear to represent distinctive aspects of past societies' identities. These may or may not correspond with the two previous regions but are critically the ones which archaeologists should aspire to study in order to comprehend the complex developments of the period covered here. The extent and precise social implications of these archaeological regions are a matter for investigation alongside detailed evaluations of the experienced landscapes of the past.

At a practical level the emphasis on regional survey has led to a gap between this and the concerns of archaeologists working predominantly from excavated evidence, concentrating on the almost ubiquitous and equally seldom defined 'site'. Some have adapted regional survey

strategies to investigate particular questions at a micro-regional scale (eg. Gaffney & Tingle 1989; Tingle 1991) but invariably have imported the conceptual baggage of regional survey in the process.

Probably the best example of this, the Maddie Farm Project, could have represented a landmark for the subject by recognising the need for a flexible approach to the scale and intensity of survey. Gaffney and Tingle recognised that the four main aims of the project could only be assessed by working at a range of levels of detail (1989, 6-7). Considering this, it is unfortunate that the theoretical and methodological implications of their survey have received so little attention since. At a theoretical and inferential level, Gaffney and Tingle largely contented themselves with adapting Foley's behavioural approach to a Romano-British context by defining the region and micro-region on the basis of physical geography, and site-catchment and other geometric spatial analyses respectively (Gaffney & Gaffney 1988). In this way their work continued the focus on approaches aimed at investigating resource exploitation patterns, artificially treating the region around Maddie Farm as a geometric variable devoid of any social basis. This is an approach commonly seen in both early prehistoric (eg. Schofield 1987) and Roman (eg. Williamson 1984) studies elsewhere.

Landscape

Landscapes, if they have been discussed at all in the archaeological literature of the period, have tended to be considered as a technical term for the visual environment. In this context landscapes are studied objectively with a 'measured and detached gaze' (Relph 1985, 23). Thus the subject has been reduced, as Ingold recognised, to the study of land rather than landscape (1986, 153), geometric space rather than geographical space (Relph 1985, 25).

Ingold's terminology very usefully highlights the conceptual confusion that surrounds many of the studies of rural settlement and agriculture in Roman Britain. Most of them (eg. Branigan 1977) treat the surface of the earth as land, in other words an abstract 'denominator of the natural world' (Ingold 1986, 154). Archaeological features did not participate in the day to day action of individuals but were simply the structures within a 'zone of exploitation' (Cunliffe 1991, 24). Thus, most traditional landscape archaeology sees landscapes more as objects for interpretation than as contexts of experience and action. As Ferrell (1992, 162) has

commented, 'So-called landscape archaeology is too often concerned with only the visible traces of human manipulation of the environment rather than with the experience of that environment as a whole.'

Geographical, historical and archaeological landscapes are as Dardel noted not 'made to be looked upon' but rather 'a site for life's struggle' (1952, 44). They are what Relph considered to be the 'matrix of where we live' (1985, 24). In other words, individuals know landscapes because they work in the fields, because they pass along trackways or paths between these and home, because they encounter landscapes continually in the course of their daily actions. The structure of these landscapes should therefore reflect the fundamental relationships of individuals to their world. Much of the time these landscapes are unobtrusive backgrounds to other more important concerns but at certain times and for particular activities they are brought forward into an individual's awareness and are constructed in order to participate in those actions (cf. Barrett *et al.* 1991).

It is just such a premise that has led Alan Baker (1992) to suggest that a landscape is not simply a way of seeing' (Cosgrove 1984) but also 'a way of thinking and of doing' which involves a process of 'creative destruction' (Harvey 1989). Cosgrove's explicit 'idea of landscape' may only date from the Renaissance, but both what have subsequently been called landscapes and also ideas about landscapes have a much wider historical and geographical validity. The modern 'idea of landscape' therefore has a more restricted historical and cultural value than does the 'landscape of ideas' (Baker 1992) or the 'ideological landscape' (Relph 1981).

In contemporary western societies landscapes tend to incorporate only the surface of the land (eg. Barrett *et al.* 1991); elsewhere and in the past what lies above or below the surface may be as important. Barbara Bender (1993, 1) has pointed out that we 'perceive' landscapes, we are the point from which the seeing occurs, an ego-centred and perspectival interpretation of landscape. In other times and cultures the visual may not have been as significant and the conception of the land not so ego-centred. (eg. Küchler 1993; Morphy 1993; Cosgrove 1993)

Place

The concept of places has until recently been rarely discussed in archaeology but is important in that it may lie at the heart of human experiences of the environment. Based largely

on the phenomenological perspective of Heidegger (1962), a number of geographers have insisted that place is indivisible in human experience and that therefore places are critical as the foci of human feelings, experience and thought around and through which we act (Tuan 1974; Relph 1985). Places exist as long as people are conscious of them and are constructed in their movement, memory and encounter. Following such an hypothesis, a focus for archaeologists could therefore be the identification of places as past foci of action at different times and scales. Two useful concepts in this regard may be those of 'imageability' (Relph 1976; Ferrell 1992, 164), and topophilia or topophobia (Tuan 1974; Relph 1985, 27). The former is the way places appear to stand out through their exceptional structures, natural features or association with significant events. Imageability is not necessarily a permanent feature as places may lose their significance over time but, as Relph noted (1976, 35), 'public places with high imageability nevertheless tend to persist and to form an on-going focus for common experience'.

Topophilia (strong affection for place) and topophobia (strong aversion) are often reflected in the chosen location for routine occasional practices. In the archaeological record these could be represented by the repetitive presence or continual absence of 'activity areas' or 'locales' within parts of the landscape. These issues form a key part of section 1.3 and are discussed in greater depth there, in the case study, and in consideration of the different survey techniques (chapters 2-4).

Space

Similarly, traditional landscape archaeology treats the spaces surrounding settlements as somehow neutral, homogeneous and measurable. In this sense the 'land' that is the focus of most landscape archaeology is considered as geometric space. Thus, archaeologists are able to study the relative locations of settlements and routes of communication which become issues for geometric analysis (cf. Hodder 1977a; 1977b; Hodder & Millett 1980). In human experience, however, space is rarely encountered or described in such pure and abstract ways. Spaces are often described by the nature of their visible form and usage (eg. field, wood, path) and are frequently identified by name. Spaces can be both natural and constructed. Dardel argued that since built spaces are human made, they convey peoples' purposes through their forms and surfaces, they are 'human intentions inscribed on the earth' (1952, 40). These include the

spaces of buildings, of assembly, of pathways, of fields and of boundaries. They are part of everyday action and are measured in terms of closeness, separation, distance and direction, as modes of interaction not as geometric variables. Therefore, for example, although a field may only lie a few metres away, it is remote to some as access to it is forbidden.

In this way space can be considered as relational, providing the situational context for the places of human action. They help structure the understanding of places and movement between them. Several attempts have been made within the geographical literature to construct generalised classifications for types of space to act as a useful heuristic device for the linkages between spaces and places (Tuan 1977; Relph 1976; Pickles 1985; Seamon & Mugerauer 1989). Tilley (1994, 15-16) also devised a list of forms of space largely based on the work of Relph and Tuan. Their views are included and adapted in identifying the six spatial forms I have adopted for figure 1.1.

Perceptual space is best thought of as that encountered by individuals. It is centred in individual perception of distance and direction in relation to bodily movement. It is 'a space of personality, of encounter and emotional attachment' (Tilley 1994, 16). It creates the personal significance of an individual's perceptions and actions.

Existential or lived-spaces (Relph 1976, 12-15) are the spaces which people experience at first hand and which they interpret and define according to the cultural beliefs of their group (Ferrell 1992, 163). There are many instances of this in action in the anthropological literature (eg. Levi-Strauss 1967; Rappaport 1972), but one particularly good example is Morphy's (1993) analysis of aboriginal perspectives of landscape in Australia. In practical terms this shows that archaeologists should consider the setting - Lukermann's (1964) idea of location - and the possible relevance of natural features or previous activity on a site (Ferrell 1992).

Existential space is a useful concept as it can be recognised as a key part of human understanding of places and landscapes linked to the social and cultural beliefs of a group. In this sense existential or lived-space is different from, though linked to, pragmatic or primitive space (Relph (1976, 8). The latter is the space of instinctive behaviour derived from studies of the territoriality of animals and is the theoretical basis of much of the territorial modelling at the heart of many field survey interpretations (e.g. Bintliff 1982; 1988; Schofield 1987; Flannery 1976; Foley 1981a).

Architectural space is closely linked to the three forms of space above but involves the deliberate attempt to create and bound space, delimiting the inside and outside of places, and physically channelling movement between them. Architecture (which in this sense involves any human constructed feature) is the creation of space in a deliberate, visible, tangible form. In this way architecture plays a 'fundamental role in the creation and recreation, production and reproduction of existential space and a profound structuring effect on perceptual space' (Tilley 1994, 17).

Beyond these spaces lie the spaces of indirect experience, where knowledge is based upon communication with others or cosmological belief. Most modern archaeologists, and for that matter geographers, assess this level of past experience through cognitive constructions of space as an object for study in the form of maps based on Euclidean geometry. These maps are a highly significant part of modern perceptions of the world beyond our direct experience and have led to other forms of cognitive space being ignored. In essence cognitive space should be conceived as the relative location of things (Relph 1976, 24) which in Euclidean geometry has been formalised through the use of co-ordinates. The relatively recent discovery that Euclidean space is not necessarily a faithful reflection of some absolute space is highly significant in that other cognitive spaces are not only possible but effect people's choice and pattern of action (cf. Norberg-Schulz 1971 for a good summary). This is especially clear in the Australian aboriginal example cited above (Morphy 1993).

Abstract space (Relph 1976, 26), which is closely associated with cognitive space, simply allows individuals to describe the world beyond their direct experience without any empirical observation. In such space places with a significant relationship to one another are considered as points whose spatial location is irrelevant. A suitable example of this could be that a relation is considered 'close' because of the strength of personal ties; their location is not an issue.

A Model for space

Following the discussion above, figure 1.1 provides an hypothetical structure to space in terms of the levels at which it may be experienced, whereby landscapes can be considered as the world encountered directly through perceptual and existential space, and regions the world

beyond that recognised largely as cognitive and abstract space. Below is an account of how this understanding can be utilised at a practical level in recognising the respective realms of landscape and regional archaeologies.

1.3 SOME APPROACHES TO THE STUDY OF LANDSCAPES AND REGIONS

The brief discussion of theory above has its own intrinsic interest and value but it also enables us to rethink our approaches to studying landscapes and regions of the past. Strictly speaking, as we become more conceptually sophisticated, we should set to work in the field or library more effectively. In practice of course things are not so simple. Trying to understand places in their appropriate historical context remains fraught with complications, as 'landscapes of ideas' can take almost as many forms as people are able to imagine and create. Variability in the material structures of a landscape is understandable, ^{but} landscapes themselves are less easily comprehended. Equally, material culture zones can be defined but how they related ^{to} regional identity is an altogether more complex issue noted at the end of this section. The challenge for such an approach to archaeology is how to link the conceptual issues described above to the practical considerations of fieldwork. How can we start to construct methodologies capable of studying these wider spatial aspects of human action and experience?

Landscape archaeology as it has been practised has involved the study of 'systematic relationships between sites. Sites are assigned one or more functions in the working of a regional system, primarily functions concerned with extraction and redistribution of material forces, or as 'ritual sites' (Barrett *et al.* 1991, 7). An alternative approach, however, focuses on the human occupancy of an area, concerned with the movement of people through landscapes, formed by the locales with which they came into contact. Around and within these locales social practices routinely maintained obligations and affinities, affecting individuals' status and position. Such actions took place at certain times and in certain places. As archaeologists we study the material correlates of activities that focussed on these places and ranged across the spaces in between them. Many of these actions will have left no material trace or ones that have long been destroyed, but chapters 2-4 demonstrate that much still survives. Our primary concerns therefore should be to:

- a) characterise as many of the foci of past activity that formed significant places and the wide variety of activities carried across the land surface. This can be achieved through a consideration of all the material correlates of these places, not just the artefact groups, soil changes and architecture that are considered here.
- b) to study the spatial relationships of material features in the landscape and their role in structuring the direction and extent of activities.

Landscapes, whose forms were constructed from both natural and artificial features, became a culturally meaningful resource (Barrett *et al.* 1991). Fields, earthworks, hedges and buildings all contributed towards structuring the movement, activities and communication of people. Thus in seeking to understand the spatial use of what we may term 'landscape architecture' and 'activity foci' we are attempting to understand past societies. As Ferrell (1995, 129) notes, 'social meaning is not added to spatial order, the two are indistinguishable from each other'. In such a time-space framework (Barrett *et al.* 1991, 7), archaeological features take on a range of identities through time. At one instant they may be locales of ritual observance where models of social order are made explicit, foci of assembly for the dissemination of knowledge and exchange of goods, or silent and almost unnoticed or ignored.

To attempt to understand how the material structures of a landscape operated and were perceived requires a consideration at least of the positioning of people in relation to them. Imageability, or 'visibility' as Thomas (1993, 30) has recognised, is important for the appreciation of such landscape features, but in the context of what can or cannot be seen or done in movement from place to place and even of non-visual experiences. Equally, topophilia and topophobia play important roles in the construction, use and maintenance of places. As archaeologists we study the material correlates of the actions that centred on such places and so tend to emphasise topophilia, places that were occupied in the maintenance of social practice. It is just as important, however, to assess why some parts of the landscape do not appear to have been used. Why, for example, were parts of the landscape, that on functional grounds seem ideally suited to occupation or agricultural use, avoided or respected? Such concepts demand an assessment of how past groups ordered and used their landscapes. It follows, therefore, that I

pursue an approach which assumes the presence of people in these places as a first principle and not as a missing part of the equation to be added later.

At a conceptual level, however, the majority of previous surveys have focussed on artefact distributions as a guide to identifying 'sites', though what these are supposed to be are rarely if ever considered. It is not enough to map the distribution of locales (the material foci that were a consequence of the significance and use of a place); an understanding of the cultural landscape is dependent upon studying what they were for. When considered, the tendency has been to concentrate on an empirical definition for recovered material without referring to what the scatter (or crop mark or geophysical anomaly) is meant to represent at an inferential level (Warren 1982; Ammermann 1985). This is despite early warnings of the dangers of such an approach (eg. Plog, Plog & Wait 1978). When the interpretation of such 'activity areas' (Schofield 1991b) is assessed it has usually been in terms of technological (eg. Healy 1991) or functional criteria (eg. Wilkinson 1982; Hayes 1991).

In chapters 2-4, and the case study that follows, I would like to consider the interpretation of different material evidence in relation to the identification and role of locales (as proxy indicators of past places) of the landscape. These can be considered as various material reflections of past foci of human activity. In this respect they are the archaeological correlates of some of the places of past human actions at an individual, communal or inter-communal level. Locales are thus material traces of places created and known through common experiences and action such as buildings, monuments, meeting places, settlements or foci for any particular activity. The characterisation of these activities and their location *relative* to each other and the role played by physical structures that formed the architectural spaces bounding their landscapes are a primary consideration of the the case study.

For the purposes of this study, techniques that identify the locales of past landscapes (cf. chapters 2-4) need to be used in such a way that the dynamic role they had in movement and communication can be understood. This is assessed using the concepts outlined above to analyse locales predominantly at a communal and inter-communal level in order to study the organisation of some iron age and Roman landscapes. It is not my intention to discuss the merits or otherwise of earlier approaches but in the chapters that follow, and in the case study in particular (cf. chapters 6 & 7), I hope to show how some of the theoretical and methodological

lessons already available can be combined within the framework outlined above to produce more integrated methodologies for a landscape archaeology of iron age and Roman settlement.

Assessing the regions of iron age and Roman society is a far more complex problem. Recognising the difference between the geographical or survey regions we construct and the archaeological regions identified in material culture or landscape form is a first step, but exploring the nature of regional identity in depth is a wholly different proposition. In the context of this thesis there is insufficient space and time to do such a theme justice, but in chapter 8 some attempt is made to consider the implications of such regional archaeologies to one such case study. In essence, the understanding that differing landscapes are the embodiment of different social routines, presents the promising prospect of using 'landscapes regions' as a guide to the complexities of regional identity, interaction and change.

CHAPTER 2: PLOUGHSOIL ARTEFACT ASSEMBLAGES

2.1 INTRODUCTION

Any attempt to interpret the archaeological significance of material collected by fieldwalking is primarily dependent upon one assumption. Namely, that surface artefact scatters can be interpreted as the end products of past human behaviour, despite the fact that they have been subjected to a particularly severe form of post-depositional disturbance. According to this view, understanding past behaviour depends on first filtering out any distortions in the data caused by activities or processes not of interest in the study, such as recent soil erosion, then analysing the artefacts' attributes, distribution, and association with other forms of information in order to study past landuse and patterns of human activity. The latter have tended to draw on a range of sources from ethnographic studies (eg. Binford 1980) and technological investigations (eg. Zvelebil *et al.* 1987), to models of the logistics of settlement location and landuse derived from human geography (Schofield 1988; Williamson 1984). None provides an all-embracing solution to questions in landscape archaeology, but instead gives us insights into the interpretation of surface collections.

The aim here is not to argue for or against an approach based on any one hypothetical viewpoint, a discussion which is better reserved for the interpretation of individual case studies (see Chapter 7). Instead, the next two sections (2.2 & 2.3) try simply to outline how ploughsoil assemblages are formed and the biases inherent in them. By reviewing the state of our present knowledge we can begin to suggest ways of calibrating surface scatters to allow their comparison with each other and with excavated material.

The following section (2.4) then discusses the remaining bias in field survey data; the conscious and subconscious sampling of ploughsoil assemblages that occurs when we collect surface material. Finally, bearing in mind the information gleaned from the preceding sections, the chapter is concluded with some suggestions about which attributes of the artefacts under examination (in this case mostly ceramics) may prove the most fruitful for analysis and interpretation in the context of the aims outlined in chapter 1 (section 2.5).

2.2 THE DERIVATION OF PLOUGHSOIL ASSEMBLAGES

In dealing with the derivation of artefacts in the ploughsoil, two important initial considerations come to mind. First, the original distribution and composition of the archaeological record before its subsequent disturbance by agricultural activity; and second, the nature of those disturbance processes. Considering the amount of ink that has been spilt in writing about field survey in recent years, remarkably little has been said on either of these subjects. Some thought is increasingly being given to how artefacts already incorporated into the ploughsoil are affected (see section 2.3), but all too rarely is there any genuine discussion of where the material originated and how it entered the cultivated horizon in the first place. The few notable exceptions tend to consist of outline descriptions of the cultivation techniques themselves (Lambrick 1977a; Nicholson 1980; Spoor 1980) or useful but limited comparisons of the results of surface collection with subsequent excavations (Crowther 1983; Gaffney & Tingle 1989; Bowden *et al.* 1991). Both give insights into how ploughsoil assemblages are formed, but the effect of cultivation techniques on their composition and distribution is frequently glossed over.

Agricultural practice affects which parts of the archaeological record enter the ploughsoil and has implications for any subsequent inferences we wish to make. There are essentially three activities involved in the preparation of arable land which are significant: ploughing, subsoiling or panbusting, and land drainage. Other techniques used such as harrowing, disking, and direct drilling tend to act only on artefacts already in the ploughsoil.

Ploughing techniques and equipment vary considerably according to the preferences of individual farmers but can be divided into two major forms by their working method. Mouldboard ploughing is the common and traditional form of cultivation and operates in a very distinctive way (see fig. 2.1A). First the share cuts the earth to a depth determined by the coulter. Then the soil is inverted by the advance of the mouldboard exposing the base of the ploughsoil on the surface. The breakdown of soil structure is achieved by subsequent weathering. Rigid tine and chisel ploughs, however, work by a different method. They operate by simply breaking up the soil with the force of their forward momentum (fig. 2.1B). The soil is not

inverted and instead the breakdown of clods is largely achieved by the impact of the equipment itself.

These two techniques are likely to have very different effects on the disturbance of buried artefacts, although at present this must remain an untested assumption. We can, however, make some suggestions about the probable differences. First, although cultivation depth varies considerably with both techniques, on equivalent soils the rigid cultivators work shallower. Generally the heavier the soil the greater the ploughing depth; up to 30-35 centimetres with mould board ploughing and 25-30 centimetres for tine cultivators (Lambrick 1977a; Briggs & Courtney 1985). Mouldboard ploughs also have a far greater tendency to bring material to the surface from depth. The inversion of soil clods they achieve automatically tends to expose artefacts which may have just been disturbed from a buried archaeological context. This leads to a situation where 'fresh' artefacts are revealed by occasional episodes of deeper ploughing. Chisel and tine cultivators, on the other hand, do not disturb buried deposits in this way, but rather drag or smash artefacts in a similar way to subsoilers or panbusters without necessarily immediately exposing them to weathering.

Subsoilers and panbusters are similar to chisel ploughs and are designed to improve drainage and aeration by breaking up natural or humanly-created impermeable layers within the soil. They work primarily by shaking the soil at depth creating fissures which run in branches up and out towards the surface (see fig. 2.1C). Again, subsoilers tend not to expose artefacts or indeed displace them very far but will almost certainly have a very destructive effect on them through their strong impact and fissuring action. They also tend to operate at much greater depths, varying from 35-70 centimetres depending on soil type, and are generally considered the most destructive form of cultivation. In clayland areas in particular they may well destroy many buried artefact groups. Lighter soils, particularly finer sandy loams, usually do not require any subsoiling unless they have a tendency to form iron pans.

Having outlined the actions of these different agricultural techniques it is important to consider how they might be expected to affect abandoned archaeological deposits. There are very few studies of the effects of cultivation on essentially undisturbed archaeological sites (for some exceptions Miles 1980; Fasham 1980), so for the purposes of discussion a hypothetical

situation taken from Haselgrove (1985) is illustrated here (fig.-2.2). Though obviously an over-simplification of the true situation, figure 2.2 does illustrate several important points.

Haselgrove pointed out that cultivation produces an assemblage in the ploughsoil which is an aggregate of the complex range of depositional activities which occurred during a settlement's use and abandonment. The composition of different areas of ploughsoil would vary according to the quantities of durable artefacts contributed by each type of depositional circumstance (Haselgrove 1985, 16). Thus ploughsoil artefact assemblages as originally constituted (before further attrition and displacement) are a sub-sample of the range of durable artefacts originally deposited. By understanding the action of tillage equipment, it is readily apparent that this is not a random sample of the archaeology but one dominated by material that lay on or close to the original land surface. The proportion of subsurface material disturbed is dependant upon changes in land surface level and tillage depth, a question which must be tested and not simply assumed. If erosion is prolonged or subsoil remains are ephemeral, all the surviving artefactual record may be incorporated in the ploughsoil. This situation is all too apparent when dealing with early prehistoric settlement on the chalk downlands of southern England. Here the soil profile in many places has been severely denuded and any structural remains of occupation have all but disappeared (eg. Gingell & Schadla-Hall 1980). The reverse of course is true in areas of soil deposition or minimal cultivation where, on occasion, material from buried land surfaces will not be present in the ploughsoil at all. Recent studies by Bell (1986) and Allen (1988) have highlighted just how significant variable erosion and deposition can be for our efforts to interpret surface scatters.

As soil erosion, ploughing depth, and the need for subsoiling are all related, in part at least, to soil type and drainage, it should be possible to attempt coarse predictions of the levels of disturbance reached across the landscape. By linking this scheme to simple augering and test pitting programmes it should be possible to gain an impression of the depth to which plough damage has occurred and thus an idea of which parts of the archaeological record are likely to be incorporated in the ploughsoil samples we collect.

A further aspect to consider is how variations in tillage practice, particularly the use of subsoilers or panbusters, affect the composition of ploughsoil assemblages. Subsoilers do not move the soil extensively but rather cause it to fissure, and so are not likely to force large

quantities of material directly upwards into the ploughed horizon, though their disturbance may make them more likely to be caught and moved upwards in subsequent ordinary ploughing. The fissuring action, however, is likely to fracture sherds held in the soil and may well be an important factor in their breakdown. In areas such as boulder claylands where subsoiling is regularly carried out, ceramic attrition will be all the more rapid and the fabric composition and size distribution of ploughsoil assemblages will be affected accordingly (a point expanded upon in section 2.3.1). This has important implications if we try to compare artefact groups collected from different lithologies within or between regional surveys. In order to interpret such assemblages they must first be calibrated through an assessment of local conditions so that we are comparing like with like.

2.3 PLOUGHSOIL PROCESSES AND THE ARTEFACT RECORD

Once an artefact is incorporated into the ploughzone it is prone to a complex series of forces which continually displace it within the soil matrix and damage its structure. Many artefact types, such as bone, can be completely destroyed after only very short periods of exposure to this regime and so are rarely present in fieldwalked samples even though they are a major component of many excavated assemblages. If inferences are to be made about past human behaviour, it is essential to understand how their composition and distribution have been affected by such a soil regime. To this end the following is a brief review of the processes known to act upon artefacts in the ploughsoil. It concentrates on ceramics as they constitute by far the largest component of all the artefact assemblages which are dealt with in this thesis. They also, however, provide a useful parallel for other materials as many of the principles described are the same.

The two major factors affecting the nature of ploughsoil artefact populations can be summarised as Attrition and Displacement. Attrition, the processes which act destructively upon artefacts, can not only alter the total quantity of sherds which survive but also the composition of an assemblage. If we hope to study any archaeological aspect of settlement based on such data, it is essential to take account of these biases (cf. Wood & Johnson 1978).

Displacement, the physical movement of artefacts within the ploughsoil, can also alter the composition of surface scatters if acting unevenly in exposing certain materials or parts of an assemblage (cf. Baker 1978). Of equal significance, however, is its affect on the horizontal distribution of artefacts, blurring or sometimes completely destroying significant patterning and producing new, misleading, artefact clustering (eg. Allen 1988; 1991).

2.3.1 Major forms of Attrition

In Europe, little attempt has been made to determine the nature and possible rates of breakdown of ceramics, but much experimental work has been carried out by members of the Laboratory of Traditional Technology in the University of Arizona and elsewhere in the United States (eg. Reid 1984; Bronitsky 1989; Bronitsky & Hamer 1986; Feathers 1989; Schiffer & Skibo 1989; Skibo, Schiffer & Reid 1989). This work has shown that, though the attrition of ceramics within the ploughsoil can take a number of forms, it is likely that three processes, Impact, Abrasion, and Frost Wedging are responsible for most sherd deterioration.

Abrasion can be broadly defined as the deformation or removal of material on a sherd's surface by mechanical contact, through the scraping, sliding or striking action of an abrader (Schiffer & Skibo 1989, 101). In ploughsoils the abraders are likely to be soil particles, other objects (such as stones or artefacts) and the surfaces of tillage equipment passing through the soil. Initial experiments by the Laboratory (Schiffer & Skibo 1989) have isolated a number of important characteristics such as the hardness, shape, and size of the abrader, which influence the amount of force that is applied to the artefact at the point of contact. To date, however, little is known about how altering these variables affects the rate and nature of attrition of ceramics.

Two important findings have been to show that wet-dry cycles weaken ceramics significantly, and that sherds in wet depositional environments will abrade at appreciably higher rates (Murphy 1981; Ware & Rayl 1981). One test on a range of untempered and sand tempered briquettes showed up to 6.5 times the rate of abrasion in wet conditions (Skibo & Schiffer, 1987, 88). Overall though, abrasion is probably not the most significant cause of artefact destruction, as in all the experiments published to date it has never reduced artefact weight by more than 10 percent despite being abraded continually for up to 4 hours at a time. The truly detrimental effect of abrasion lies mainly in its removal of surface features on ceramics making them difficult to

ascribe to a particular source or date, a problem experienced clearly in the Middle Farm Project. Here, it was maintained, the badly abraded nature of the sherds prevented 92.4 percent of them being called anything more than 'Roman', although the conservatism of local pottery traditions are partly blamed (Gaffney & Tingle 1989, 210-11). These observations have obvious relevance when comparing ploughsoil ceramic assemblages across different lithologies, climates or agricultural regimes even within individual surveys.

Within some survey areas, and particularly when assessing the composition of a scatter recovered from a single collection unit (a field or 30 metre length of line for example), the degree of abrasion is determined far more by the fabric of the pottery itself. This abrasion resistance or abrasibility (Skibo & Schiffer 1987), is dependent upon the strength of the fired paste, the size, shape and quantity of pores, cracks or voids in it, the type and quantity of temper used, and the shape and surface features of the ceramic. The strength, or resistance to intergranular fracture (Rice 1987, 356) of the fired paste, is of particular significance to the rate of abrasion and is determined by the action of the potter, the use of the ceramic and environmental processes such as wet-dry cycles.

From the limited experimental results available, it is apparent that of the variables in pottery manufacture, firing temperature and duration have the greatest effect on abrasion resistance as they considerably harden the paste (Schiffer & Skibo 1989, 105). Tests on ceramics fired from the same clay with a variety of mineral and organic tempers have shown a consistent increase in resistance as firing temperature is raised (eg. Skibo, Schiffer & Reid 1989, fig. 3, 128). One such test, by Vaz Pinto *et al.* (1987), showed that briquettes fired at 900°C were, depending on temper, at least 5-7 times more resistant to abrasion than those fired at 700°C. Skibo *et al.* (1989) broadly support this ratio with their results on organic (grass and manure) and mineral (fine and coarse sand) tempered ceramics fired between 650°C and 850°C (table 2.1 below).

The relationship of temper to abrasion resistance, however, is still poorly understood, with preliminary results suggesting a complex situation in which rates are affected by the hardness and shape of particles, their size, quantity and orientation. Generally, it appears that organic tempered ceramics are more susceptible to abrasion than mineral tempered ones at lower firing temperatures (below c. 700°C), where abrasion resistance is markedly improved by

harder tempers, a difference which virtually disappears with increasing hardening of the paste (fig. 2.3).

Table 2.1 The Effect of Firing Temperature and Temper Type on Abrasion Resistance Showing Mean Percentage Weight Loss and Percentage Weight Loss Ratio (After Skibo *et al.* 1989)

Percentage weight lost by abrasion on ceramics fired at x°C			
Temper type	650°C	850°C	Ratio (650°C:850°C)
Fine sand	3.67	0.68	5.4:1
Coarse sand	4.07	0.79	5.2:1
Grass	2.97	0.66	4.5:1
Manure	7	1.45	4.8:1
Untempered	3	0.57	5.3:1

The shape and surface topography of an artefact, (affected by the external finish a potter uses) can also influence the degree of abrasion. Marked convexities such as rims, edges, handles, and corners are most easily abraded, with experimental results indicating that abrasion declines rapidly once these are rounded off or smoothed out (cf. Skibo 1987). Thus freshly exposed or broken sherds are initially abraded rapidly, losing details of rim form and surface decoration, a situation experienced in the case study (chapter 7) with rims in shelly fabrics and the colour coats on lower Nene Valley wares. Some colour coated surfaces only survive in concavities such as under rims. Differences in surface treatment also translate into effects on abrasion resistance when they act to remove irregularities in topography; thus in one experiment polished ceramics were more resistant to abrasion than untreated ones (cf. Skibo 1987). Much work, though, still remains to be done on tempers and finishing techniques before their relevance to abrasion resistance is properly understood.

The breakage of ceramics in the ploughsoil and their further deterioration into ever smaller fragments is primarily due to a combination of impacts with agricultural machinery and stresses on the integrity of the fabric caused by freeze-thaw action. Research into the effect of impacts on ceramic assemblages has again been scarce and the results to date have been very

limited in their usefulness and range of applications. Recent investigations into the effects of trampling on artefacts do provide useful pointers to the way ceramics deteriorate through impact and abrasion.

The rate and nature of sherd breakdown are determined by four main factors: the impact strength, the frequency of impacts, the compaction or hardness of the substrate in which the sherd lies, and the strength (or impact resistance) of the ceramic itself. Little or nothing is known of the relative impact strength of agricultural machinery or the frequency of impacts with ceramics in ploughsoils. It is thus very difficult to attempt any assessment of the effect of different cultivation techniques on sherd breakdown. It is, however, possible to outline some of the main principles in sherd deterioration even though absolute rates are little understood.

Interest in the post depositional processes affecting house mounds in semi-arid regions led Kirkby and Kirkby (1976) to investigate rates of sherd breakdown through trampling (impact and abrasion combined). Simulated trampling exercises showed that sherd breakdown from an initial sample of a hundred 4-8 centimetre sized sherds was not uniform through time and had a number of distinctive characteristics. Such trampling simulations are of limited use when trying to assess actual rates of breakdown in ploughsoil conditions but do show how impacts affect relative size distributions and total sherd numbers through time.

The Kirkbys' experiment and subsequent similar work (Nielsen 1991; Skibo, Schiffer & Reid 1989) showed that sherd fracture rates from impacts decline with time as a reduction in sherd size leads to an increase in their impact resistance. This is illustrated by figure 2.4 in which the sherd data from Kirkby and Kirkby table 3 was calculated as a breakage index, b (b = the number of fragments after a trampling event divided by the number before that event) and plotted through time. If this trend continued, breakage would eventually effectively cease (at $b = 1$) when impact resistance is greater than impact strength. The size at which this would occur is dependent upon the sherds' microstructure, thickness and curvature, and the weight and contact area of the impact agent. A consequence of this is that after a significant number of events (ploughing episodes for example) sherd size should increasingly approximate to a unimodal distribution centred around the point where resistance equals impact strength. This occurs regardless of what the original distribution may have been. An example using data from Nielsen's (1991) experiments is given in figure 2.5. These characteristics should apply equally

well to plough damaged assemblages, but lack of detailed study of the problem limits any real assessment at present.

It is possible that the impact strength of agricultural tools is so high that ceramic strength is never sufficient to prevent fractures although, after a time, this appears unlikely short of a sequence of regular direct hits. If impact damage does stabilise after a certain point then further ploughing would result in the gradual lowering of the modal sherd size through continued abrasion and frost action until the whole curve approximates to a Poisson distribution. In an experimental situation this could be used as a coarse indicator of the magnitude of normal impact strength.

Such a shift in the sherd population in the soil should initially be associated with a marked increase in the total number of sherds available for recovery (cf. fig. 2.6). Once sherds fall below a certain size however, (for the purposes of this review say 10 millimetres), they are effectively invisible archaeologically and become part of the soil matrix eventually leading to a decline in 'recoverable' pottery. If Nielsen's data can be taken as at all applicable, the rate at which this occurs will be highly variable. Some types (eg. A in fig. 2.5) effectively disintegrate after short periods of exposure to ploughing, whilst others once reduced to a highly resistant size remain relatively stable (type B in fig. 2.5). The role of soil compaction and hardness in determining the point at which this happens are also probably significant, but with next to no research targeted at the problem little can be said at present. If a stable point is reached, abrasion and frost action take over as the major destructive processes.

Frost destruction is probably the least well understood of the processes of attrition. It is primarily due to frost wedging, or the prying apart of porous materials by the expansion of frozen porewater (Washburn 1980). This is sometimes accompanied by hydraulic pressure generated by the restricted flow of water ahead of the advancing ice (Powers 1955). The resistance of ceramics to this is known from research in the materials sciences to depend on three major factors; firing temperature, pottery permeability and soil moisture content.

Interest in the relative survival of different pottery fabrics from sites in the Mid-West United States (Johnson & Hanson 1974; Johnson *et al.* 1977; Reid 1984) led to laboratory experiments on the effects of frost destruction on organic and mineral tempered ceramics (Skibo, Schiffer & Reid 1989). These tests did not replicate precisely the likely environmental

conditions, as the freeze-thaw periods in the laboratory were shorter but more severe than usually encountered on sites. These results, therefore, do not necessarily correspond to actual rates of destruction in the field but do give a useful guide to the relative differences between tested types of pottery. Firing temperature affected resistance to frost destruction markedly, so much so that after 10 severe freeze-thaw cycles none of the briquettes fired to 950°C had been damaged at all regardless of the temper type used (see fig. 2.7). The reasons for this lie in the complex series of changes the microstructure of the pottery undergoes during firing. Before heating the ceramics are often highly permeable as almost all their pores are open. During the early stages of the firing sequence porosity can increase as organic matter and volatiles (such as water) are burned out of the system. Porosity generally reaches a peak at about 800°C, after which point it declines as the mass starts shrinking, a process accelerated by vitrification of the paste and the consequent closing or elimination of pores (Rice 1987, 351).

Porosity is also linked to the use of tempers and the finishing techniques used in pottery manufacture. All tempers increase porosity, explaining why in the experiment the untempered ceramics showed considerably higher resistance to frost even at lower temperatures (fig. 2.7). Organics such as grass burn out in the early stages of firing leaving voids in the paste which can act as moisture reservoirs. The long planar shape of many of these pores provide ideal conditions for the concentration of pore ice pressure into points of weakness, thus increasing the likelihood of crack initiation along the long axis of the pore. The method of forming used (such as wheel throwing) can lead to the orientation of these particles along lines parallel to the surface of the ceramic. These form lines of weakness or fissile planes (Reid 1984, 69) through which water can migrate from entry points at sherd fracture surfaces as well as from surface or channel pores. Ceramics with fine finishes such as burnishing or slip coating, which reduce surface permeability, are still susceptible to frost action in this way, eventually producing laminar or foliated fractures in which the surface is separated from the core of the sherd. Mineral tempered ceramics could be expected to have greater resistance to frost action as they do not usually burn out on firing. This, though, is not the case as at lower temperatures drying cracks and the differential expansion and contraction of temper and paste can lead to increased porosity and weakening of the fabric (Vaz Pinto *et al.* 1987), a problem also witnessed in the 1989 experiment (B in fig. 2.7).

Differences in microstructure and strength help to explain variability in ceramic resistance to attrition in similar conditions, but frost destruction in the field is equally dependent upon soil temperature gradients, texture and moisture content. Frost usually penetrates from the surface downward. The rate and depth it reaches depend upon the thermal conductivity of the soil. Any material, such as snow or vegetation, insulating the soil can markedly inhibit freezing (Rolfsen 1980; Briggs & Courtney 1985). Penetration is fastest on exposed, light, open textured soils which drain freely, allowing any moisture in the pores to freeze rapidly. In finer grained soils with higher silt and clay content, the freezing front usually advances more slowly and their high capillarity draws water up from warmer lower-lying levels, further slowing penetration.

Breakdown of all aggregates in soils is known to be encouraged by frequent fluctuations across freezing point (Baver *et al.* 1976). Additionally, rapid freezing is more destructive than slow, suggesting that finds in lighter soils should be more susceptible to frost destruction. In practice, however, these soils drain very freely, leaving artefacts near the surface with too little moisture to be affected by the expansion of ice in their pores. It is only when soils are sufficiently saturated to fill ceramic pores that freezing is likely to cause significant damage. To this end the ability of some finer textured soils to draw extra water toward the surface through capillary action is particularly significant. Thus even during relatively dry spells, finds near the surface of silt and clay textured soils (which often drain poorly anyway) can still be saturated and susceptible to severe frost damage.

The penetration of frost action from the surface down leads to the development of temperature gradients in the soil. Artefacts on or near the surface are exposed to more rapid fluctuations in temperature and subsequently far greater incidence and intensity of freeze-thaw action. With depth the soil increasingly insulates artefacts from these fluctuations and in temperate lowland Britain frost rarely reaches below 30 centimetres (Briggs & Courtney 1985). Artefacts are usually only exposed to significant frost action when they are close to the surface as can be illustrated by data from meteorological station 1 at Butser Hill experimental farm (Reynolds 1987; 1988). Here the surface was covered by grass which inhibited frost penetration markedly below 5-10 centimetres, but figure 2.8 shows the intensity of freeze-thaw events during the winter months. On arable land autumn tillage tends to increase macropore

volume and with little or no surface vegetation frost penetrates further, producing a similar situation to Butser but over greater depth (cf. Briggs & Courtney 1985, 231).

As the data used in figure 2.8 are only for minimum grass temperatures, it is likely that there are far more minor freeze-thaw cycles than shown. It does, however, show the minimum number of major cycles a field can be expected to undergo in a particular winter. The 19 events for the winter of 1987-88 are not unusual when compared with 21 in 1986-87 and 23 in 1988-89 at the same station. It should, however, be noted that at this latitude the aspect of the ground surface is very important in determining local daytime temperatures. Station 1 at Butser lay on a south facing slope and was susceptible to more fluctuations above and below zero as overnight frosts were soon displaced by sunshine. North facing slopes are likely to be prone to fewer but more intense freezes. The intensity of frost action on ceramics may well, therefore, have been underestimated, but until more field experiments like those of Reynolds and Schadla-Hall (1980) are carried out we cannot easily quantify its likely effects. Freeze-thaw damage in the winter months, particularly in conjunction with subsequent impact and abrasion through ploughing in the spring, are likely to reduce porous ceramics on the surface rapidly. How rapidly and with what distortions to the composition of ploughsoil assemblages is dealt with in more detail in section 2.3.2.

2.3.2 Displacement Processes

The complex processes causing the movement of ceramics in ploughsoil can be simplified by considering them under three main headings: tillage, geomorphology, and biogenic activity. Most interest has focussed on the effects of arable cultivation techniques on artefact movement and a series of experiments have sought to better understand the processes at work (Roper 1976; Ammerman 1985; Cowan & Odell 1990; Yorston 1990; Dunnell 1990; Clark & Schofield 1991; Frink 1984; Lewarch & O'Brien 1981a; 1981b; Odell & Cowan 1987). These studies have often been inconclusive or unreliable due to limitations in their methodology. Classic examples include insufficient knowledge of the original distribution of the material (Trubowitz 1978), recovery of surface material only - a small and probably biased sample of the ploughsoil population (Frink 1984) - and insufficient information about the cultivation history of

the site (Ammerman & Feldman 1978; Ammerman 1985), preventing an understanding of its annual effect.

The most useful study has been at the Butser Ancient Farm Research Project where most of these problems have been addressed (Reynolds 1982; 1987; 1988). The recording of the behaviour of replica sherds made from plastic resin over several seasons allowed Yorston, Gaffney and Reynolds (1990) to model the lateral displacement of sherds with some confidence. The results of their experiments have helped dispel some common misconceptions about the nature of artefact movement through cultivation. Although normal agricultural practice will tend to move artefacts in alternating directions (Lambrick 1980a) and thus produce little net displacement, a concentrated assemblage will nevertheless gradually disperse. On sites with several initially discrete groups of finds this, they suggest, can lead to spurious concentrations of material away from their original centres as distributions gradually overlap. These observations lead them to remark that 'despite the optimism displayed in much of the recent archaeological literature about the effect of cultivation on archaeological assemblages, the initial results of simulations based on Reynolds' data give no grounds for complacency' (Yorston *et al.* 1990, 81). Though this is undoubtedly true, there are a number of flaws with the Butser experiments and the simulations based upon them. Most significantly, they take no account of the changing nature of real archaeological assemblages. All the Butser sherds were placed within the cultivated horizon and were thus subjected to displacement by ploughing from the start. No account was taken of how and when artefacts enter the ploughsoil and how buried assemblages, subsequently incorporated during an episode of subsoiling for example, effect the overall distribution. The target population (Haselgrove 1985) of artefacts in the ploughsoil is not a constant, but changes with cultivation depth and attrition. The almost indestructible nature of the resin sherds did not allow assessment of how rapidly ceramics disintegrate once incorporated in the ploughzone. It is conceivable that most ancient pottery is destroyed before it has dispersed any great distance, certainly over the 50 to 200 years covered by the computer simulations.

The majority of experiments on displacement through cultivation have also omitted detailed considerations of the effect of the various tools used. From the few details available little can be said about the differences in dispersal caused by harrowing, disking, mouldboard

ploughing and subsoiling. It has been suggested that mouldboard ploughing brings greater quantities of material to the surface than other types of agricultural equipment (Tingle 1987), but experimental results on a group of lithics in southern England appear inconclusive despite the optimism of the authors (Clark & Schofield 1991, 100). This experiment does, however, indicate that the major cause of horizontal displacement is cultivation, not ploughing, a conclusion that is not surprising considering how the different equipment operates (cf. Nichol森 1980; Briggs & Courtney 1985).

On level ground the horizontal displacement of artefacts tends to be even in all directions over a number of years (Reynolds 1988). This is caused by the modern agricultural practice of reversing ploughing patterns on alternate operations so that there is no net displacement of soil in any one direction. Sherds under such a regime move stochastically, gradually dispersing evenly from their original centre point. Distortions in this pattern can occur when ploughing only takes place along a single axis due to restrictions in field shape or where slopes prevent cross ploughing along contours. Here the primary direction of displacement should be in the direction of ploughing and/or erosion.

The role of geomorphology, especially soil erosion, in the displacement of artefacts in the ploughsoil has only become an active area of research in British archaeology within the last ten years. Earlier interest in the problem was almost solely restricted to a group of American archaeologists and anthropologists influenced by a processual brand of archaeology expressed in the work of Michael Schiffer (1976, 1983, 1987). The problem with much of this work, however, is that most of these studies were process or landform-specific and thus limited in scope or area of application (Lewarch and O'Brien 1981b). Good examples include Hesse (1971), Kirkby and Kirkby (1976), Rick (1976), Synenki (1977), Thornes and Gilman (1983), and Bell (1986). Many insights derived from them are only really applicable to environments outside the scope of this review. It is only through an increasing body of research into environmental change in Britain (eg. Bell 1981; 1982; Allen 1988; 1991; Burren & Scaife 1988) and studies in physical geography (eg. Morgan 1980; 1985; Quanash 1981; Thornes 1987; Imeson & Kwaad 1990; Boardman *et al.* 1990) that a fuller understanding of the subject can be obtained.

Erosion is known to be widespread in the lowlands of England and Wales (Evans & Cook 1986) as water and wind act on bare soils of arable land. The impact of water erosion has

been monitored and it is now possible to predict when and where it is likely to occur. Potentially erodible soils are those down to arable, on gently rolling landscapes with slopes generally less than 10 percent and with soils that contain between 9 and 30 percent clay (Evans 1980; Morgan 1980a; 1985).

Recent studies of erosion on the chalklands of southern England (Boardman 1984) led Allen (1991) to suggest how a combination of fluvial events (rainsplash, sheetwash, rilling and occasional gully formation) can affect the distribution and visibility of ploughsoil assemblages. Erosion of fine soil particles by sheetwash and small rills is a frequent and regular event on the downland soils and is unlikely to result in significant downslope movement of artefacts. Instead, the regular removal of the silt and fine sand fractions results in an overall loss of soil depth on hill crests and increase in depth at the bottom of slopes in the valley edge margins. These changes in soil volume affect sherd concentrations in the matrix accordingly and thus numbers visible on the surface (see section 2.4).

Under higher energy erosion events, such as rilling, artefact movement is highly probable. Empirical testing by Allen (1991) linked the specific gravity of artefacts and their shape to their susceptibility to fluvial transport. Coarse pottery with the lowest specific gravity showed the greatest tendency to movement downslope. With a high percentage of artefacts in the experiment capable of travelling over 50 metres in as little as four years, the tests appear to have alarming implications for the interpretation of surface scatters. For a number of reasons this problem, to an extent at least, may have been exaggerated. First, the downland landscapes in which Allen and Bell worked are some of the most rapidly eroding in Britain. Analysis by Morgan (1980; 1985) and Drewett (1980) has indicated that as much as 700 millimetres of soil may have been removed since the fourth millennium BC.

In the Midlands, where soils are generally heavier and less susceptible to erosion, recent surveys by Evans (pers comm.; 1990a) have suggested more usual losses^{of} 120-160 millimetres over the same time period. Furthermore, the higher clay content of the east Midlands soils considerably improves their aggregate stability, holding coarse constituents such as stones and pottery in their matrix. A number of factors including greater surface roughness and higher organic content further limit the effects of fluvial erosion in this area. Until similar work to Allen's is attempted on Midland soils, the extent of horizontal displacement can only be guessed at. It is,

however, possible to outline areas that are potentially erodible using principles extracted from the surveys carried out in physical geography. Follow up work similar to that by Brown (1987; 1992) to study actual erosion levels could then be targeted on these areas of possible bias. In practice this would require the recording of characteristics such as soil particle size, aggregate stability, surface stoniness, and topographic details of slope angle, length and form. These details are readily available in published or archive form from the Soil Survey of England and Wales (eg. Hodge *et al.* 1984) or can be recorded simply in the field (Parish pers. comm.).

2.4 SURVEY DESIGN AND ARTEFACT RECOVERY

A great deal of time and effort has been expended in the discussion of various sampling strategies and survey designs over recent years, sometimes leading to whole volumes on the subject (eg. Cherry *et al.* 1978; Mueller 1976; Shennan 1985). Much ground has been covered and the pros and cons of judgement, random, and probability sampling are well illustrated in the literature. For the purposes of this discussion, the aim is not to look at the effectiveness of particular strategies in discovering areas of human activity, something better reviewed with particular survey regions and periods in mind (see chapter 7), but instead to point out some of the more important aspects of the design of collection procedures themselves (section 2.4.1). Section 2.4.2 then shows some of the unintended biases in recovery which come into effect at this stage. Problems with the recovery of artefacts lead to distortions in any survey database which are important to counteract if we are to avoid poor interpretations based upon them.

2.4.1 Collection Strategy

Once a survey block or transect has been selected, there are essentially two elements to the collection strategy which have important effects on the the nature of the artefact groups archaeologists eventually analyse. First, the proportion of the selected area which is subsequently visited for fieldwalking and second, the spacing and size of collection units used by the surveyors.

Ideally the aim of any survey would be to obtain complete coverage within the sample blocks or transects selected. This is never possible as constraints on access to land, its previous

destruction (by quarrying for example), or modern land use such as pasture or housing prevent fieldwalking. More usually, therefore, the area covered represents a further sampling exercise; one which is not controlled by the archaeologist. Even when as full a sample as possible is walked, it rarely constitutes more than two thirds of the total land area and 30-50 percent is more usual. This is illustrated in table 2.2 where a selection of British surveys are used as relevant examples. This constitutes a particular problem in interpreting field survey results as we are invariably left with a fragmented distribution map of the artefactual material collected.

Table 2.2: Area Coverage and Fieldwalking Intensity of Selected British Field surveys

Survey	% of area visited	Line interval	Coverage	Reference
Marshfield	20	5 metres	20-50%	Russett (1985)
Maddle Farm	50	25 metres	4-10%	Gaffney & Tingle (1989)
Holme-on-Spalding Moor	17	10-20 metres	5-25%	Halkon (1987)
Raunds	67	15 metres	6.7-16.7%	Pary (forthcoming)
Durham	0.1-7.2	10 metres	10-25%	Haselgrove <i>et. al.</i> (1988)
Cambridgeshire	25-40	30 metres	3.3-8.3%	Hall (1987)
N.W. Essex	c.60	3 metres	33-83.3%	Williamson (1984)

In surveys such as the Maddle Farm Project, where the aim was to look at total land use within a specified area, serious gaps remained. If these contained further settlement or activity areas, the results could have differed markedly. In order to have more confidence in interpreting land use from intensive survey, it is essential that we start looking at the gaps in survey coverage more critically by incorporating methodologies which, for example, investigate areas covered by pasture. These must be built into the original research design and not, as is so often the case, brought in towards the end of projects to address a specific problem.

The interval between walkers also has significant effects on the nature of the recovered assemblages from fieldwalking. As table 2.2 shows, line intervals vary considerably between surveys and this effects the intensity of coverage within any field. If we take the area in which artefacts are visible to a walker as being between 1 and 2.5 metres wide (as suggested by Gaffney & Tingle 1989), then we can see that the area of any field covered varies from 3.3-8.3 percent in the Cambridgeshire survey up to 33-83.3 percent in the North West Essex survey. Such differences not only alter the densities of material recovered but also the likelihood of identifying small diameter, low density, scatters which may be associated with certain activity foci. When assessing the iron age or early Anglo-Saxon periods, where smaller quantities of artefacts survive in the ploughsoil, this can lead to an inability to recognize settlements at all (cf. chapter 7). Schofield (1989, 467) noted precisely this problem when reviewing early medieval pottery distributions from a number of projects in lowland England.

The spacing and size of the collection units used in a survey are critical to the level of analysis that can subsequently be carried out on the material recovered. If artefacts are recorded by the section of line or grid square they were collected in, then the spatial resolution of the data is usually relatively high. In the Raunds Area Project pottery was assigned to a unit 15 x 20 metres but in the Cambridgeshire Fenland survey (Hall 1987), the pottery was grouped into scatters whose size was recorded subjectively in the field (cf. chapter 7). The latter limits analysis of the spatial distribution of the material collected to comparisons between recovered concentrations of artefacts. Any study of intra-scatter patterning is impossible. The unit size also has important implications for interpreting the nature of locales, what constitute significant differences in the quantity of material, and where locale boundaries may lie. The further problems inherent in a database collected by Hall (1987) and Sylvester's (1988) methods are discussed more in chapter 7.

2.4.2 Biases in Visibility and Recovery

Distortions in the composition and distribution of fieldwalked groups caused by variability in surface visibility and collection have been noted for some time (eg. Hirth 1978). Surprisingly, however, they are still probably the least well understood biases affecting recovered artefact assemblages. These biases can essentially be divided into two groups;

those affecting the quantity of material visible on the surface, and those caused by differences in the ability of individual surveyors to recognise and collect the artefacts under study. Many of the factors affecting the former have already been outlined in sections 2.2 and 2.3 but other sources of bias do exist.

The effects of soil erosion and colluviation on the horizontal distribution of artefacts have been noted, but their influence on surface visibility is further illustrated here (fig. 2.9). A hypothetical situation is portrayed in which sherd density per unit volume is initially even across a field (fig. 2.9A). Common low energy erosion events gradually increase soil depth at the foot of slopes with a corresponding decrease on hill crests. As soil fines are stripped from the upper slopes of the field, artefact density in these areas increases leaving higher numbers of sherds exposed on the surface. Soil deposition at slope bottoms has the reverse effect and can eventually lead to some objects being permanently buried beneath ploughing depth (fig. 2.9B). This effect, observed by Boismier and Reilly (1988) at Fair Oak in Hampshire, is however further complicated by the action of higher energy erosion events like gullying which remove artefacts from narrow bands of soil within the field and deposit them in gravel fans at a major break in slope (fig. 2.9C). This can, in theory at least, initially produce small low density concentrations of abraded sherds on the surface which would decrease with subsequent ploughing in of the fan. Thus careful consideration of the effects of geomorphological change on the surface visibility of artefacts should be an important part of intensive survey designs, in order to remove spurious patterning in the material collected.

The effect of ground conditions at the time of the collection process has rarely been studied in detail. A number of recent surveys have noted its probable significance by describing surface conditions in each field, but most are not yet published or do not attempt to assess the information in depth. One exception is the East Hampshire Survey (Shennan 1985), where a wide range of factors including ground conditions, soil type, moisture, light, and land use were all recorded and then used in a series of regression analyses. These were intended to statistically 'explain' which variables in collection caused the majority of variation in artefact densities. Although the analysis contained a series of inherent flaws, including the large number of zero values that had to be removed and the use of rank-order or categorical descriptions for many of the variables, it may indicate some of the more likely sources of bias.

The regression analysis of the Romano-British pottery (the most relevant to this discussion) indicated that light conditions accounted for 33.8 percent of the variation explained and Shennan suggested that the colour of the pottery may have been responsible (1985, 39). One concern, however, is that Shennan's Roman pottery samples were very small and that the results of the analysis may have been spurious. Possible support for this view is provided by similar analyses of the medieval pottery, post medieval pottery, chipped stone and burnt flint, which indicated that light conditions were not even remotely significant a source of variability.

The East Hampshire survey also recorded the extent and nature of ground cover by vegetation, a possible bias often noted in field survey (eg. Hall 1987). None of the regression analyses showed it to be a major factor affecting artefact recovery except in the collection of medieval pottery, where it accounted for a meagre 2.1 percent of variability. The results of Shennan's analysis seem to suggest ground conditions may be exaggerated as a source of bias in artefact collection. Unfortunately, though, they only indicate that there is no linear correlation between the ground conditions and artefact variability. The examples cited by Hirth (1978) and particularly Haselgrove (1985) indicate that the opposite may be true. At Beaurieux Les Grèves (BLG), Haselgrove illustrated how the masking effect of stubble over part of the site produced potentially highly misleading artefact groupings. An inspection of the results of the collection (Haselgrove 1985, fig. 1.5, 22) supports this view. Unfortunately Haselgrove's description of ground conditions at BLG constitutes a solitary example of such analysis and one in which surface visibility was particularly bad. At present the serious lack of available information on the extent of possible collection biases such as these prevents any firm conclusions about how best to account for them.

The same could be said for another of the problems in collection, namely differences in individual recovery rates or what Shennan termed 'Walker Effects' (1985, 40). That is, how significant a part of the variability that we find between collection units is a product of differences between individuals and crews in artefact recognition? This problem has long been identified in field survey (Plog *et al.* 1978) and excavation (Payne 1972; Clarke 1978), but again there are few cases of studies which attempt to assess the problem. Shennan, on the basis of further regression analyses, believed 'that inter-walker variation is a fairly minor source of variation in fieldwalking results, but that it is definitely present' (1985, 43). He also noted that, whilst some

walkers were better at recovering burnt flint and chipped stone, they were not necessarily more effective at collecting other materials. Thus, individual walkers are by no means equally good at picking up different materials. This problem obviously has important implications for multi-period surveys involving the collection of a wide range of materials. The main concern here, however, is whether individual differences are still a significant bias in collecting material which is broadly of a similar type such as late iron age and Roman pottery. Initial results from the Aisne valley survey (Haselgrove 1985) suggest that they are. Haselgrove analysed the results of fieldwalking by two teams in adjacent zones (A & B in fig. 2.10A) of the iron age and Gallo-Roman site at Beaurieux Les Grèves. He concluded that individual performance clearly influenced artefact recovery, with the inexperienced team (in zone B) collecting less iron age and Roman pottery (fig. 2.10A & B). Haselgrove outlined two ways in which this bias could be compensated for; first, by replotting the Roman pottery collection results from the two areas using their separate means (fig. 2.10C), and second, by working in terms of the relative proportion of iron age pottery from each individual square (fig. 2.10D). Though the latter approach is dependent on variations in the quantity of more common fabrics, both methods appear to produce more satisfactory results. Haselgrove used this proportional method to suggest that the main locus of iron age activity was still to be found in the zone walked by the experienced team (cf. fig. 2.10A and D).

The use of proportions in this way has much to commend it, but does not account for differences in artefact recognition between individuals within either of the two zones. The proportional method also presumes that the inexperienced team are equally less adept at collecting other artefacts (such as Roman pottery), an assumption already challenged by Shennan (1985). Thus possible anomalies in the proportions of iron age material within the zones walked by the experienced team (A in fig. 2.10A) and the new team (B in fig. 2.10A) may not be genuine but rather a product of individual bias. Haselgrove's analysis could be extended to incorporate relative proportions collected by individuals as opposed to teams. Such detailed calibration exercises require a greater number of surface collection units than were available at Beaurieux Les Grèves but could be part of larger scale surveys where an individual worker will walk many units spread over the survey area. Results from tests like these must be used with care, preferably in conjunction with the absolute quantities of material collected and trial excavations designed to act as a control. Checks on biases in visibility and individual recovery

such as these can easily be incorporated into survey design, but should not be isolated from similar studies of the effects of post-depositional processes (see sections 2.2 & 2.3). By accounting for distortions in the artefact assemblages recovered from ploughed fields, subsequent analysis and interpretation will be more reliably based on archaeological variation. One way of smoothing out such a bias may be to group the finds collected by the members of a team into single collection units, a practice used by Hall in the Fenland.

2.5 ASPECTS OF POTTERY ANALYSIS AND INTERPRETATION

Once a series of artefact assemblages have been collected by fieldwalking, there is still the critical question of how to study them. The analysis of later prehistoric and Roman artefacts collected by field survey in Britain has long been a rather neglected area. For earlier prehistoric periods, lithic assemblages have been intensively studied for their use as chronological, technological, and functional indices (eg. Schofield 1987; 1988; Holgate 1985; Zvelebil *et al.* 1987; Shennan 1985; Gaffney & Tingle 1989). Similar work on the ceramic dominated assemblages of the iron age, Roman and medieval periods in Britain has, in comparison, lagged behind. There are a number of useful exceptions to this, but each has only partially investigated the data. Some have carried out detailed studies of the spatial distribution of the ceramics (eg. Gaffney & Tingle 1989; Williamson 1984), others their fabric and chronological breakdown (Halkon 1987; Green in Hayfield 1987), but rarely both. Although there are probably as many attributes in a group of ceramics as we choose to select, there are a smaller number of features more commonly recorded. At the heart of any decisions about the quantification and classification of ceramics lies the essential purpose of the study. What do we want to understand from the data? In the context of this study it is to help characterise differences in the patterns and nature of past activity across the landscape. Surprisingly little work has attempted to use ceramics for this purpose in Britain, but section 2.5.1 outlines key characteristics of ploughsoil artefact assemblages and their strengths and weaknesses. These are then linked to common issues of quantification, (section 2.5.2), classification (2.5.3), and spatial distribution (2.5.4).

2.5.1 Ploughsoil Artefact Scatters and Interpretation -

Up to now discussion has centred on the derivation and unique nature of ploughsoil assemblages. Here, I wish to consider the implications this has on the interpretation of field-walked assemblages for landscape studies. In particular I wish to note five characteristics of field-walked pottery that I consider to be of special significance. First, they have been removed from the conventional stratigraphic contexts that we use to spatially define past actions from excavation. As a consequence, survey data have to be spatially grouped using other schemes based on arbitrarily defined collection units. The size of each collection unit restricts the level of characterisation of past activities to the area of one unit or larger, an aspect of survey interpretation that is still very poorly understood. If we are to better use field-walked data, it is essential that we start to study the spatiality of depositional activity and how this may be reflected in ploughsoil assemblages.

Second, pottery in the ploughsoil is derived from a specific range of contexts that usually lay on or near the ground surface. These were a consequence of a particular range of activities that is not necessarily comparable to those relating to deeper contexts. Until this insight is more widely considered, we will continue to make the mistake of considering ploughsoil assemblages as proxy indicators for surviving archaeological sites. In fact, they are a valuable index of periods or places where acts of surface deposition were pre-eminent and warrant consideration in their own right.

Ploughsoil processes also homogenise assemblages of ceramics producing aggregate groups that usually still preserve some spatial integrity. The material from a collection unit is thus the summation of a range of depositional activities that occurred in its vicinity but that can have undergone compositional changes. Though this presents certain problems, in some ways ploughsoil assemblages may be a better guide to the overall nature of occupation across a specific space than the very context-specific material retrieved through limited excavation. Those collection units derived from foci of dwelling, for example, may provide more valuable information about the total supply of pottery to a place than do large quantities of material recovered from the excavation of one building.

The continuous spatial recovery of material enables us to assess the continuity and discontinuity of activities in space and helps break the site orientated philosophy that hampers a

contextual understanding of places. This is probably the best understood characteristic of field-walked assemblages, but suffers from a lack of theoretical development. Thus, for example, a great deal of time and effort is expended on the empirical definition of what constitutes a site without consideration of the fundamental issue of how changing densities of pottery actually relate information about past activity.

Finally, the speed of survey allows large areas to be sampled. The lack of contextual and quantitative information is thus balanced by the added advantages of spatial information. In particular, survey data are ideal for inter-activity foci comparisons and the analyses of the wider use of space between them. Survey's great strength was noted by Foley (1981a), but it is surprising how in British surveys of ^{the} Roman period in particular its analytical possibilities have so often been neglected in favour of the continued hunt for 'sites'. Though this is undoubtedly changing (cf. Hayes 1991), I suspect that this is a reflection of the excavation-based, monument-orientated philosophy that still lies behind so much work on rural settlement of the period.

If we are to improve the interpretation of field-walked surveys, these issues need to be considered as positive challenges. Ploughsoil artefact distributions are not the poor relation of excavated groups but a different and equally valid dataset, a point that has long been recognised for earlier prehistoric periods in Britain (eg. Schofield 1987) and for the larger assemblages available in the Mediterranean region (cf. Keller 1983). Many of these issues are discussed further in the context of the case study (chapter 7), but here I want to briefly consider three aspects of survey methodology at a general level.

The simple quantification of ceramics according to assigned fabric and/or form classifications and their recording by context or phase, is a commonplace in excavated assemblages but, until recently, was rarely practiced in field survey in Britain. This may partly stem from the poor quality of fieldwalked assemblages in this country, but little effort has been expended on trying to tell just what their limitations are. The following account is not intended to be a full reassessment of the classification and quantification of pottery from field-walking, or a prescriptive list of those attributes which should be analysed. It is designed rather to outline aspects of the ceramic groups which, partly from an understanding of the points raised in this chapter, I believe to be basic concerns for those interested in interpreting artefact scatters.

2.5.2 Quantification

Pottery quantification is important for a range of descriptive, inferential and comparative purposes (outlined above and in sections 2.5.3 & 2.5.4). Most quantitative studies of pottery are basically simple listings of numbers of sherds in different ceramic categories, such as fabrics or forms, which are assigned by the researcher. The intention, whether phrased in absolute terms or as relative amounts, is to represent the number of vessels that are present or the amount of pottery in a particular collection unit. A wide variety of techniques have been proposed, from simple counts and weights (eg. Solheim 1960; Evans 1973) to more complex methods producing adjusted weights (Hulthén 1974) or estimated vessel equivalents (eve) based on measurement of rims, bases, or handles (Millett 1979a; Orton 1975; 1980; Orton *et al.* 1993; Egloff 1973; Plog 1985).

There has been considerable debate as to the respective merits of each method. Millett (1979a) compared counts, weights, adjusted weights, maximum number of vessels, and minimum number of vessels using Pearson's correlation coefficient. He demonstrated that the different methods produced highly correlated results, but argued for the use of counts and weights because of speed and ease of application. Orton (1982), however, pointed out that such an analysis only compared different measures with each other and not with any objective standard. On the basis of a series of computer simulations, he suggested that estimated vessel equivalents was best as they were unbiased estimators, but that sherd counts and weights were next as their biases were predictable and could be corrected. Vessel estimates based on maximum number of vessels were least favoured because of unpredictable variation in bias. More recently, a research programme by Orton and Tyers (1991; Orton *et al.* 1993) has produced more sophisticated estimates based on eves.

All the published reviews of quantification were carried out on, or with, excavated assemblages in mind. In order to consider a method's applicability to field survey assemblages it is important to bear in mind significant differences in the nature of the latter. Problems arise in the use of eves for a number of reasons. The highly fragmented nature of fieldwalked pottery means that those rim sherds that do survive tend to represent 5 percent or less of a vessel. In this situation the vessel's diameter is almost impossible to estimate and thus each eve measurement is unreliable (Plog 1985). Efforts to measure bases for eves also present

considerable problems due largely to the low densities of pottery usually recovered by fieldwalking in Britain. As each recorded group tends to have few small diagnostic rim or base sherds, the effects of a complete base (surviving intact due to its extra thickness) on the eve score can be marked. In practice it can lead to inconsistencies between proportions of a particular type of pottery recorded by eve as opposed to counts or weights (Taylor in prep.). A recent re-evaluation by Evans (1991) has suggested that in groups where minimum numbers of vessels estimates suggested figures of 30 or more vessels are present, sherd counts and weights are reliable comparative quantifiers. For excavated groups, Evans suggested that this is often around 50 sherds (1991, 70). The evaluation noted above (Taylor in prep.) has, however, indicated that in British field-walked groups, virtually every sherd is from a separate vessel. Using Evans' criteria, therefore, suggests that in most cases sherd counts and weights are reliable in groups of approximately 30 sherds. It might seem more useful to adopt minimum vessel numbers estimates, but practical difficulties arise over the length of time required to carry it out. Also, as sherds are grouped together on the basis of whether they might be from the same vessel, the method is somewhat subjective, with a likelihood in larger groups that different people will arrive at different figures (Millet 1979a).

Sherd counts and weights are the most commonly used methods of quantification. Both are quick and simple to carry out and correlate well with other methods. The problem is knowing how consistent they are as measures of quantity. For example, do two similar sherd counts from different contexts represent a similar number of vessels or quantity of pottery? We do not need to know the absolute number of vessels, an estimate's accuracy, merely that they are comparable. In this context it is important to consider the major causes of variation in the two forms of estimate.

The number of sherds recorded from a context is not a direct indicator of the number of pots present (cf. eve), but a product of their fragmentation. If the extent of breakage between groups differs greatly, then sherd count comparisons can be misleading. This could constitute a serious problem when contrasting assemblages from, for example, separate fields which may have been subjected to very different agricultural regimes, or if comparing fabrics with varying resistance to attrition (section 2.3.1.). Quantification by sherd weights is less affected by artefact fragmentation as the proportion of a vessel present is broadly the same whether in two sherds or

twenty. Variation occurs when the range of vessel sizes in a particular fabric is large. Heavier vessels are always over-represented and, if present only in some of the recorded assemblages, will distort the relative proportions of different fabrics. Thus weighing small artefact scatters containing fragments of greyware storage jars, for example, will cause all the other types in that assemblage to appear to be under-represented, particularly if converted to percentage of total assemblage. In general, the smaller the assemblage the greater the problem becomes and when dealing with fieldwalked material it is particularly pertinent to be aware of this. Some possible approaches for assessing these recording biases in practice are discussed in more detail in chapter 7.

One of the side effects of recording both counts and weights is that the sherd size distribution of a group of pottery can be analysed. This simple statistic provides an index of the degree of fragmentation of an assemblage and can be used for studying both post depositional processes and past human activity. In reality the measure is of sherd weight and thus susceptible to the same biases as were outlined above. It can, however, be used to assess the degree of reworking an assemblage has undergone and may help identify areas of recently exposed archaeology by picking out groups without the size characteristics of heavily worked groups illustrated by figures 2.4 and 2.6. To date no such analysis has been published about fieldwalked material, but a simple case study was carried out on groups of pottery from the case study and from a similar survey in East Yorkshire and is currently under assessment (Taylor in prep.). The lowest level of precision recorded is a final possible bias in recording sherd weights that is frequently overlooked. Weighing machines that record with a precision poorer than plus or minus five grammes can seriously affect the accuracy of results based on groups of small sherds as the error starts to represent a significant part of the total weight of each class recorded.

2.5.3. Classification and Pottery Function

Classification depends on the selection of attributes by which items, in this case ceramics, can be grouped together for the purposes of naming, organization and comparison. Most such methods are dependent upon devised, formal or scientific classifications created by the analyst (Rice 1987). The problem is to decide whether a particular classificatory framework bears any resemblance to past cultural usage. This is highlighted when attempts are made to

reconcile devised classifications with 'folk' classifications in which artefacts are grouped according to native as opposed to scientific criteria (Rice 1987). The following ancient Chinese classification of animals is a useful reminder of how difficult it can be:

'Animals are divided into (a) those that belong to the Emperor, (b) embalmed ones, (c) those that are trained, (d) suckling pigs, (e) mermaids, (f) fabulous ones, (g) stray dogs, (h) those that are included in this classification, (i) those that tremble as if they were mad, (j) innumerable ones, (k) those drawn with a very fine camel's hair brush, (l) others, (m) those that have just broken a flower vase, and (n) those that resemble flies from a distance'. (Borges, *Other Inquisitions: 1937-1952*, quoted in Rice 1987, 277-8).

Ethnographic examples of native pottery classifications are not usually as complex as this and recent studies suggest that terms for pottery are almost invariably based on their projected use (eg. Longacre 1981; DeBoer & Lathrap 1979; Kempton 1981). If this is true for archaeological groups, then the functional analysis of ceramics is of major concern as, for example, it could be useful in determining the nature of activity at various locales across the landscape (cf. section 2.5.1). In order to do so, we need to select attributes which approximate to the original uses of the pottery. To date, next to no work has been done on tackling this problem in Britain. Haselgrove (1985, 17) among others suggested the division of pottery into fabric classes reflecting finewares, every-day wares and heavy duty vessels as one possibility, but acknowledged that such categories are highly subjective. Some possible empirical support for the validity of this form of classification, however, is given by Evans' (1987) study of graffiti on pottery. Most attempts at functional interpretations of pottery have been based on categorising vessel fabrics and forms and then applying descriptive labels to them such as dish, bowl, jar, and beaker (eg. Millett 1979b). The application of these terms tend to ascribe a function without clear indication that such was the vessel's use. Thus an implicit association between form and function is emphasised.

Ethnographic research shows that particular vessels often have a wide range of functions which vary according to their context at a given moment in time, so it is important to look at alternative methods for assessing whether particular forms (or fabrics) relate to a limited range of functions. This is an extremely difficult task, but some useful hints may be found by interpreting function from contextual information in excavations or from direct evidence of use

through the identification of contents (Shackley 1982; Rippengal-1995), use wear analysis (Griffiths 1978) or the presence of fireclouding and sooting (Hally 1983). Though these techniques are themselves problematic, they are essential if form and fabric classifications are to be used with any confidence for functional interpretations.

Direct indications of use and contextual information are largely missing from ploughsoil pottery scatters. Here, functional interpretations are dependent upon the reliability of the classificatory scheme as an indicator of original use. Until more is done, any form of classification chosen in order to study the original functions of pottery recovered by fieldwalking will be highly subjective and based on a series of untested assumptions (cf. chapter 7). Whatever form of classification is chosen, the limitations of field walked assemblages will ultimately force them to be simple if they are to have any practical validity.

2.5.4. Pottery Distributions

The main reason behind wishing to understand pottery functions in the study of ploughsoil scatters in this thesis is in order to help characterise the range of activity present in a landscape. By analysing assemblages' composition, distribution and density, it is usually hoped to identify 'activity areas' (Schofield 1991b) or the ubiquitous 'site' and then discuss the spatiality of human action. To do this it is essential to define what constitutes an activity area (or locale) and consider whether surface artefact distributions are the most appropriate tool to use. As has already been outlined, surface scatters are not a uniform or unbiased guide to the original and surviving archaeology of an area (cf. sections 2.2-2.4).

If we characterise the places of past landscapes by surface artefacts alone, then we must be aware of the biases that this involves. Even in artefact rich periods and regions, such as the Roman period in lowland England, buried archaeological remains are often not ploughed up and so are invisible to fieldwalking. The distribution of surface artefacts does not represent the full variety of activity locales in a landscape but merely those parts that:

- a) led to the deposition of durable artefacts
- b) have subsequently been exposed by ploughing, and
- c) been recorded by the archaeologist.

Some of these problems can be accounted for by investigating the processes mentioned earlier (sections 2.2-2.4), but it is important to recognise that a number of past activities will have left no surviving artefactual trace or one that is not represented in ploughsoil assemblages. Therefore any methods devised to identify and interpret past landuse from surface assemblages alone will only be partial evaluations unless attempts are made to evaluate the blanks in the record. If we are to define activities on the basis of empirical definitions, we should state the theoretical considerations behind them.

One alternative is to think about the range of other traces left behind by the use of past locales. Obvious possibilities include the use of air photographic survey to identify architectural features (chapter 3), geochemical analysis, and geophysical survey by magnetometry and resistivity (Chapter 4). Each of these techniques identifies traces of human action which are often complementary to the artefactual record. The study of surface artefact distributions should thus be one important element in survey, not its entirety. Several aspects to this approach were discussed within a more explicitly theoretical framework in Chapter 1 and are important to understand in relation to the approach adopted for the case study (Chapters 5-7).

CHAPTER 3: AIR PHOTOGRAPHY AND LANDSCAPE ARCHAEOLOGY

3.1 INTRODUCTION

Aerial reconnaissance has the potential to be a uniquely powerful technique for the discovery and identification of buried archaeological remains across the landscape. Over the past 60 years it has resulted in the recognition of literally thousands of archaeological monuments and landscape features, most graphically illustrated by the Royal Commission's report on England's major river valleys (Bowen & Butler 1960), and emphasised by subsequent regional surveys (eg. Webster & Hopley 1965; Benson & Miles 1974; Gates 1975; Richards 1978). These surveys highlighted the extent of crop mark evidence and had profound implications for the ways archaeologists viewed the complexity of settlement in rural Britain. Archaeological sites could no longer be seen in isolation but as components of far larger ancient landscapes which could only ever be partially excavated or preserved. Given the obvious need for a change in approach to the investigation of rural settlement and landuse, it is somewhat surprising that so few subsequent surveys have explored the landscape as a whole rather than concentrating on interesting or distinctive features within it. Examples of the latter, 'single site' approach (Whimster 1989), have ranged from neolithic causewayed enclosures (Wilson 1975; Palmer 1976), cursuses, long barrows and mortuary enclosures (Loveday & Petchey 1982; Marsac *et al.* 1982), bronze age round barrows and ring ditches (Lawson *et al.* 1981), and henge monuments (Harding & Lee 1987) to iron age square barrows (Whimster 1981), defended farming settlements (Smith 1974; Barrett 1980), the Roman military fortifications of northern Britain (St Joseph 1976) and Romano-British villas (Wilson 1974). A number of these studies have provided useful insights into the characteristics of certain site types, but there are several shortcomings with their methods.

In isolating individual features for study, they are removed from their local contexts, which may include important information about, for example, their spatial relationships with other landscape features, whether of similar or different kinds. If we are interested in the totality of rural settlement and landuse, this approach constitutes a serious handicap to our understanding. Furthermore, single site approaches tend to be dependent upon an assumption that similarity of

crop-mark equates with similarity of date and function. Though this may be true when dealing with types well known from ground-based survey and excavation within smaller regions, it becomes increasingly questionable when used over wide geographical areas, with morphologically simple forms, and without supporting information. The need to isolate a visually distinctive form for single site analysis also biases attention towards features like villas or henges and away from less morphologically distinctive, but far more ubiquitous forms such as single ditched enclosures. This constitutes a serious handicap to the use of air photographic survey in analysing the diversity and complexity of past landscapes.

One way of avoiding some of these problems is to map the entire archaeological content of an area and some of the earliest studies followed such an approach (Crawford 1924; Allen 1938; 1984; Hawkes 1939a; Riley 1944). The successors to this landscape approach, the regional surveys of the 1960s and 1970s mentioned above, have tended to settle for the basic photo-interpretation and mapping needed for archaeological management by county units through their sites and monuments records. The majority produced simple plots of the information on to small scale maps such as those for the Thames valley surveys, which are of insufficient accuracy or detail for longer term research requirements. Much of this problem is now being addressed by the Royal Commission on Historic Monuments' target of mapping the whole of England at 1:10,000 scale, although this too is largely for descriptive purposes.

Recently, four studies have investigated the potential of mapping approaches in more detail. The first, by Derrick Riley (1980), recorded the wealth of crop-marks appearing on the Bunter sandstone of north Nottinghamshire and south Yorkshire and discussed the extensive system of fields and enclosures he discovered. The second, a survey by Roger Palmer (1984), reviewed the information from the Wessex chalklands around the iron age hillfort of Danebury, Hampshire. Whimster (1989) incorporated two surveys of radically different regions, one in the upland/lowland transitional zone of the Welsh Marches, the other along the gravel terraces of the Trent valley in Nottinghamshire. The fourth and perhaps most useful attempt at a landscape survey from the air was Brongers' (1976) study of Celtic fields in the Netherlands. Although covering markedly differing landscapes, these studies all had a common aim expressed by Whimster as 'the tentative reconstruction of an archaeological landscape through the morphological and spatial analysis of its numerous undated and unexcavated fields, land

boundaries and farmsteads' (1989, 2). In this respect they constitute the most useful attempts to investigate regional rural settlement and landuse through air photography to date. Each perceived the need to identify and present the archaeological evidence in the form of accurate maps, thus displaying it in its spatial context, and attempted to identify observable patterns and relationships within that evidence. It is this approach, and its inherent limitations, which need to be further discussed if we wish to advance our understanding of past settlement patterns and organization of the landscape within the context of the aims outlined in Chapter 1. In particular, this requires an assessment of air photography's utility as an analytical technique to investigate the purpose, date and spatial relationships of architectural spaces across the landscape.

The following sections aim to outline the practicalities and biases of air photographic reconnaissance as one of a range of tools available for the analysis of landscape architecture in iron age and Roman Britain (cf. chapter 1). Section 3.2 covers the problems encountered in observing and recording surviving archaeological evidence through air photographic survey. This is an aspect of the subject which has been extensively discussed over the years by the small number of specialists involved. The cumulative effect of such source criticism has been to construct a considerable body of knowledge which can be included in the preliminary stages of a survey. Any subsequent interpretations can thus be based within a largely qualitative appraisal of the non-archaeological biases affecting the survey data.

The succeeding section (3.3) then addresses questions which arise during the initial interpretation and plotting of features onto maps for the purposes of further archaeological research. This raises questions of methodology and is aimed at outlining some practices which aid subsequent analysis of the plotted images or their investigation through associated field programmes. No one methodology is either practicable or, frankly, desirable for all purposes, but the points raised below should stimulate debate about why we record and present air photographic images in the way we do. The chapter is then extended, with some suggestions for analyses which can be carried out using the landscape approach described in chapter 1 as a starting point.

3.2 RECONNAISSANCE HISTORY AND THE RELIABILITY OF AIR PHOTOGRAPHIC EVIDENCE

There are two major prerequisites for the recovery of archaeological information from air photography:

- a) archaeological features must be visible to observation from the air;
- b) they must be identified and recorded by an airborne observer in the right place at the right time.

These critical factors, defined below as reconnaissance history (section 3.2.1) and archaeological visibility (3.2.2), affect the reliability of all subsequent analysis. They lead to biases in the density and distribution of recorded information which are important to understand in order to qualify our descriptions and interpretations of locales and landuse across a given region. By documenting and applying this often mundane but significant information, we can, therefore, carry out a form of source criticism. As well as tempering subsequent archaeological interpretation, it can also act as a stimulus to further research. Having identified zones of strength and weakness in the air photographic record of an area, they can be targeted for assessment by secondary aerial reconnaissance (if previously poorly covered) or alternative ground-based survey techniques (cf. chapter 4).

Recording the reconnaissance history of an area allows an assessment of the quality of existing archaeological coverage to be made. Documenting the factors affecting the visibility of the archaeological evidence, on the other hand, produces an archive of the potential for air photography across the region under study. Biases in the former can be corrected by further aerial reconnaissance, the latter cannot. It is partly for this reason that they are dealt with separately below.

3.2.1 Reconnaissance History

The need for some form of assessment of the photographic history of crop and soil mark groups has been recognised for quite some time by specialists in the field (eg. Hampton & Palmer 1977; Palmer 1978). It was not, however, until recent reviews of this problem by Whimster (1983; 1989) that a range of practical methods for judging the quality of existing

coverage was suggested. Whimster noted three relatively simple ways of doing this by measuring:

- a) simple annual numbers of 'new discoveries';
- b) the frequency with which individual crop mark sites or interpretation and mapping units (IMUs for short) had been photographed by more than one flyer or in more than one season;
- c) the annual ratio of discovery to repeat photography of previously recorded IMUs (Whimster 1989, 11).

The simple figures for the number of new crop mark sites in each year give a crude indication of the variable rates of discovery over time. They are closely linked to the number of hours flying time in any year and the annual variability in conditions for crop and soil mark formation. Though this can be instructive in itself, it is more useful for landscape surveys when plotted as a distribution map of discoveries over time. By doing this it is possible to get an idea of where past and existing air reconnaissance has tended to concentrate. An example is illustrated in figure 3.1, where information from the Welsh Marches survey was plotted in just such a way. The problem with a map like this is that it is impossible to be certain that gaps are not just a reflection of crop mark variability, as photographs are only taken of fields in which archaeological features have appeared. If these data were linked with records of flying time and flight paths, it would be relatively easy to identify, at a large scale, areas which have received scant attention in the past. Unfortunately, such details were either not studied or not available to Whimster. Such an approach is admittedly a very coarse assessment of reconnaissance history, but helps identify areas which have rarely been crossed by archaeological air photographic survey flights. Glenn Foard adopted such an approach when publishing information on five seasons reconnaissance in *Northamptonshire Archaeology* (Brown 1980; 1981; 1982; 1983). By combining several seasons flying data it was possible to build up a picture of the varying density of coverage in terms of the number of times an area is flown (see fig. 3.2). This, at least, is a crude estimate of the reliability of coverage by air reconnaissance.

A measure of the frequency with which IMUs have been photographed by more than one flyer or in more than one season can be used in a similar way. Recording the number of times an IMU was photographed gives an impression of the intensity of survey in those areas

and was used by Whimster to show how, in the Welsh Marches, reconnaissance was still heaviest around known areas of Roman military and civilian activity (1989, 12-15). This measure, however, is also biased as it assumes that the repeated coverage of a known IMU equates with reconnaissance of the surrounding area. Although this is probably true for fields in the immediate vicinity, it is not necessarily so for areas further away. Therefore, just because certain crop mark sites in the lower Clun valley have been intensively photographed does not mean that the valley itself has been intensively surveyed. It is dependent on whether the IMUs in question were photographed as part of a general reconnaissance flight, or had been specifically targeted for photography for detailed research or simply because sites were known (eg. Jones 1973). This distinction between general reconnaissance, and repeat photography of known sites, is important as it has a bearing on the third method of assessment used by Whimster.

Comparison of the annual frequency of discovery with the repeat photography of known IMUs was designed to indicate the rate at which undiscovered sites were being recorded through time. An advantage of the technique is that it smooths out fluctuations in discovery caused by variation in the intensity of total annual reconnaissance and thus gives a better picture of the rate at which new sites are being identified. By studying the trajectory of a graph of the ratio of discovery to repeat photography through time, an impression is gained of the potential profitability of further general survey. Riley (1987), after 11 years study of north Nottinghamshire and South Yorkshire, noted that though new discoveries were being made they had become increasingly rare. He suggested that a point is reached when the time spent searching for new discoveries within a region becomes too expensive for the extra rewards involved. Subsequent flying should then concentrate on more detailed, problem-orientated, survey. The ratio method can be used in this context as an analytical tool to aid such a decision. Whimster (1983) used it to show that in the very well surveyed Cambridge region the rate of new discoveries had dropped to 35 percent by 1974, but that the decline was still slow. A similar picture emerges from the Welsh Marches survey, but in the Trent valley the rate had fallen to 10 percent by the mid-1970s (Whimster 1989, 12). It is, however, important to remember that the rate at which new discoveries decline will also be dependent on the varying susceptibility of different areas to crop mark formation. The point at which new crop mark discoveries decline rapidly is a combination of the extent of coverage and the frequency with which a particular crop mark will show.

There are two further points that need to be raised at this juncture. First, the ratio method is itself susceptible to bias because, as previously mentioned, it may be markedly affected by the type of reconnaissance that is being carried out in a region. If, as often happens when flying time available is limited, flights are concentrated on zones where crop marks are known from previous reconnaissance, then the chances of making new discoveries are decreased and the ratio affected proportionately. It is, therefore, important to note whether flights are designed for general reconnaissance or problem-solving and to assess the rate diagrams accordingly. Second, any decision to switch the emphasis of survey towards specific questions must take account of the need for further broader work in either exceptionally dry years, when areas not normally susceptible to crop mark formation may reveal important extra evidence, or when regional farming regimes change. This is particularly important in wetter parts of the country where drought years or change to arable cultivation can reveal proportionately very high numbers of new discoveries.

3.2.2 Archaeological Visibility

Archaeological features appear on air photographs in three main forms; as crop marks, soil marks and earthworks. Upstanding earthworks may, in theory, be photographed at any time, but are most effectively recorded in winter when covering vegetation is low and topographical features are thrown into high relief by long shadows. If survey is sufficiently thorough and overlying vegetation not too thick, then the total surviving record of such features should eventually be recordable.

Archaeological sites which have been levelled by cultivation present more complex problems and are by far the most common features in the predominantly arable farming land of eastern England. Unlike earthworks, these show only as marks in bare soil or as variations in crop development. The factors responsible for their formation are complex and often unpredictable and require evaluation in order to understand how reliable they are as a sample of the surviving archaeological record. To assess the density and distribution of crop and soil marks, it is important to study the geographical factors affecting their visibility and to propose practical approaches to account for them.

For crop marks of geological or archaeological origin to show, growth differences must be sharply developed within a particular crop. To understand the vagaries of crop mark formation it is important to note the factors which affect crop growth. Nationally, or at a regional scale, when topographical or altitudinal variation is significant, climate is an important determinant of crop growth. Temperature is a major factor in crop development, but is rarely responsible for measurable differences at a field scale. These variations are most commonly due to varying supplies of available soil moisture, which are governed by precipitation, water holding capacity of the soil, availability of ground water, and evaporation and transpiration. When potential transpiration exceeds rainfall, the difference is called potential 'soil moisture deficit' or SMD (Green 1964; Jones & Evans 1975). Actual soil moisture deficit is difficult to measure, but potential SMD can be easily calculated by using mean monthly rainfall data and mean potential transpiration figures estimated by Penman's method (discussed in detail by Smith 1967). These data can be used to predict when crops will be short of water. During water stress the growth of leaves are affected first and subsequent variations in leaf area index are known to be the most common cause of distinct crop marks.

Although understanding climate helps to predict variation in crop growth seasonally (Evans 1974) and regionally (Green 1964), field growth is controlled by soil fertility and the ability of different crops to cope with water stress. Extensive work during the 1970s and 1980s by the Soil Survey of England and Wales has demonstrated which crop types and soil associations tend to form crop marks and the relative frequency of their occurrence (Evans 1972; 1980b; Evans & Carroll 1976; Evans & Catt 1987). This allows us to map the localities where crop marks are likely to occur within a particular survey region and is also useful in explaining apparent blanks in the visible record. They do not, however, allow us to determine whether they will occur in individual fields, because of localised variability in soil and crop types and especially variation in drainage caused by changing soil depth and topography. Such an exercise, therefore, is largely a qualitative appraisal of the main biases in crop mark formation over the survey area as a whole. Evans (1990b) suggested five levels of crop mark visibility which have been applied to the soil associations covered by the Northamptonshire case study. These are shown in table 3.1. If this information is converted to map form (see fig. 5.14), it can be used to shape further reconnaissance to get the most out of increasingly limited resources.

Table 3.1: Crop mark visibility across the soil associations of Northamptonshire (data from Evans 1990b).

Levels of crop mark visibility	Soil associations (from Hodge <i>et al.</i> 1984).
i) Frequently and extensively recorded.	343a, 343b, 343d, 511a, 511b, 511i, 541r, 543, 544, 571u, 572g, 573a.
ii) Extensive only in dry years.	None.
iii) Frequently recorded but cover small areas.	411c, 411d, 572h, 711f, 711t, 712b, 712g, 813b.
iv) Occasionally or rarely recorded	511j.
v) No crop marks recorded.	None.

Soil marks appear on photographs as sharp tonal changes due to differences in surface colour and reflection. They occur on many soil types but appear most commonly on soils that are very reflective, such as chalk or silt Fen soils (Evans 1972) where the underlying subsoil contrasts enough to be visible when ploughed to the surface. For soil marks to appear to the naked eye it is necessary for the topsoil and subsoil to have significantly different tonal properties and to be close enough to the surface to be exposed by ploughing. The use of multispectral remote sensing is not discussed here as it is still largely an experimental technique. Thin, reflective soils are best suited to this and were listed in more detail by Evans (1972), Wilson (1981; 1982) and Scollar *et al.* (1990).

Soil marks rarely appear on clays as the soils and archaeological feature fills show little contrast. However, soil marks can still form on these soils if the archaeological materials being ploughed to the surface are themselves sufficiently distinctive. The classic example of this form of soil mark can be seen in the ploughing up of the chalk wall foundations of Gallo-Roman villas in the Somme recorded by Agache (1970). In lowland Britain, however, this is a relatively rare occurrence and plotting potential soil mark visibility is more a matter of understanding tonal contrast between ploughsoils and underlying horizons, and overall soil depth.

A final factor affecting both crop and soil mark visibility is the nature of modern landuse. This is one of the easiest problems to account for in any preliminary assessment of the air photographic potential of an area and can be a very significant source of bias in the plotted record. Many types of landuse can mask or destroy the archaeological record, but can be divided into four major types; built-up areas, woodland, quarrying, and agriculture. Indicating areas of masking caused by modern settlement and woodland can be indicated simply by plotting from Ordnance Survey and local authority maps of a relevant scale. Zones destroyed by quarrying and gravel extraction are less immediately obvious, but can be plotted from county council records, or as is now frequently the case, county Sites and Monuments Records. The destructive effect of extraction is best illustrated by a further example from the study region (fig. 3.3). In Northamptonshire the main causes are ironstone quarrying, particularly around Corby and Kettering, and gravel extraction along the Nene Valley. In certain areas of the county it is such a serious problem that landscape archaeology between Wellingborough and Thrapston, for example, is virtually pointless. On a regional scale, this information gives a useful guide to areas where relatively continuous tracts of landscape still survive and is especially useful when choosing sample areas for more detailed surveys (cf. Chapter 5).

Agricultural landuse presents a more complex problem, as the balance between arable farming and animal husbandry will affect the likelihood of earthworks, crop marks and soil marks being discovered. Areas of permanent pasture will tend to preserve earthworks unless they were subjected to significant levelling at some previous period by, for example, medieval cultivation. They are, though, notoriously poor areas for producing crop marks, except in particularly dry years. Areas of arable cultivation, and particularly cereals, are likely to have a much higher potential for crop marks but correspondingly poor earthwork preservation. At a field scale this balance is very difficult to assess as crops are rotated and areas come in and out of pastoral use depending on the economic climate. At a larger scale, however, the *Ministry of Agriculture, Fisheries and Food Parish Summaries* are a useful guide to the balance between arable, temporary grassland, and permanent or rough pasture. Figure 3.4 shows the balance in Northamptonshire in the late 1970s.

3.3 THE INTERPRETATION AND MAPPING OF AIR PHOTOGRAPHIC INFORMATION

Bradford summarised the aims and philosophy of air photographic interpretation neatly when introducing his section on 'Use of the Evidence': 'Whatever the form of the photographic or visual record from the air, the *end* is to make it an instrument of powerful archaeological policies; the *means* lies in a clear understanding of what evidence to look for and how to find it' (1957, 11). An interpreter needs to have an understanding of the properties of the recording medium used (almost invariably monochrome photographs), the forms of evidence they are likely to encounter, and the biases that occur in the act of interpretation (cf. Palmer 1978, 136-7). If bias in the first two can be accounted for by relatively simple analyses of photographic properties (eg. Jones & Evans 1975; Scollar *et al.* 1990) and archaeological visibility (section 3.2), then the act of interpretation is largely dependent upon the perceptive abilities of the individual (Palmer 1989). This is a very difficult area to assess and studies of human perception are a major element of much research in psychology. Training and experience are thought to improve a person's perceptive powers, but they also tend to lead to 'selective perception and the funnelling of attention to objects and events about which special knowledge and experience have been acquired' (Vernon 1971, quoted in Palmer 1989). Thus, individuals perceive a particular scene subjectively and no two photo-interpretations will necessarily be alike, especially if the interests of the interpreters differ. This has obvious implications for photo-interpretation based on the work of an individual, but is also important in highlighting the need to specify our research aims and in particular the basis of interpretations about what constitutes archaeologically significant detail. Those features selected for mapping will be the focus of further analysis and therefore it is important to keep a record of the reasons for decisions on uncertain points.

Having made initial identifications, it is usually advantageous to synthesize the information recorded on the photographs by plotting them onto a map. Maps display an individual or group's interpretation of the air photographic record in a form which is easily assimilated. They are, however, only an intermediate stage in aiding interpretation of past landscapes and are more descriptive than analytical. They show the range and density of

archaeology identified within a block of land in a reduced format and as a palimpsest. Any subsequent analysis must, critically, untangle the latter and interpret the shapes seen on the air photographs for their archaeological attributes. The challenge in air photographic interpretation is not ultimately to produce a map of the total archaeological record for an area but to have a methodology capable of *analysing and interpreting all the elements of human action displayed on it*. In the context of this thesis that involves the construction of methodology that:

a) aids efforts to isolate features that are likely to be from a specific chronological horizon (the iron age and Roman periods) and, where possible, to periods within it (section 3.3.1). Although the chronological control attainable in any landscape survey is limited, it is important to be able to subdivide the study period into shorter spans if we are to say anything significant about the development of iron age and Roman landscapes and society in the region;

b) enables features to be interpreted as various functional elements of landscape architecture such as habitation areas, field boundaries and roads or droeways (section 3.3.2). For the purposes of such an analysis it is necessary to be able to identify various elements as parts of an active and changing human landscape (cf. chapter 1). Only then is it possible to recognise, for example, patterns of agricultural exploitation, settlement, and social interaction.

3.3.1 Air Photography and Landscape Chronology

There are two key ways in which it is possible to order a palimpsest of crop and soil marks chronologically. Sometimes features are intrinsically datable by their particular form. Good examples of distinctive morphological types of this kind are Roman villas and forts. Their shape is usually sufficiently different from anything previously or subsequently built to date them to the Roman period (eg. Wilson 1974). The number of cases where morphology alone can securely date a feature identified on an air photograph are, however, few and the literature on the subject has highlighted many examples of mistaken identification (Wilson 1982; Riley 1987; Palmer 1992a; 1992b).

The morphology of crop marks is still the basis of most schemes of analysis in air photography as it represents one of the few attributes of a feature that can be recorded from the air. It is commonly considered the only guide to a feature's date and complex morphological typologies have sometimes been constructed to attempt to order common features such as

enclosures into chronological sequences (Bewley 1994; Palmer 1984; Whimster 1989). Bewley, Palmer, and Whimster all attempted to check the validity of their typologies by comparing their enclosures with the limited number of excavated examples available. This empirical control on their work has indicated that enclosure form classifications such as curvilinear, rectilinear and hybrid are usually of limited use for dating. Virtually all the enclosures can be dated as iron age or early Romano-British, but within that period there is little obvious variation (though Whimster noted that rectilinear types in his study area were probably later iron age and Romano-British). Table 3.2 highlights the difficulty faced when attempting to study changes in settlement within the broad time span in which single ditched enclosures are common. Morphology is only really of use for dating purposes when there are distinctive and uniform changes in the structures of a landscape. At the outset of the case study, morphological analogy appeared to be of some use in isolating features to the broad period under study in Northamptonshire, but of little use in ordering them within that time span. The detailed studies of chapter 6, however, suggest that some forms can now be suggested to be indicative of particular periods of construction in the region (cf. chapter 6).

Table 3.2 Dating by excavation of morphologically defined enclosures. (The figures in brackets represent the number of excavated examples cited).

Type	Dating	
	Palmer (1984)	Whimster (1989)
Curvilinear	Iron Age to (2) Romano-British	Middle Iron Age to (2) Romano-British
Rectilinear	Late Bronze (1?) Age ?	Late Iron Age to (7) Romano-British
Hybrid	Iron Age to (2) Romano-British	Iron Age to (1) Romano-British
Totals	(5)	(10)

In the absence of morphology as an aid to dating within the period of study, it is important to assess a second approach. The archaeological landscapes recorded on air photographs

represent a palimpsest of many phases of activity. In the intensively occupied valleys of the East Midlands, they show many overlapping features, the spatial relationships of which may provide an opportunity to work out their relative sequence of development over time. Recently, both Whimster (1989) and Edis, MacLeod and Bewley (1989) have examined what has come to be known as the elementary structural relationships (ESR) of crop and soil marks in an attempt to separate them out into broadly contiguous groupings.

In order to use ESR, structural features (or elements) plotted from photographs are recorded to analyse the principal synchronic and diachronic relationships between them. These are usually considered to occur in three forms: *clustered* (where features lie adjacent to one another), *superimposed* (where one lies above or below another), and *conjoined* (one element is annexed to another pre-existing one). The three relationships are illustrated as examples in figure 3.5a. To this list I would like to add a fourth relationship: *aligned* (where one element appears to be parallel, near parallel or in line with another), which is also shown in figure 3.5a. Superimposition suggests that the elements identified are of a different date, and importantly, that one is constructed without concern for the other. The difficulty with superimposed crop marks is that it is frequently not possible to tell which is the earlier, only that they are separate. Conjoined and aligned features, on the other hand, suggest that the different elements were built with regard to each other, even though they may not have been constructed contemporaneously. Clustering is usually used to refer to the grouping together of maculae. Here broad contemporaneity or continuity is far less easy to suggest, although isolated groups with a distinctive shape, such as graves, can usually be combined with at least some degree of confidence.

The use of ESR has partly been incorporated by the Air Photographic Unit of the Royal Commission for Historic Monuments for their National Mapping Programme with the development of the MORPH software system (Edis *et al.* 1989; Bewley 1991; Horne & MacLeod 1991). The computer package currently in use aims to classify archaeological monuments by shape and pattern using a strict hierarchy of morphological alternatives to produce a systematically defined description. All crop marks and soil marks are considered to be one of four basic types: enclosures, linear systems, linear features and maculae, examples of which are given in figure 3.5b. A single example of these is considered to be a *site*. If they show close

morphological similarities and/or suggest contemporaneity, they are identified as a *group*. *Sites* and *groups* are usually parts of a *complex* which, under MORPH, represents nothing more than an area of landscape containing archaeological crop marks (they are analogous to Whimster's (1989) Interpretation and Mapping Units). Thus, the archive is ordered into a hierarchical system based on the classification and recording of individual *sites*, each of which has a unique code number. The system has a number of advantages in that it organises the information recorded into a classification which can be assessed by ground based survey and excavation. With any form of classification there are of course problems; with MORPH they lie with the inflexibility of the archive (a point touched upon by Palmer 1991) and the selection of what constitute the basic *sites* and *types*.

Criticism over the inflexibility of MORPH in the light of changing interpretations through continued survey and excavation is not an unfamiliar problem with large scale recording systems. Regardless of the utility of the variables chosen in the initial record (discussed below), the key to its success as an analytical resource is the ability to rework the information it contains in the light of new discoveries, without requiring wholesale restructuring of the system. Bewley (1991) recognised this and the simple list of attributes used for descriptions allows sites to be reordered within a type classification by adding new variables to the classification procedure. Two problems with the system, though, are caused by the way in which sites are classified and the somewhat ambiguous way in which sites and groups are defined (see Edis *et al.* 1989, 114-5 & 122-6). The former constitutes a weakness which affects MORPH's usefulness for analysis and interpretation.

The main confusion with MORPH arises over the criteria used to classify crop marks as sites and the types of site into which they are grouped. This is easiest discussed using an example taken from Edis, MacLeod and Bewley's article (fig. 3.6 from Edis *et al.* 1989 fig. 2, 116). All the features plotted are essentially made up of two basic elements: *linears* (ditches, banks, surfaces, and foundations) and *maculae* (area features such as graves, pits and wells). The number, pattern, shape, and form of these determine the visible form of the archaeological monuments we record and any types we define tend to be based explicitly or implicitly upon them.

If the aim is to produce a database which is both analytically useful and flexible, then these elements should be the basic unit of recording. With MORPH the units (*types*) are enclosures, linear systems, linear features and maculae. MORPH is thus based on an assumption that the four types are the fundamental units, rather than the elements of which they are made (Hingley 1991, 40). By predefining the classification into four groups, all subsequent study is constrained within that classification. Ideally it would be possible to record all the basic elements recorded on a map individually, but as Bewley has commented, this would lead to an intolerably large number of descriptions for little gain as their interpretive value lies largely in their juxtaposition and association with other features (1991, 10). The largely intuitive exercise of ordering the elements into sites (such as those shown in fig. 3.6) is necessary to interpret the development of a section of landscape through time and deal with the large number of elements of which it is made. The weakness of MORPH is not that it aims to group features into sites, but that the sites are predefined as certain types, and that these are the basis of any functional or chronological interpretation. It tends to isolate enclosures from linear systems as with Bi and Bii in figure 3.6, for example, when they are probably broadly contiguous features.

An alternative approach is to define sites simply by combining elements which produce a coherent group through the basic principles laid down by ESR. The exercise is still intuitive but has the advantage that sites are not pre-selected to fit into four types. Instead, they are defined by the combination of elements from which they are made and the likelihood of their continuity or discontinuity. Sites are formed by grouping elements which are conjoined, aligned or clustered and separating them from elements with which they are superimposed or have no obvious relationship. The reliability of these groupings (which can be recorded under site codes) can be tested by excavation and field survey, allowing us to group and regroup them into any series of sites we choose as more information about their date and function becomes available. Though the initial groupings may differ little between the two methods, the latter allows the use of a single set of criteria for classification instead of the four separate lists used by MORPH. New site types can be devised so that, for example, if a particular field system is subsequently discovered to be a group of settlement enclosures, they can be considered as such without the need to re-record them under a new type heading. This alternative system is beyond the scope of a case study, but is currently under assessment in Northamptonshire

(Foard pers. comm.) and for the purposes of illustration a worked example using figure 3.6 is discussed here.

Using MORPH, sites Bi and Bii in figure 3.6 are classified using two separate sets of criteria (A & B in fig. 3.7); Bi as a linear system, Bii as an enclosure, and would be dated on the basis of morphological analogy with dated sites of the same type. A landscape based method records both sites using the same criteria and makes no prior assumptions as to the type or date of each (fig. 3.7 C & D). The variables selected to describe the elements of each site are still subjective and others (such as the direction of linears or topographical location) could be incorporated if desired. The aim of the landscape-based approach is primarily to identify areas of continuity and discontinuity in forms of landscape architecture (cf. section 1.3). The task of interpreting what type of monument each may represent is left to the concluding section, where interim statements about date and function(s) can be re-edited as new information becomes available.

It is important to remember that the term *site* in both approaches is not intended to suggest the absolute contemporaneity or unity of a group of elements. It is just an initial 'best guess' at their level of association based on the limited information about features available from their ESRs. With information from excavation it is possible to split sites which appear broadly contemporaneous from the air photographic evidence into phases. This process allows air photographic classifications and excavation records to be linked by looking at the ESRs between dated elements and those in the surrounding area. This practice was used in plotting the crop marks that provide contextual information for the excavated locales discussed in chapter 6 (cf. chapter 6 & section 8.2.2).

For the purposes of illustration, one example from the Tallington/West Deeping area in the lower Welland valley is shown in figure 3.8. The numbers shown are those used in describing the results of air photographic survey in *A Matter of Time* (Bowen & Butler 1960 fig. 7, 38) in order to make reference between that report, the discussion below, and excavation reports for the area easier. Not all the crop marks shown in figure 3.8 are numbered as they have no bearing on the discussion, though normally they would also be grouped into sites through their ESRs. Using the principles of superimposition, conjunction, alignment, and clustering, it is possible to group the 14 numbered monuments shown into the 8 sites listed in table 3.3.

The initial grouping of sites can be carried out in the absence of excavation in the area and provides the base for a structured ground-based programme of excavation and survey. In this instance, however, the aim is to discuss the validity of each site as an indicator of contemporaneous and/or contiguous use of particular elements in a landscape in order to reconstruct synchronic and diachronic aspects of their architecture.

Table 3.3: Crop mark sites formed by studying the elementary structural relationships of 14 numbered monuments illustrated in figure 3.8.

Site	Monument numbers included	Reasons for Grouping
A	31 & 31	Alignment.
B	51	Conjunction of elements.
C	37, 48, 49, & 46	Conjunctions.
D	36 & 44	Alignment.
E	40 & 42	Alignment.
F	53	Parallel alignment of elements.
G	35	Single enclosing linear.
H	45	Parallel alignment of elements.

In the example (fig. 3.8), excavations have been carried out at locations i) to iv), the results of which can provide valuable information about the validity of the site groupings chosen. If excavation indicates that two or more elements in a site actually relate to completely different and, critically, unrelated phases of activity, then the site grouping can be seen to have been mistaken and two separate sites subsequently recorded. If, however, excavation proves that elements of a single site were broadly contemporaneous or constructed in relation to one another, then the site is still a valid grouping. It does not matter if separate sites are discovered to be contemporaneous, as long as there was no obvious relationship between them from their ESRs.

Excavations at i) (Gurney *et al.* 1993a, 29-40) and ii) (Gurney *et al.* 1993a, 40-65) indicated that monuments 36, 37, and 48 were all broadly late bronze age-early iron age in date,

and that at one time, the pit alignment (36) had a gap between the double ditches of 48 that was subsequently blocked (cf. section 6.2.2). Though the precise relationship between monuments 36 (table 3.3, site D) and 48 (site C) are not clear, they do appear to have been constructed as part of a continuous process during the late bronze age and early iron age (cf. figs. 6.12 & 6.13). Consequently they can be considered together in reconstructing landscape development during that time. None of the elements excavated (36, 37, & 48) show evidence for activity of an unrelated date or purpose and so could be seen as reasonable groupings. Extending this interpretation to the other elements of site C (46 & 49) is a difficult enterprise, but it is worth provisionally considering them as part of the same phase of landscape evolution though not necessarily of directly contemporaneous construction.

Site B (monument 51) was selected as a separate site as it bore no obvious relationship to any of the other numbered monuments. On excavation (Gurney *et al.* 1993a, 55; fig. 3.8 iii), the enclosure proved to be of late Pre-Roman iron age and early Romano-British date, confirming the impression that it is part of a later and largely unrelated phase in the structure of the landscape locally. Excavation was also carried out at location iv) (Gurney *et al.* 1993, 55 & microfiche), but enclosure 35 could not be dated and thus remains isolated from the surrounding sequence.

The results of this exercise help to show that the ESR-based approach is useful and reasonably reliable in aiding subsequent investigation in the area. None of the sites can be seen to have been wrongly grouped, although the detailed phasing of some elements is more complex than the rather static picture provided by air photography. This is a common feature of the effect of excavation on the local sequences constructed by ESR, which is discussed in relation to the studies in chapter 6.

3.3.2 Landscape Architecture: Forms and Functions.

A second critical factor in any air photographic analysis of features is the problem of equating crop mark or soil mark forms to their original function(s). In this respect morphological analysis can face two considerable problems in interpretation. First, morphologically simple forms, such as enclosures, can be constructed for a very wide variety of reasons. Linking a certain shape or pattern of crop mark with a particular range of activities, without supporting

evidence, can be a very dubious exercise. At a simple level it can sometimes be used to identify the location of settlements, burials and roadways if their forms are distinctive. For the period under study in Northamptonshire, though, more detailed interpretation is frequently not possible as forms are varied and rarely linked to single functions (see chapter 6). This problem is exacerbated when features such as ditched enclosures are used and reused over time for a number of different purposes, changing from settlement, to industrial area, to field for example. To carry out functional analyses using air photographic evidence, it is still best to incorporate excavation and other forms of ground-based evaluation. Ground work not only helps date the features but also identifies changing foci of activity within the architectural framework seen on air photographs. This is certainly apparent in the Nene valley, where late iron age and early Roman settlement enclosures are often used for agricultural and industrial purposes in the second and third centuries AD (cf. section 6.5). These requirements place a detailed evaluation of this approach beyond the reach of the current thesis, but ^{it} is now being attempted in Northamptonshire (Foard pers. comm.) and elsewhere (cf. Palmer 1995). In the absence of field work, the fundamental challenge in air photographic analysis is over which attributes of crop and soil marks are likely to provide the information we require. Some of the broader factors behind recording and classification in archaeology were discussed succinctly by Adams (1988), but here the intention is simply to outline some of the key issues.

A common error in archaeological classifications has been the assumption that there can be a single 'right' classification, useful for all purposes (cf. Hill & Evans 1972, 235). Classifications for analytical purposes in archaeology usually take the form of typologies (MORPH is one example) and it has long been acknowledged that typologies must serve a purpose (eg. Rouse 1960; Dunnell 1971; Hill & Evans 1972). Unfortunately, the practical implications of this are often not explored and the validity of selecting a particular set of attributes not explained. If typological classifications are to be used in air photographic analysis, it is important to assess whether the types formed help answer the questions we are asking. As Adams stated, 'the value of any type and typology, like that of any other measure, can only be judged by its utility' (1988, 54).

Most recent air photographic surveys have recorded details of the shape, form, number and area of crop marks, but a wide range of other variables could be selected if required. A brief

review of recent surveys reveals a worrying tendency to choose certain variables because they are the easiest to record or just the 'obvious' characteristics of crop marks seen from the air (Riley 1980; Palmer 1984; Whimster 1989; Edis *et al.* 1989). Rarely are archaeological reasons given for the selection of one particular group of criteria over another despite the obvious need for further work if air photographic survey is to progress beyond the purely descriptive (cf. Palmer 1989).

It can even be argued that, as features in a landscape can have multiple uses at any given moment (and particularly over time), morphological classifications producing types constrict them within an inappropriately static framework of interpretation (cf. chapter 1). In reality landscapes and their architecture are dynamic forms whose meaning changes with their social context, or as Barrett commented, 'The monuments that archaeologists study within the landscape 'participated' actively in the structuring of social conditions.' (Barrett *et al.* 1991, 8).

In practice, some form of classificatory procedure is useful as it orders our data into a manageable form, provided that we assess the choice of variables used in the context of the questions being asked. For this reason it is critical that the recording system should contain three key elements:

- i) an initial assessment of the reasons for choosing the particular classification procedure used;
- ii) a methodology that incorporates analysis of the continuity and discontinuity of elements in a landscape (discussed in section 3.3.1 above);
- iii) a structure that promotes re-assessment of the recording procedure's usefulness through further survey, excavation, and inference.

A brief outline of one such recording procedure is given in the light of the insights gained during the case study as part of the conclusion to this thesis (section 8.2.2 & figs. 8.1 & 8.2).

3.3.3 Landscape Architecture: Synthesis and Regional Context.

The requirements of classification and analysis described above are needed to disentangle the palimpsest represented on air photographic maps. It also, however, tends to remove the features that have been identified from their landscape context. If our aim is to attempt to reconstruct past landscapes from air photographic evidence (cf. Whimster 1989), it is

imperative that these features are returned to their spatial context as tentative, broadly contemporaneous period maps. The spatial organisation of the architectural elements from a given period can then be compared in their spatial context to look at changing constructions of the landscape through time.

It is, however, insufficient to simply replot the crop mark evidence on modern background maps and expect to be able to interpret the evidence effectively. Two further considerations are necessary. First is the need to include information about the past physical geography of the area, especially its paleotopography, soils, and drainage. These factors are often a significant aspect of landscapes and as such can affect the pattern of much human behaviour and can be important in, for example, choices about the length and direction of exchange and communications in the region.

The physical geography of the study area can be plotted relatively simply, but reconstructing its human geography is a far more difficult proposition. Air photographic survey plots the surviving structural record over extensive areas, but this is often fragmentary and always partial. Many important structures in past landscapes have long since been lost to modern ploughing. Hedgerows and upstanding markers such as cairns, mounds and single stones are all good examples and it may appear impossible to attempt to account for these missing monuments and the areas they demarcated. Although they definitely pose a serious dilemma for landscape archaeology, some inkling of their past presence may be gleaned by using geochemical and fieldwalking surveys to identify differing aspects of past activity (see Chapter 7). These past places may be impossible to see today, but the structure of the landscape of which they were a part may still, to a limited extent, be recognisable. Certain foci in past landscapes may not have been signalled by architecture, but the activities which focussed upon them often led to artefactual deposits or soil changes that can be traced today.

CHAPTER 4: GEOPROSPECTION AND LANDSCAPE ARCHAEOLOGY

4.1 INTRODUCTION

The basis of all geoprospection techniques in archaeology is that certain human activities change the physical and chemical properties of soils such that they can be measured. At first glance it may appear deceptively simple to interpret the various geophysical or geochemical anomalies recorded and usually displayed in the form of digitised maps or plans. On closer inspection, it becomes obvious that archaeological interpretation depends upon measurements of soil properties that can be caused by a highly complex range of anthropogenic and non-anthropogenic sources, a point frequently raised in introductions to the subject (eg. Clark 1970; Provan 1971; Tite 1972a; Aitken 1974).

Given that distinguishing between the archaeological or non-archaeological origin of geoprospection anomalies is a fundamental problem, it is surprising that so little has been written about the subject, despite the fact that most practitioners in the field are painfully aware of the difficulties. Probable reasons for this are discussed further below, but first it is important to understand the nature of archaeological inference from geoprospection in the context of the discussion in chapter 1. Many misconceptions and assumptions surrounding the interpretation of geophysical results have arisen as a product of a simple failure to clarify the nature of the information and its relationship to other aspects of the archaeological record. For this reason it is important to distinguish the different stages in the formulation and interpretation of survey data. If interpretation is not to be erroneous, geophysical data must be treated as largely an unknown, their nature a matter for explanation in terms of all the processes which contributed to their formation, their relationship to the archaeological record as something for investigation not assumption. This is particularly significant if we wish to use individual techniques as essentially complementary parts of an integrated approach to the investigation of archaeological landscapes (cf. chapter 1).

4.1.1. A Model for Inference from Geoprospection Data ..

With the above points in mind, the conceptual stages involved in interpreting geoprospection data are set out as a simplified model in figure 4.1. The model is composed of three components which describe different aspects of the processes at work. The central column simply lists the key stages in the transmission and transformation of information from the nature of past human behaviour to the recovery and presentation of geochemical and geophysical data. It is shown as a series of steps, but in reality is a continuum with the soil's properties and structure continually changing up to and after the moment of survey. It does, however, draw the critical distinction between the processes which originally affected the soil, those which have subsequently altered it (similar to the post-depositional history of artefacts) and those that influence the recorded data. These are described as the *Boundary Conditions* (after Carr 1982) which affect whether archaeological information survives and in what form. Figure 4.2 summarises the key pre-requisites of these conditions for us to be able to identify and infer archaeological activity. The first of the *Archaeological Conditions* is fairly self-explanatory and the areas of interest here really surround the issues of equifinality and spatial and temporal superimposition. Equifinality is when two or more different actions create indistinguishable end results. An example is when a small geological fissure and a ditch appear to produce the same anomaly with a magnetometer. This problem has been recognised in geoprospection but rarely satisfactorily tackled and is discussed at greater length in the four sections on techniques below (4.2-4.5).

Contemporaneous deposits of soil investigated using geoprospection techniques are frequently the product of a very wide range of cultural and natural processes spanning considerable lengths of time. If we hope to use a particular technique, we must be able to separate at least some of these processes in order to untangle the palimpsest of human and pedological history contained within a survey area. This problem has plagued all of the techniques and must be a primary concern to archaeologists interested in geoprospection. In the sections that follow (4.2-4.5), the problems and remedies recognised with four techniques are discussed and some alternatives suggested.

At first sight the initial *Pedological Condition* (fig. 4.2 B1) may appear the same as the first *Archaeological Condition* (fig. 4.2 A1). This, however, is not the case, for although they are

linked they refer to separate issues of interpretation. The archaeological factor refers to activities that are likely to cause a change in the soil (a matter of archaeological inference), the former refers to whether a specific soil type is affected in such a way that a change can be detected (a matter largely of geophysical investigation). A good illustration would be a magnetometer survey of two ditches of identical form, one cut into gravel, the other in boulder clay. Although the archaeological action is similar, the differing lithologies may affect whether each is detected.

If a particular aspect of past human behaviour affects the soil appreciably, then, in theory, the remaining pedological factor is all that prevents a recognisable soil anomaly existing. For an archaeological action to be detectable, its effect on the soil must remain stable over long periods of time and not have been subjected to considerable alteration, burial or removal. This aspect of interpretation is the realm of post-depositional studies similar to those discussed in chapter 2, but includes complex geophysical and geochemical changes as well as those of geomorphology or subsequent landuse. The degree to which particular factors affect each technique varies and is better assessed in connection with them (sections 4.2-4.5).

After taking archaeological and pedological conditions into account, it may seem reasonable to think that recovering the available information is a relatively simple task. Unfortunately, the variety of data collection and presentation methods applicable imposes certain limitations and alterations to the information archaeologists use. Such factors have to be included in this review as they not only affect the way inferences are made but ultimately their use in the type of landscape survey methodology described here.

4.1.2. Geoprospection in Landscape Archaeology.

Up to now the discussion has centred on some basic theoretical and methodological concerns about inference from geophysical and geochemical survey. Here the aim is to assess the specific roles that geoprospection methods can play in relation to the methodological and practical questions raised in chapter 1 and which are discussed in connection with the case study in chapters 5 and 6.

In chapter 1, an approach to understanding landscapes was outlined which emphasises the need to identify the spatial interaction between people and the places of their existence.

Given this context the geoprospection techniques considered here have to be evaluated in relation to their contribution to two initial aims:

- a) the reconstruction, as far as is possible, of the landscape architecture of the period under study. This produces the physical framework in which the societies studied lived and includes not just anthropogenic structures such as boundaries, settlements and roads but also features of topography and drainage;
- b) the spatial study of other forms of material correlate for the past foci of activity (places) that constituted the landscape in order to construct 'taskscape' of landuse, settlement and social interaction.

These aims are obviously linked but are considered separately for the conceptual reasons described in section 1.3.

A second key consideration for the use of geoprospection techniques in landscape studies is the spatial scale on which each operates (Heron & Gaffney 1987). Geophysical surveys have to balance the conflicting issues of the quantity and quality of spatial coverage. None of the techniques described below can match the extent of coverage possible through air photography and field walking, but each has advantages and disadvantages at a smaller scale. The chief compensation of geoprospection is the complementary nature of much of the evidence it provides. Magnetic susceptibility and phosphate analysis present an opportunity to study often overlooked aspects of past human behaviour which leave little or no obvious trace in the archaeological record. For this reason, each method is discussed separately below but also as part of a multivariate approach to landscape survey where the advantages of an integrated methodology are discussed with the aid of some worked examples (section 4.6).

4.2. RESISTIVITY SURVEY

4.2.1. Introduction and Principles

First developed for archaeology by Atkinson (1953; 1963) and then by Martin and Clark (Clark 1957), resistivity survey has become a frequently adopted tool for archaeological assessments. The basic principles of the technique are well known and only a brief summary is

given here as good published descriptions are numerous (Clark 1970; 1975; 1990; Aitken 1974; Carr 1982; Weymouth & Huggins 1985; Weymouth 1986; Scollar *et al.* 1990).

Resistivity surveying measures the electrical resistivity of the soil in a restricted volume near the surface. The resistance of the soil depends on a number of factors, but the most significant are the amount of water in the soil, its ion content, and soil structure and porosity (Weymouth 1986). The precise relationship between soil type and resistivity is, however, the complex sum of a wide range of factors discussed in detail by Carr (1982) and Scollar *et al.* (1990).

The method relies on the relative inability of different materials to conduct an electric current which is passed through them (Gaffney, Gater & Ovendon 1991). Surveys have traditionally been carried out by electrical profiling whereby a constant spacing traverse measures lateral variations in resistivity to provide plans of anomalies. Profiling involves the use of four probes (one pair passing the current, the other recording the voltage drop) and changing the configuration of them alters the aspects of a soil's resistivity studied. The twin electrode configuration that was developed especially for archaeological use, is by far the most commonly adopted method today. For the remainder of this chapter discussion of area surveys will be based on this system, though many of the issues are similar using other techniques. Vertical electrical sounding, until recently a little used technique, studies layers down through the soil profile. The uses of these two diverse approaches are considered separately below.

4.2.2. Anomalies and Interpretation

The assumption behind resistivity survey for archaeology is that various human activities change a soil horizon's physical and chemical properties such that localised resistance to an electric current is significantly altered. Resistivity survey detects anthropogenic effects only if they produce an anomalously high or low reading compared to their surrounding context (cf. fig. 4.2 A & B). In theory specific human actions will produce such anomalies if they create *Conductive or Resistive Structures* relative to local pedological conditions (Scollar *et al.* 1990, 359-363). Both Carr (1982) and Scollar *et al.* suggest conductive structures are usually features excavated into resistant materials such as limestone, gravel or alluvial sands which subsequently fill with loose material that has a finer texture, more clay and/or humus. Resistive structures, by

contrast, are usually caused by constructions in stone (walls, floors etc.) or by isolated cavities (such as cist graves) where trapped air acts as a barrier to electrical currents. Fortunately experience suggests that specific anthropogenic actions do, often, produce such anomalies, but a number of serious flaws in interpretation lie between the ideals of theory and the reality of practice.

Archaeological interpretation of resistivity surveys has been based almost entirely on the intuition and experience of individual surveyors. It is a problem which is exacerbated by somewhat alarming lack of literature on what is the most important part of resistivity survey. Indeed, the most archaeologically-orientated recent volume on the subject (Clark 1990), dedicates only 26 out of a total of 176 pages to interpretation and presentation. Wynn (1986) and others have noted this caveat and its consequences, but the vast majority of published works do not discuss how interpretation is carried out. This has led to a stagnation in the quality and reliability of survey interpretation which has passed largely unnoticed in the literature but which soon becomes apparent when trying to understand the archaeological significance of the variety of resistivity signatures found in areas of past human activity.

All the various attempts to interpret resistivity data archaeologically can be divided into three approaches. Interpretation has been carried out by:

- a) analogy from theoretical and laboratory based-models using the basic principles of soil resistivity (eg. Clark 1980; Noel & Walker 1991);
- b) the extension to unexcavated areas of the relationship between anomaly signature and the results of trial excavation (eg. Young & Droege 1986);
- c) morphological analysis, whereby anomalies are linked to archaeological features of a similar plan known from elsewhere (eg. Weymouth 1986). It is an approach which is analogous to morphological analysis in air photography (section 3.3).

Most reports concentrate on linking theoretical models of anomaly form to buried structure. Thus, for example, laboratory exercises have shown how synthetic objects of high resistance and known shape produce a characteristic resistivity signature (eg. Clark 1970; 1990; Noel 1992). Slightly more sophisticated approaches have used mathematical models for the predicted anomaly form of known features given basic details of real resistance properties and shape (Young & Droege 1986; Cruciani *et al.* 1991). In practice both methods have been used

for interpretation by simply inferring that anomalies which match the model signature must come from a particular feature. Two problems arise from this method. First, all too often there is a tendency to make a direct link between anomaly form and archaeological feature, with no further evidence to support this. In resistivity survey an anomaly signature is formed by a particular type of pedological structure and as such may or may not be of archaeological origin; the profile of a resistivity anomaly alone is often not sufficient evidence. In the field, the regularity with which this problem occurs determines the reliability of ascribing a particular anomaly to a known archaeological form. It is difficult to debate the seriousness of the problem in the absence of published literature on the subject, but basically the issue comes down to a question of the specificity of an anomaly to a particular archaeological source. Judging by the experience of others, however, it is unsafe to assume that the relationship is straightforward other than for discrete well-bounded structures (Payne, Jordan, Gaffney pers. comms.).

With electrical profiling, the data represent resistivity 'averages' for a block of soil, the volume of which is proportional to the probe spacing. Survey plots are produced by linking together these readings in a grid format. Individual anomalies recorded in this way can easily be misinterpreted as the technique provides little depth information and signatures tend to be of simple and similar forms for a range of structures (Clark 1990). The second problem with modelling is that the idealised structures used have invariably been simple forms which help identify discrete forms but are of little use when assessing the more amorphous features often encountered in field archaeology. Thus, they provide idealised signatures for buried structures with clear resistance boundaries such as pits or ditches, but provide little guidance about diffuse archaeological deposits such as compacted earthen floors or middens. It is largely because of these problems that the second two methods of interpretation mentioned above are adopted.

Excavation of anomalies was commonly used as a remedy to uncertainty in interpretation in the earliest surveys (eg. Atkinson 1963; Clark 1970). It has the obvious advantage of being a direct and relatively unambiguous way of testing the anthropogenic origin of an anomaly, but has two disadvantages which tend to outweigh this. Excavation is a time consuming and expensive business. One of the original purposes of geophysical survey was to act as a cheap and efficient alternative form of archaeological assessment. It would be pointless to use resistivity if all recorded anomalies had to be excavated. Excavation of parts of a complex of anomalies can be

a very useful exercise and will usually confirm whether a particular anomaly is of archaeological origin. Unfortunately, though, extending the same interpretation to other similar resistivity anomalies is entirely dependent upon similar moisture and soil physical conditions being present. This may frequently be the case within the limited confines of a single survey where lithology and surface conditions are uniform, but beyond this interpretations are of doubtful value.

Without the aid of excavation, morphology is the only relatively reliable method of interpreting an anomaly that is regularly applied to surveys. It is probably the most common method of interpretation and yet is almost never explicitly recognised and works by helping to separate anomalous patterns of archaeological significance from the background 'noise' of pedological signals. Anomalies arising from extended cultural features, such as walls, ditches or mounds, tend to be correlated in space; that is, they occur on several grid points in a definite pattern, whereas short range noise tends to lack spatial correlation. For morphology to succeed, it is important to obtain and plot sufficient data to reveal the patterning, usually by gridded mapping of an area. The spatial integrity of such features allows them to be identified even when their electrical signature is not distinctive or has low signal to background ratios (Weymouth 1986).

Some cultural anomalies, such as those from pits, hearths or graves, may not have extended patterning unless enough data points are recorded over them. To be able to identify these features it is necessary to use a grid unit that is not larger than half the size of expected structure so that an anomaly will occur over at least two points. Even then it can be very difficult to distinguish such features using electrical profiling alone. In examining the extent of anomalies it is important to keep in mind that what is measured is an apparent resistance averaged over the volume between the probes and to a depth comparable with the inter probe distance (Aitken 1974). If a feature is smaller than the inter-probe spacing, the resulting anomaly is a combination of the feature and the surrounding soil. The anomaly smears out the feature to the area of the grid point and dilutes the resistivity contrast, often to the extent that it is no longer distinguishable. These issues also affect the way resistivity surveys are carried out and the range of archaeological features which are detected in larger scale surveys for landscape archaeology (cf. section 4.2.3.).

Without resorting to continued excavation (which, as has been noted, is only a partial solution) it is important to identify alternative sources of information that can help resolve the archaeological or non-archaeological origin of anomalies quickly and cheaply. At present this requires us to look beyond resistivity and highlights the need for a multivariate approach to archaeological survey (cf. section 4.6). One possibility, however, may lie within the confines of resistivity survey itself through the application of vertical electrical sounding. It is commonly recognised in introductions to the technique that the spacing between probes affects the spatial resolution and depth of investigation of resistivity survey. Profiling surveys a layer of soil of constant depth from the surface. Any anomaly within that layer is represented on a plan. One simple way of separating noise of geological or surface contact origin from those related to archaeological features is to provide geophysical sections through them locating the vertical positioning of anomalies.

A partial solution is to carry out a number of independent surveys, changing the probe separation and thus depth of investigation each time (Pattanyus-Á 1986; Edwards 1977). The result is a set of resistivity maps biased toward different depths, but the technique is very time consuming and spatial resolution declines rapidly with depth. A new approach, however, is now available by which geophysical sections are reconstructed tomographically, using measurements on a multi-electrode array (Noel & Walker 1991; Noel 1992). It is not my purpose to detail the principles and methodology of this technique, but preliminary testing suggests that a 16 probe array with 0.75 metre probe spacing provides a high quality of resolution to a depth of approximately 2.25 metres. The principal obstacle to applying resistivity tomography to field survey is presently the time required to gather each set of readings and then move the array. Noel (1992; pers. comm.) has suggested that this can be overcome with the construction of specialised resistivity meter incorporating a data logger. The technique then has the capacity to survey at rates comparable to conventional Wenner arrays by 'leap-frogging' electrodes. Resistivity tomography could then be used in conventional geoprospection alongside traditional two dimensional profiling to provide detailed cross-sectional signatures of anomalies seen in plan (as shown in fig. 4.3a). This would aid interpretation immeasurably but has a further significant consequence. A combined profiling and vertical sounding approach provides an opportunity to unravel the stratigraphic sequencing which can appear as a baffling palimpsest in

a simple two dimensional survey plan (Clark 1990). If this can be achieved it may produce relative sequences for archaeological features, but is only likely to succeed where vertical stratigraphy is reasonably clear. Where two intercutting features are the same depth, it is unlikely that tomography would record with sufficient resolution to identify which is the later, particularly if their resistivity profiles were similar. A schematic example of this is provided by figure 4.3b.

The pedological conditions affecting anomaly formation are a key aspect of resistivity survey which have so far only been alluded to in this review. It is, however, useful to identify the main characteristics of anthropogenically altered soils (or anthrosols) which affect soil resistivity, as they represent a chance of independently assessing the archaeological validity of an anomaly. If certain physical or chemical properties of anthrosols can be tested by simple soil testing then anomalies can be sampled to distinguish whether complex or diffuse anomalies have archaeological or geological causes.

Carr (1982) carried out exhaustive research into the chemical and physical properties of anthrosols producing resistivity anomalies. His analyses and discussions by Weymouth (1986), Clark (1990) and Scollar *et al.* (1990) form the basis of the characteristics listed below. They constitute only the most significant pedological conditions. Four components of soils could be examined to help identify archaeological activity. Two of these, magnetic enhancement and soil phosphate content, are studied below. The third, soil texture, can be studied by a wide range of basic pedological analyses available in a number of texts (eg. Fitzpatrick 1980; Limbrey 1975; Shackley 1975). Most of these techniques have long histories of application to the identification of anthropogenic and 'natural' formation processes which are invaluable in this context. They range in complexity from simple handling properties (Fitzpatrick 1971) to more detailed sedimentary analyses (Limbrey 1975). A discussion of each of the methods is beyond the scope of this study, but one approach to grain size is covered in the assessment of magnetic susceptibility (section 4.4) and shows their potential even within the four commonly used techniques covered here.

The fourth pedological characteristic of anthrosols is their structure, which is best studied through micromorphology. Again, a recent detailed review of the subject in archaeology (Courty *et al.* 1989) has shown the potential of the technique but it is of limited use in field survey strategies where excavation is not a real possibility (as in the case study). This is because soil

samples for micromorphological analysis have to be taken in such a way that their whole distribution is preserved for thin sectioning. As yet there have been few suggestions as to how this could be achieved without trial excavation, but large diameter corers may provide a solution in some soils. The development of soil structures detectable by resistivity varies according to soil texture, being best developed on sandy loam through clayey loam soils, less so on clay soils and least on sites located on sands (Carr 1982). This problem helps explain the lack of sensitivity of resistivity on some clays and coarse sandy soils, a point to consider when deciding how and where to use the technique.

Having considered the problems of interpretation and pedological conditions, the final issue to assess is that of survey procedure itself. Some of the implications for interpretation caused by probe spacing and configuration have already been mentioned, but resistivity survey, perhaps more than any other of the methods covered in this chapter, is prone to considerable biases caused by conditions at the time of survey. The moisture regime of the soil is a problem that links pedological and survey conditions. As resistivity detection depends largely upon the distribution in the ground of rainwater, it was soon realised that profile responses were conditioned not only by archaeological and pedological conditions but also by the soil moisture regime; precipitation input against water loss by evapotranspiration and drainage. Experiments by Al Chalabi & Rees (1962), Hesse (1966a; 1966b; 1978) and Clark (1975; 1990) on a range of soils and geology have shown how, on some lithologies, resistivity responses can vary considerably and even invert from negative to positive as a function of changing soil moisture balances (fig. 4.4a). Clark (1990), has outlined the particular problems of chalk cut features, but the problem appears less severe elsewhere (see fig. 4.4b & c). These tests nevertheless show the need for better understanding of the link between climatological conditions and the nature of archaeological anomalies on different soils.

The final survey conditions are those that relate to the nature of data acquisition, which is largely determined by the survey layout and choice of electrode spacing. The twin probe array is discussed here as it is by far the most commonly applied technique and has a number of operational advantages. Survey layout can be by linear or area survey and the selection of each is best discussed in relation to the projected use of resistivity (4.2.3). Linear surveys can cover much greater areas economically but are of limited use for two dimensional profiling, for two

reasons. First, the simple anomaly signatures produced are difficult to interpret archaeologically. Second, even when substantial features are identified, extrapolating their direction between lines is a difficult task which can lead to serious misinterpretation (eg. Clark 1990, 59). It is far better suited for use with vertical sounding techniques such as tomography that provide resistivity cross-sections through the soil profile which are more easily interpreted from anomaly signature alone. This fits well with the Wenner style probe arrays used in tomography which are suited to surveying in single traverses. Area survey is the key approach for two dimensional profiling as it provides the detailed spatial patterning required for morphological analysis. It can be used in conjunction with tomography to help visualise anomalies in three dimensions, as in the schematic illustrated in figure 4.5.

Electrode separation is less of an issue in the context of this discussion as both tomography and twin probe array systems such as the Geoscan RM4 and RM15 have established interprobe spacings of 0.75 metres and 0.5 metres. Consequently, the twin probe array has a depth penetration of approximately one metre and spatial resolution of up to 0.5 metres. The tomography system can penetrate approximately 2.25 metres and has a vertical resolution of roughly 0.25 metres and horizontal resolution of 0.75 metres. The archaeological consequences of this are discussed with the methodological issues covered below.

4.2.3. Resistivity in Landscape Survey.

In section 4.1.3. two main factors were considered critical to how and when any geoprospection technique should be used in the type of archaeological study envisaged for this thesis. One was the need to consider which aspects of the archaeological record each technique was capable of identifying. The other was the restriction placed on these theoretical capabilities by the practicalities of survey methods and technology.

The latter issue was touched upon when comparing the respective scales of coverage of ground-based geoprospection techniques with those of air photography and fieldwalking. In this context it is important to assess the potential scale of resistivity coverage in its own right and the implications this has on its archaeological usage within an integrated survey methodology. Papers outlining the operational speeds and detail of coverage of resistivity surveys are rare and those examples that do occur tend to compare them with the financial costs of excavation (eg.

Papamarinopoulos *et al.* 1991). Such information is usually known by surveyors from experience and current views on the use of twin probe arrays such as the RM4 for area surveys suggest that approximately one hectare per day is usual with measurements at one metre intervals (Jordan & Payne pers. comms. & personal experience).

Although greater areas could be scanned by using linear survey, the problems of interpretation encountered by two dimensional profiling would render such results of little value. Even surveyors confronted with very large tracts of unprospected land have almost always preferred area survey or linear scanning with magnetometers. Of 75 such surveys carried out by British Gas in advance of pipelines, all but a few (where the aim was simply to locate archaeological features already tentatively identified on air photographs) were by area coverage (Catherall *et al.* 1984; Catherall 1986).

Despite the limited speed of resistivity survey, it is important to stress it can, and does, identify extensive features of archaeological significance, but the lack of energy expended on improving interpretation still limits its reliability and application. At present, interpretation still rests largely on simplistic signature modelling and the morphology of anomalies in plan. Resistivity profiling, therefore, is most satisfactory when detecting archaeological features with clear resistance boundaries and recognisable spatial patterning. Furthermore, these features usually only produce a sufficiently strong anomaly if they have a cross-sectional area large enough to produce a detectable anomaly when averaged over the total volume of soil recorded by the probes. In particularly favourable subsoils such as gravels, smaller cut features, such as gullies can be detected as the contrast between their fill and the surrounding matrix is particularly strong. Such instances are, however, rare and resistivity is usually only effective for detecting features such as walls, ditches, large pits or wells, and occasionally well defined surfaces such as roads or mosaic floors (Aitken 1974; Clark 1990; Scollar *et al.* 1990). Thus, resistivity survey is best suited to the definition of larger landscape architecture over areas that are greater than is usually feasible through excavation but far smaller than is possible via air photography. It can place architectural foci in their immediate landscape context, helping the study of how such foci articulated with the wider landscape. Such surveys can very effectively provide a framework of the major negative features in, and immediately around, architectural locales, and the foundations of stone structures within them if the boundary conditions

described above are satisfactory. Resistivity and magnetometry are particularly effective when linked to complementary information provided through field-walking and excavation (eg. Taylor 1989; 1995; cf chapter 6). As a broader prospection technique resistivity is unlikely to be effective unless far faster recording systems can be constructed, perhaps along the lines of the tractor driven RATEAU system in testing with the CNRS (Hesse *et al.* 1986; pers. comm.). Away from the density of archaeological features found in the vicinity of settlements and other architectural foci, the laws of diminishing returns make two dimensional profiling by resistivity an inefficient approach.

Vertical sounding through tomography could provide solutions to a number of the problems of interpretation but is at an early stage in its development. If speeds comparable to Wenner array profiling can be achieved, tomography would provide invaluable support by improving interpretation and helping to unravel the palimpsest of features encountered. This, however, is still a matter for speculation until a specialised and reliable electrical resistivity tomography meter is manufactured.

4.3 MAGNETOMETRY

4.3.1 Background and Principles

The history of magnetometry has roughly paralleled resistivity, with the earliest developments in the 1950s using proton magnetometers (Aitken *et al.* 1958; Aitken & Tite 1962; Aitken 1974). These instruments measure absolute values of the magnetic field, but data acquisition is slow and they have largely been replaced by the fluxgate gradiometer in Britain (Aldred 1964; Philpot 1973; Clark & Haddon-Reece 1973). In recent years the development of an accurate and robust gradiometer (the Geoscan FM18 and FM36 models) has led to its predominant use in Britain and it is the focus of discussion in this section.

4.3.2 Archaeological Interpretation

In magnetometry human activities can be recognised if they create high or low localised magnetic field strength relative to surrounding soil conditions. Archaeological interpretation has tended to use the same three approaches as were outlined for resistivity, but the degree to

which each has been developed has differed. Far more analysis has been attempted in modelling magnetic anomalies and the degree of sophistication in their methodology is greater. Early discussions (eg. Aitken & Alldred 1965; Linington 1964) produced highly simplified laboratory models not dissimilar to those Clark created for resistivity. During the course of the 1960s and 1970s, however, these initial studies were built upon to produce quite sophisticated computer-based models (Scollar 1968; 1969; Lynam 1970; Linington 1973a; 1973b; Heathcote 1985). These, though, still concentrated on archaeological features with very clear anomaly signals produced by their distinctive shape and well bounded margins. Modelling has provided good agreement over the identification of pits and ditches and matched filters have been used to search real data for structures of an assumed geometry (Scollar 1970; Scollar *et al.* 1971) Unfortunately these filters are not reliable when soil noise and other forms of disturbance are significantly high or when they produce two dimensional anomaly signals of similar magnitude to archaeological features (Scollar *et al.* 1990).

Little effort has been expended on trying to identify signatures for more complex or ephemeral features, despite the suggestion that magnetometer anomaly signatures are often more anthropogenically specific than those for resistivity. Some indication of the possibilities of applying sophisticated modelling to a wider range of archaeological remains can be gained from initial experiments by Gibson (1986), Young and Droege (1986) and Sternberg (1987). Sternberg modelled shapes that approximated to buried hearths needed for archaeomagnetic dating. The approach adopted by Gibson, and Young and Droege, combined a similar method of modelling with test excavation, using excavated features as analogies for the location of further archaeological remains. They identified hearths and pottery concentrations on prehistoric sites that were otherwise largely featureless and the published examples appear quite successful in this aim. Unfortunately neither case study excavated the entire study area to see if features were not recognised, so we cannot tell whether these methods were only partially successful. The majority of interpretation is still based on morphological comparison, but the few published experiments suggest that modelling and trial excavation may have the potential to be far more reliable than is possible with soil resistivity.

A key consideration when using morphological analogy, raised in conjunction with resistivity interpretation, is the need for extended or at least recognisable patterning. For

smaller, discrete anomalies, recognition is dependent upon the depth sensitivity and spatial resolution of the technique. Fluxgate gradiometers are able to record almost continuously and with automatic data logging can record at very close intervals along a traverse with little or no slowing of survey. Clark (1990) has illustrated how changing spatial resolution significantly improves both the anomaly signature (often linked to models for particular feature forms) and horizontal detail. Figure 4.6 shows the ability of high resolution surveys to differentiate between archaeological and non-archaeological anomalies. This only improves resolution in the direction of traverses; resolution perpendicular to them is dependent purely upon inter-line separation (usually set at one metre). Clark (1990) and Payne (pers. comm.) however, have commented that in practice this is not a problem as the detailed measurement along traverses is highly effective for characterising the nature of the feature, so that it is sufficient only to establish its extent in the other direction. An exception is the case of linear features running parallel to the traverses, but this is rare in practice as features must be of limited extent and very straight.

The depth sensitivity of magnetometers is of more concern as it drops away rapidly between one and two metres depth. This is a particular problem with gradiometers, as at one metre they are only between half and two thirds as sensitive as proton magnetometers. Fortunately, the majority of archaeological features in English landscapes lie at a depth of between 0.25 and 0.7 metres (Hodge *et al.* 1984). It does however, raise awareness of the significance of geomorphological variation and in particular the masking effect of colluvial and alluvial deposition (cf. Clark 1990).

The pedological conditions affecting the formation of enhanced or, more rarely, reduced soil magnetism are complex and discussed in detail by a number of authors (eg. Baver & Gardiner 1976; Le Borgne 1960; Thompson & Oldfield 1986; Tite 1972a; Mullins 1974). Here the aim is simply to consider how changing soil conditions affect the applicability of magnetometry. Usually, the effectiveness of magnetometer detection depends upon the magnetic susceptibility of the soil and its contrast with the underlying subsoil or surrounding soil matrix. Experiments (Tite & Mullins 1971; Tite 1972b; Tite & Linington 1975; Clark 1990) have provided a useful, though limited, outline of the implications of differing soils and geology on magnetometry. In southern and central England the situation is summarised by figure 4.7 and the outline below. The Jurassic ridge, which includes the Cotswolds and runs from Dorset to

Cleveland, provides very good conditions as the iron rich topsoils here contrast strongly with underlying limestone. Drift deposits derived from this including the silts and gravels of rivers such as the Nene and Welland are also good (Clark 1990). Other responsive sedimentary strata are the Lower Greensands. Cretaceous deposits, like the Upper Chalk, are generally weak but stronger where they are overlain by Tertiary materials like clay-with-flints as around the Chilterns. Much of East Anglia is covered by weakly magnetic drift deposits, or is affected by periglacial phenomena or glacially transported material which can be confusing, making prospection largely unrewarding.

4.3.3. Magnetometry in Regional Survey

Up to now discussion has surrounded the nature of magnetometry generally, but a good impression of its applicability to landscape surveys is soon apparent. Modern gradiometers are capable of recording data very quickly, which allows conventional grid surveys to a high level of resolution along traverse axes (normally 0.25 or 0.5 metres) at speeds little different from a walking pace. Again there is little or no published information on speeds of coverage, but experience suggests that between 1.4 and 2 hectares per day is usual on open terrain. Gradiometry, therefore, is approximately 40 to 100 percent faster than resistivity and with higher resolution along one axis of survey. At a regional scale this improvement does not make a marked difference and gridded surveys are still most efficient at the scale of individual architectural foci. The additional area that can be covered, however, makes it especially suited to the contextual surveys that link locales with their wider landscape architecture. If magnetometry is to be used over more extensive areas, then it must be effective in detecting features through linear scanning. A recent review by Clark (1990) suggests that this is feasible as the spatial resolution possible along traverses, combined with the distinctive nature of signatures from anthropogenic features, allows experienced operators to identify significant features quickly. These can be assessed by localised grid surveys to identify their pattern and extent. The speed of coverage is dependent in large part on the distance between traverses considered acceptable, an area that is currently poorly understood.

4.4 MAGNETIC SUSCEPTIBILITY

4.4.1 Background and Principles

Unlike magnetometry, 'magnetic susceptibility is only measurable in the presence of a magnetic field, and is defined as the ratio of the strength of the induced field, to that of the magnetizing field' (Clark 1990, 99). Its usefulness to archaeology derives from two factors: the normally greater susceptibility of topsoil compared with underlying layers and the enhancement of this susceptibility by human action. In prospecting, features filled with such soil are ideal for magnetometer survey, whilst susceptibility prospection is suited to the detection of occupation layers and their limits; it does not require the existence of distinctive features. Thus, activity which may only have survived in the topsoil can be detected, sometimes in quite fine detail.

A number of processes enhance topsoil magnetism. Le Borgne (1955; 1960) suggested a fermentation effect, produced in soil by alternating dry and saturated conditions, and a burning effect, in which oxygen was excluded from the ground beneath a fire as it burned, but able to reach it when a fire went out. Subsequent studies by Mullins (1974; 1977) seem to indicate that the fermentation effect may be responsible for the generally slightly higher levels of topsoil enhancement but the burning effect is the cause of the far higher levels of enhancement found on archaeological sites.

Measuring magnetic discontinuities in the topsoil is best tackled with instruments that inject a signal into the ground and record the response caused by magnetic susceptibility. The penetration of such instruments in the field is relatively shallow because the signal is attenuated on its way into the ground and on its return (Clark 1990). Thus field sensors such as the Bartington MS2D have an effective depth sensitivity of only about 0.1 metres. Where deeper penetration is required, laboratory based-sensors have been developed to measure samples from soil augering or coring. Both approaches have advantages and disadvantages which are discussed further below.

4.4.2 Interpretation

Whereas magnetometry and resistivity are best detecting discrete archaeological features, magnetic susceptibility can be used to analyse the spatial variation of activity

throughout the topsoil. It has long been known that magnetic susceptibility sampling can identify anthropogenically altered soils, but the precise processes by which a concentration in human activity is linked to enhancement have, until recently, received little attention. The geological conditions affecting magnetic susceptibility have broadly been covered for magnetometry above, but two further factors need to be mentioned. Magnetic susceptibility can be used across a wide range of soils to infer areas of intense human action despite often wide fluctuations in local background magnetism. The work of Tite and Mullins has helped show that the source of the soil parent material is usually the most important factor determining whether a survey may be performed successfully. To this must be added constraints imposed by the type of soil conditions in the area of survey. First, is podsolisation, which leads to a severe reduction in the enhanceable iron content of the soil, but it is not a significant factor in the lowland landscapes of eastern and central England covered in this thesis. Gleying is a more severe restriction which can eradicate susceptibility enhancement in the time between its occurrence and the present day. Brown earth soils with free drainage, by far the predominant type in the survey region, have reasonably high organic content and thus good prospects for enhancement. In Northamptonshire, gleying can present localised problems which are most acute on the floodplains of the main river valleys but generally present few problems.

Given its widespread applicability, it is surprising that magnetic susceptibility has been so little utilised as a prospection technique in its own right. This may stem from the shortage of specialised skills within the discipline, but is also probably due to a tendency to avoid tackling archaeological concepts in field geophysics for research or development (cf. Gaffney, Gater & Ovendon 1991). The challenge for magnetic susceptibility is not to determine the geophysical causes for enhancement, which have been reasonably well researched, but how specific forms of human action produce distinctive changes in soil magnetic susceptibility. In this respect there are two areas which deserve further research within the field, namely, overall magnetic enhancement, and the frequency dependence of susceptibility. Little published material has considered the archaeological aspects of magnetic susceptibility, but some limited experiments provide the basis for an assessment of its capabilities.

Work by a number of researchers has established fairly conclusively the link between areas of intense human occupation and enhanced magnetic susceptibility of soils (Tite & Mullins

1971; Mullins 1977; Longworth & Tite 1975; Clark 1983; Yates 1988; Taylor *et. al.* 1991; Challands 1992; Dockrill & Gater 1992). Mullin's (1974) experiments showed how ordinary topsoil usually has only had 0-10 percent of its iron salts converted to the more magnetic state, whilst those from archaeological sites display values in the range of 10-50 percent. Therefore, on any particular lithology activity foci tend to stand out from surrounding topsoil levels. The absolute level of enhancement varies according to the concentration of iron salts found in that soil. In order to use overall magnetic susceptibility as a guide to archaeological activity, it is important to take readings from across the same lithology to identify the local norm for topsoil and parent material. If no intensively occupied areas are present, then a histogram of the samples tends to be unimodal with a narrow peak. Areas where occupation has taken place tend to be multimodal (Scollar *et al.* 1990 & fig. 4.8).

This information has been used for relatively small scale test surveys to identify the location and broad boundaries of activity areas. Taylor *et. al.* (1991), Challands (1992) and Dockrill & Gater (1992) have all surveyed areas under pasture with some success. Test excavations have confirmed the presence of archaeological activity which was unlikely to have been identifiable by magnetometry or resistivity. The possible importance of non-architectural activity areas (or locales) was mentioned in chapter 1, but has rarely been considered outside early prehistory, or in the context of the interpretation of small scatters of ploughsoil artefacts (eg. Gaffney & Tingle 1989). Until it is more widely used, the architectural bias seen in accounts of later prehistoric and Roman landscapes will continue to dominate the subject. This said, the usefulness of general enhancement magnetic susceptibility surveys is presently limited when applied to more complex questions than simply activity locale identification. There are virtually no accounts comparing enhancement to more specific types of use for an area and so it is difficult to assess whether it can be used effectively as a tool for characterisation studies. Mullins' (1974) data appear to show a good correlation between levels of enhancement and length or intensity of occupation, but this is only an initial perception with little empirical support. Perhaps more interesting is the clear separation of cemetery sites from the others, with burial areas having susceptibilities only slightly above the surrounding topsoil levels (Mullins 1974 fig. 4/6, 314 & cf section 4.6). This may point to possibilities for using relative magnetic susceptibility levels as an indicator of landuse type, but as it is likely that a range of past activities

cause similar overall enhancement (the question of equifinality raised earlier), this approach alone is limited. It is, however, possible to link this information with other complementary evidence to differentiate between at least some of these activities (cf. section 4.6).

Within magnetic susceptibility survey, one source of information may help distinguish between causes of enhancement. Dual frequency measurement of samples in the laboratory provides an indication of the nature and size distribution of the magnetic minerals in a sample. Material weathered directly from bedrock tends to consist of large multidomain grains and shows little variation in magnetic susceptibility when measured at different frequencies. Reworking by humans tends to favour change to smaller grain sizes, leading to greater differences in magnetic susceptibility with changing frequency. This is termed frequency dependence and is known to distinguish magnetic enhancement due to human action from that of natural origin. As Clark has stated, 'magnetic susceptibility measurements over a field may show quite strong variations, but if the frequency dependence is constant and low these are probably due to varying concentrations of natural magnetic minerals.... Sites of human activity will be distinguished as areas of high susceptibility accompanied by increased frequency dependence.' (1990, 103). This helps identify foci of occupation, but it has not yet been used to differentiate between types of human action despite its successful application to studies of pedogenesis in fluvial, lacustrine and marine sediments (Thompson & Oldfield 1986). Recently, some of the method's potential has been discussed in relation to studies of past soil erosion and land use (Allen 1988; Allen & MacPhail 1987; Brown 1992) and is discussed in relation to one of the themes of the case study in section 8.2.3.

The discussion above has, due to a lack of published information, been a brief review of the use of magnetic susceptibility for archaeological interpretation, but more critical assessment of the link between both overall enhancement and its frequency dependence is needed if it is to be used for identifying variations in past human activity and land use. The specificity of this link to particular types of past action is a matter of some debate, but Dockrill and Gaters' case study at Tofts Ness (1992) provides some indication of the gains to be made by a more integrated approach using a range of criteria to define the processes that have affected a particular set of samples (cf. section 4.6).

4.4.3 Magnetic Susceptibility and Landscape Survey

One of the key advantages of magnetic susceptibility in landscape survey is the complementary nature of the evidence it records when combined with magnetometry, resistivity and soil phosphate analysis. It is already known that magnetic susceptibility can identify areas of human occupation where no discrete archaeological structures survive. What has been lacking are attempts to understand whether magnetic susceptibility can characterise different forms of human activity across the landscape. The suggestions above are only tentative, but recent integrated studies do indicate that it is an important aid to the characterisation of anthropogenically altered soils.

A range of different equipment can be used to record magnetic susceptibility, but basically they divide into field and laboratory sensors. The field sensors are quick (though not capable of rates of coverage as fast as magnetometry) and have been used in areas of pasture to identify ephemeral prehistoric sites (eg. Taylor *et al.* 1991). They do, however, lack depth penetration and in arable areas only record ploughsoil magnetic susceptibility, which can be a misleading guide to buried archaeological remains (cf. section 2.3). One way of overcoming this problem is to use soil augers to take samples from the base of the ploughsoil or buried archaeological layers where they survive. Here readings are taken directly from the levels of interest regardless of minor variations in depth caused by topography and erosion. This method by-passes spurious effects caused by the presence of modern surface activity, such as stubble burning, bonfires or manure heaps. The problem is that augering is a laborious technique, with work at Shiptonthorpe requiring five full days to take approximately 360 samples (Taylor 1989). To use augering as a broader survey technique, the sampling points have to be widely spaced and again little information is available about how sampling intervals effect the quality and quantity of magnetic susceptibility information. Clark (1990) has suggested measurements on a grid as coarse as 30 metres can be effective for defining the location and broad limit of activity areas and a brief review of published surveys suggests that with the exception of earlier prehistoric sites this may be true. At this scale of resolution simple augering could cover approximately 4-6 hectares per day, though processing and recording a day's samples in the laboratory takes as long again. Such speeds provide some possibility of larger scale surveys that look at landuse across larger sections of landscape lying between neighbouring foci. The

augering approach also has the advantage of providing soil samples which can be subjected to further analysis such as dual frequency susceptibility and soil phosphate extraction. A single augering survey, therefore, can produce a multivariate database of soil samples which can aid interpretation considerably and save time in the field.

4.5 PHOSPHATE SURVEY

4.5.1 Introduction and Principles

The basis of phosphate analysis in archaeology is that human action strongly redistributes phosphorous in soils. In the absence of wholesale soil loss, such changes can persist almost indefinitely and are thus a valuable aid to the location, delineation and characterisation of areas of past human action. The aim of this section is threefold. First, to briefly outline the principles of phosphate analysis and its interpretation. Second, to assess different methods of phosphate determination, and finally, to discuss its use in surveys where emphasis is placed on the spatial structure of landscapes through studies of their constituent locales.

Phosphorous compounds are ubiquitous in all plant and animal tissue, with concentrations increasing as one progresses up the food chain (Hamond 1983). Many foodstuffs, and particularly meat and fish, are rich in phosphates (usually denoted as P) and the processing, storage and disposal of them can lead to considerable localised enhancement of the soil's P content. The bodies of humans and animals are particularly rich in P. Burial of skeletal material greatly enhances natural P levels, Johnson (1956) suggesting that an interment can increase levels locally by upwards of 50 parts per million. In the vicinity of a cemetery, in use over many years, an appreciable P enhancement is therefore likely.

Excreta do not contain particularly high P concentrations, but their high production rate makes them an important source of enhancement. Humans have a relatively low excreta production rate, but can be by far the most important animal source of P due to their numbers and tendency to live together in spatially small areas, thus creating high localised enhancement in the vicinity of settlements.

4.5.2 Phosphate Detection and Interpretation.

The detection of enhanced P levels is only possible if the bulk of anthropogenic P becomes incorporated within the soil and relatively little is subsequently lost. The ability of soil to fix P is primarily dependent on its pH and texture. In alkaline soils the calcium cation is primarily responsible for fixation, in acid soils it is aluminium and iron cations. In neutral soils (pH 6-7), P is slightly more soluble, though only a small proportion is likely to be lost (Eidt 1977). P in highly acid soils (pH 1-2) is extremely soluble but is not a problem in the soils of the study region. Fine grained soils are more retentive than coarser ones (Sjoberg 1976) and clays are particularly effective. Although the levels of P lost by leaching are negligible in many soils (Cook & Heizer 1965; Eidt 1977) it can nevertheless occur under certain conditions such as in iron, calcium and aluminium poor soils or podsols (Provan 1971).

Given this background, three key factors must be assessed in any attempt to interpret soil phosphate data. First, there is the question of the variable chemistry of soil phosphates and the effect particular extraction techniques have on the results obtained. Second, is how to distinguish significant archaeological variation from the natural background noise of changing P levels. Third, is the effect of sampling strategy on the results and particularly the sampling depth and interval chosen.

Discussions addressing the vexed questions of the chemistry of soil phosphorous are numerous and many contain detailed accounts of how partial and total P extraction techniques are biased in one way or another (Cook & Heizer 1965; Provan 1971; Proudfoot 1976; Eidt 1977; 1984; Bakkevig 1980; Hamond 1983; Bethell & Maté 1989). This debate is extensive, but some areas of general consensus can be cited. Total P extraction techniques are preferable as they are less affected by the chemical equilibrium of individual soils. They are, however, generally expensive and time consuming, and have been difficult to justify in the majority of archaeological situations. Recently, one possibility of overcoming this has been suggested through the use of EDXRF which, though expensive in terms of initial investment, can process samples accurately and rapidly (eg. Clogg & Ferrell 1992). Unfortunately a detailed evaluation of the technique is not yet available and so cannot easily be included here, but current estimates suggest that 100 samples per day can be prepared and analysed (Dungworth & Clogg pers. comms.).

The complexity and slow speed of total extraction techniques had restricted the use of phosphate analysis until a rapid field method was developed during the 1960s and 1970s (Eidt 1977). The problem with Eidt's spot technique and similar partial P extraction methods (eg. Sieveking *et al.* 1973; Craddock *et al.* 1985) lies in the fact that they measure a form of inorganic P only. Thus results may vary systematically with chronology, depth, and soil moisture status. They are also only semi-quantitative at best and the ability to standardise them is debatable (Hamond 1983; Karlsson 1980). Until now, however, they have represented the only form of P survey that could produce sufficient samples within the limited financial resources and time available for most surveys. The applicability of field P techniques to particular situations is best discussed in the light of the experience of surveyors (eg. Craddock *et al.* 1985; Keeley 1981; Edwards *et al.* 1983) and an understanding of the particular soil environment of the area studied. None of the rapid field methods can be applied to all situations, but with judicious use can provide valuable information rapidly and cheaply (eg. Alexander & Roberts 1978; Hassan 1981; Conway 1983; Edwards *et al.* 1983; Eidt 1984; Nunez 1990; Nunez & Vinberg 1990; Osterholm 1991).

If, by careful reconsideration of local soil conditions, it is known that soil P analysis is feasible, then the next hurdle to overcome is the problem of archaeological interpretation. The first consideration is how to separate archaeological variations from pedological ones. There are two main sources for the P found in soils; the parent material, and the actions of humans, animals and plants. The former can usually be accounted for by sampling P variation through the soil profile at a number of locations within the same lithology. A carefully chosen set of such control samples can provide calibration profiles of changing soil P concentrations both vertically and horizontally. One example of such an approach (Clogg and Ferrell 1992) is shown in figure 4.9 (shown as the Background line). The control profiles have formed as a result of the processes of pedogenesis for that soil type and will largely reflect its mineralogy but also the compound effect of past and present land use. Changing patterns of land use and particularly heavy modern fertilisation will cause horizontal and vertical trends in these profiles. Such trends tend to be widespread and can be identified through, for example, trend surface analysis (eg. Clogg & Ferrell 1992; Taylor & Clogg in prep.). There are a number of theoretical and practical reasons to feel that they will rarely mask the effects of P enhancement in the vicinity of intensively occupied

locales. In the immediate proximity of past settlements there is ample evidence to suggest that large localised P enrichment occurs. Unless natural variation in P derived from the parent material is high, these localised peaks stand out as large residuals from the background trend.

Interpreting areas of enrichment is, however, a far more problematic issue, as case studies that have tested the link between forms of P enhancement and the nature of past occupation are extremely rare. Given this, it is currently best tackled by considering the basic anthropogenic causes outlined above in the context of any other information about patterns of occupation and land use available from other sources. Here, magnetic susceptibility data are very useful as the causes of enhancement between the techniques are largely complementary and a single sample can be used for both analyses.

Given the importance of spatial patterning in interpreting soil P data, it is critical to remember the effect of the sampling strategy. Soil P data can only be recovered effectively through augering, a slow and physically demanding method. At present there has been little consideration of this problem addressed specifically to soil P studies, but Mees (pers. comm.), Proudfoot (1976) and Hamond (1983) provide the basis for some consensus on essential requirements. If the horizontal sampling interval is more than 2-3 metres, then more than one sub-sample should be taken from around each point in order to cancel out random local variability in phosphorous levels. The sub-samples can be bulked to minimise the analytical load. One of the great uncertainties is to choose a distance between sampling points close enough to identify changes but not so close as to provide an intolerably large number of samples. This issue is better discussed in considering the particular aims of any individual P survey (section 4.5.3).

The final problem is to choose the depth at which to sample, because movement of phosphorous down the profile and new soil formation in the period after archaeological use can obviously influence the results obtained. Vertical distribution patterns have received much less attention than horizontal ones, but the work of Sieveking *et al.* (1973), Bakkevig (1980) and Gurney (in Craddock *et al.* 1985) suggests that ideally samples should be taken at several points down each profile, but that this leads to an unacceptable proliferation of samples. In practice the best location for sampling on cultivated land depends on the depth of the ploughsoil and local geomorphological conditions. On level ground with little evidence for erosion and new soil

formation, sampling is best carried out between 0.15 metres from the surface and the base of the ploughsoil. Samples from the top 0.15 metres may be contaminated by vegetation and recent application of fertilizers and as a rule should be avoided. Samples from below the ploughsoil on level ground will have often come from well below the archaeological land surface and thus may not be representative of the activities carried out on it.

4.5.3 Phosphate Analysis and Regional Survey

Many of the issues discussed for magnetic susceptibility augering apply to phosphate analysis also and do not need reiterating here. There are, however, additional complications that are specific to P survey. First, the qualitative techniques are, by their nature, crude and only securely applicable on some soils. They cannot be used as readily as magnetic susceptibility to cover tracts of largely unknown land, but should be applied only where soil pH, background P levels and texture are suited. Total P extraction could be used far more widely as it is less soil type specific, but until faster techniques such as EDXRF are more widely available, they are likely to remain of limited use.

Field techniques such as the spot test can provide evidence for the presence of enhanced P content, but for the purposes of landscape studies their interpretation is often unclear. Currently, the specific context of high P values seldom suggests a clear derivation (eg. Hassan 1981). Only by linking P data with complementary techniques (eg. Bintliff *et al.* 1992; Taylor 1995) is it possible to construct more detailed frameworks for the derivation of a soil sample and thus inference about past activity. Like magnetic susceptibility, soil P analysis can study past activities that were not associated with architectural features and could provide invaluable information about the use of space in and around neighbouring foci. To become a tool for the characterisation of locales, however, it is imperative that detailed case studies are carried out in conjunction with excavation or other survey techniques.

4.6 INTEGRATED GEOPROSPECTION AND LANDSCAPE ARCHAEOLOGY

The brief overviews above have focussed on the advantages and problems of each technique, but I now wish to consider how they can contribute to the aims stated in chapter 1 and

section 4.1.2. Resistivity and magnetometry are at their most effective in identifying discrete physical features, whether they be of anthropogenic or non-anthropogenic origin. In this respect they can contribute a great deal to the reconstruction of past landscape architecture. Their speed of coverage limits their application to selective samples from the broader landscape, usually in order to investigate the morphology and complex relationship of features in and around key locales. In integrated strategies they can be used to fill gaps in air photographic coverage or prospect areas where air photography has proven impossible. Resistivity and magnetometry have all too often simply been used to confirm the evidence of air photography and only used for general prospection in advance of development. This fails to significantly expand our understanding of landscapes as existing biases in coverage from air photography and excavation are reinforced.

Gradiometers, when used in conjunction with preliminary broad interval magnetic susceptibility surveys, can be used as a wider prospection technique in areas unsuited to air photography. In areas of extensive pasture, localised rises in magnetic susceptibility can be scanned for the presence of buried features and then grid surveyed to produce reasonably detailed plans of surviving archaeology (cf. Taylor *et al.* 1991). A good example of the gains to be had from surveys used to identify foci within larger complexes can be seen at Stanwick, North Yorkshire (Haselgrove *et al.* 1990). For the Northamptonshire case study an assessment of the survey practice and iron age and Roman archaeology of the region was carried out to see if current surveys could be used for such a purpose (chapters 5 & 6).

Combined air photographic and geophysical surveys can be of considerable value in reconstructing the architectural framework of the landscape. The problems of interpreting land use and settlement from feature morphology alone, however, are well known (cf section 3.3). This is where the integration of the morphological information with the other indicators of past activity is critical to survey. Traditionally survey methodologies have placed a great deal of emphasis on finding sites (usually used to mean settlements or other architectural foci) and so have rarely considered other forms of activity across the landscape.

Fieldwalking, magnetic susceptibility and phosphate analysis provide useful and complementary datasets about the location, type and (with fieldwalking) date of past activity foci. Each technique has been used with varying degrees of success but, almost invariably, they

been applied alone or in conjunction with excavation. Consequently we have failed to produce even relatively sophisticated models for the spatial use of landscapes. Models have been developed for fieldwalked data, but many of the conclusions drawn about, for example, so-called manuring scatters, have remained largely unchallenged assumptions. The likelihood that any one of the techniques described is capable of characterising activity areas with any accuracy must be considered highly debatable. In combination, however, it may be possible to produce more sophisticated models designed to help search for distinctive finger prints of different soil characteristics associated with types of land use. There have been remarkably few attempts to investigate this multivariate approach, but some idea of its value and limitations may be derived by recourse to two brief examples.

Freij (1988) took samples from an area classified by geographers into a number of land-use classes on the grounds of their present use. The aim was to identify whether one or more of four methods of soil analysis (phosphates, magnetic susceptibility, darkness and density) correlated with the land use classification. His data showed that if one variable was used, it was difficult to determine to which category a sample should belong. Combining two or more variables increased reliability considerably (cf. fig. 4.10). Freij's technique worked well because of the consistent lithology on which the survey was carried out, but also because the area had not been subjected to considerable changes in land use over time. In this sense Freij was investigating a well preserved single phase landscape similar to those studied by Widgren (1983) in Sweden. In the lowland landscapes of England where centuries of changing land use have produced a palimpsest of soil changes, Freij's analysis is more problematic, as the data from any field represent the sum of all past and present activity. Subtle changes in soil composition caused by past uses such as intensive and extensive arable fields are likely to have been obliterated by subsequent cultivation. Only in areas where past human action has been intensive or prolonged are these properties likely to show as sizeable and characteristic fluctuations from those trends. In the vicinity of past settlements under modern agricultural land such as at Maxey (Craddock *et al.* 1985), Cat's Water (Pryor 1984), Coneybury Henge (Clark 1983), King Barrow Ridge and Wilsford Down (Entwhistle & Richards 1987), and Shiptonthorpe (Taylor 1989; 1995), soil analyses have distinguished marked variations in activity which can be confidently separated from action of other periods.

At the Romano-British settlement at Shiptonthorpe, North Humberside, an attempt was made to see whether there was a reasonable correlation between a combined phosphate/magnetic susceptibility 'fingerprint' for a particular area and its usage. Samples from areas subsequently excavated or in the immediate vicinity of earlier excavations were compared. As well as classifying the use of these excavated areas, samples taken from over the course of the main Roman road were also studied to see if they displayed any consistent phosphate/magnetic susceptibility ratio. For comparative purposes, control samples taken well away from the settlement were also plotted to show the contrast ^{with} those from the selected 'on-site' areas. The results of this exercise are shown in figure 4.11, where samples are classified as *Road*, *Habitation-Buildings*, *Habitation-Surfaces*, *Cemetery* and *Background* according to their provenance. The Habitation samples were all taken in the eastern end of the 1987-1991 excavation trenches. The cemetery samples were from the 1985 trench immediately south of the A163 road which contained a small group of cremations and infant burials.

Although the number of samples is small and the circumstances of the exercise far from ideal, the plot does appear encouraging. The Habitation samples display a wide variety of scores (as might be expected of an area where a very wide range of domestic activities would have taken place) but both *Building* and *Surfaces* categories show consistently higher levels of magnetic susceptibility than the surrounding background scores. This suggests that, on a lithology such as Shiptonthorpe's at least (aeolian sand), habitational areas can be realistically distinguished from their surrounding landscape. The *Cemetery* ratios are encouraging as they are consistent with what might be expected from a combined phosphate/magnetic susceptibility survey. The area, which on excavation revealed no evidence for use other than burial, would be expected to have magnetic susceptibility levels little different from the surrounding country, but phosphate levels that were high from the decayed burials.

The widely dispersed scores from the *Road* samples are not as disappointing as they at first seem. The nature of the road's usage was such that it will not necessarily have a distinctive fingerprint, a point which appears valid in the light of a re-examination of the provenance of each sample. Road samples taken nearest to the known habitation and cemetery areas had broadly similar ratios to them. It is possible that in these areas there is a 'blurring' effect with soil from the adjacent enclosures being dispersed by, for example, trampling, erosion or spoil clearance from

ditches. The problems in interpretation that this can lead to are discussed in detail in Taylor (1995), but the results of this exercise were used in conjunction with the magnetometer survey and pottery data to identify changing functional patterns across the settlement.

Despite the difficulties of integrated survey involving relative and absolute chronology, and overlapping uses, it provides several advantages. Integrated surveys can help to characterise activity foci in totality, not just as fragments recovered by rescue excavation, and place them in their immediate local context (eg. Taylor 1995; Dockrill & Gater 1992). Their speed allows a number of areas to be studied within the landscape to aid comparison between locales. Thus the scale and basic structure of a number of the settlements and ancillary activity areas within a particular region can be inferred and their relationship studied.

Finally, integrated surveys can draw attention away from the biases that have inevitably come from a site orientated excavation-based methodology. Projects founded on material from fieldwalking and excavation alone tend to focus on artefactually or structurally rich areas and ignore those that are less 'visible'. Thus some of the techniques discussed above can, and should, be used as part of methodologies not handicapped by the overworked and limiting concept of the site (cf. Haselgrove 1985; Gaffney & Tingle 1984).

PART II: THE CASE STUDY

CHAPTER 5 CONTEXT, THEORY AND METHOD

The subject of the case study was the old county of Northamptonshire (fig. 5.1). It is a county with a long tradition of excavation and survey and has been well served by local archaeological groups. Somewhat surprisingly, however, it has received little treatment in regional or national syntheses on the Iron Age and Roman periods, providing occasional examples for analyses centred on other parts of the country. This study partly stemmed from a desire to fill this gap by bringing together some of the diverse range of evidence from the region. It was also intended to incorporate new data in order to construct an integrated landscape-based perspective of occupation around the Nene valley from approximately the fourth century BC to the fourth century AD. The philosophy behind this approach was discussed in chapter 1 and is considered further below where the text is divided into three main sections under the headings of Context (5.1), Theory (5.2) and Method (5.3).

Section 5.1 outlines the physical, material, and historical context for the archaeology of the region as it stood at the outset of the case study. In particular, it focuses on factors influencing the survival and recovery of archaeological data from the area. Section 5.2 discusses the desire to apply a coherent theoretical framework to the region based on the broader themes of landscape theory discussed in chapter 1, but given the limitations imposed by the availability of suitable data outlined in 5.1. Section 5.3 then describes the methodological framework. Here the focus lay on the threefold aims of:

a) incorporating the diverse but often high quality information available from published excavations into a study of the spatial development of activity foci, in relation to their immediate landscape context;

b) integrating the site-orientated dataset with survey data in order to better understand the spatial organisation of several blocks of landscape across the region to study changing patterns of land use and social interaction. The two key sources for this came from an extensive fieldwalking survey of the county carried out by David Hall, and by integrated plotting and analysis of the excavations, geophysical surveys and air photographic evidence from three sample areas;

c) looking at additional field-walked and excavated data from the county to assess whether particular landscape forms extended across the region or if other landscapes may have existed in areas outside those studied in detail.

5.1 CONTEXT

The spatial context of the case study is the pre-1974 county of Northamptonshire incorporating the Soke of Peterborough, now part of Cambridgeshire. The selection of a study area based on administrative boundaries may appear strange in the context of a study of Iron Age and Roman landscapes as it almost certainly has no relevance to the pattern of occupation before the medieval period, and is neither strictly a geographical unit, nor a statistical sample of eastern England. There are, however, a series of theoretical and practical reasons that make its selection justifiable.

Physically, the county is dominated by the Nene Valley and its tributaries (especially the River Ise, and the Willow and Harper Brooks), but it also incorporates the River Tove (a tributary of the Ouse) and the southern side of the Welland valley (fig. 5.1). To the north east the old county boundary borders the edge of the Fens whilst the north-western end is dominated by the clay vales of the Jurassic ridge with high limestone plateaux to the south-west and north. The county thus incorporates the wide range of soils, relief and topography typical of much of the English Midlands.

Archaeologically, the county, and the Nene valley in particular, has been viewed as a boundary area between cultural groupings in the archaeological record. For the iron age the Nene Valley lies at, or near, the edge of a series of material culture regions (figs. 5.2, 5.3 & 5.4), and marks the limit of particular types of burial practice (fig. 5.5). In the political geography of the period it is usually considered to mark the boundary area in which the territories of the Catuvellauni, Corieltauvi and Iceni meet, a view based, in part at least, on the distribution of their respective coinages (see fig. 5.4). For the Roman period the *civitas* boundaries of the tribes previously mentioned are frequently shown as broadly following the Nene valley and its junction with the Fenland near modern Peterborough (Rivet 1958 fig. 9, 161; Millett 1990 fig. 16, 67; &

fig. 5.6), though their location is based on very little evidence and, in any case, has been partly defined using the iron age coinage distributions.

Historically, the county has a good record of local fieldwork that is catalogued in detail in six RCHM volumes (1975; 1979; 1980; 1981; 1982; 1985) and consequently is only outlined and updated below. Since the 1950s, though, divisions have arisen in the way separate parts of the county have been studied in the wake of the emergence of local organisations such as the Lower Nene Valley Research Group, the Upper Nene Archaeological Society and the Fenland Archaeological Trust. This situation has been exacerbated by uneven urban development and landscape destruction in the region since 1945. Iron ore and gravel extraction have forced larger organisations such as the Northamptonshire County Council Archaeology Unit (now Northamptonshire Archeology) to concentrate resources on areas under serious threat (eg. the Wollaston area discussed in section 6.3). These distinctive historical trends have markedly affected the nature of the recorded archaeology of the county and are the subject of the following parts of this section.

Northamptonshire was well served by antiquarians of the eighteenth and nineteenth centuries such as Morton, Artis (eg. 1828; 1847), Sharp, Baker, and Dryden to the extent that George was able to note that 'Northamptonshire will bear favourable comparison with the majority of our English counties' (1902, 12). George's survey could list about 300 locations with archaeological information of pre-medieval date which, for the Roman period, largely reflected the work of these men. An aspect of much of this work was that the more active excavators concentrated their efforts within small areas of the county, usually close to their homes. Thus early records of the distribution of iron age and Roman settlement in Northamptonshire tended, for example, to be dominated by finds from areas around Castor (Artis), Irchester (Baker) and Northampton (Sharp). Figure 5.7 illustrates the effect this had on the understanding of Roman archaeology at the time of Haverfield's (1902) survey of evidence.

As has been noted elsewhere (eg. Ferrell 1992 for north eastern England), the 1920s to 1940s saw a lull in fieldwork with few new excavations and occasional reinterpretations of nineteenth century collections. Fell's (1936) publication and commentary on the finds recovered by Sir Henry Dryden at Hunsbury made public a valuable group of iron age ceramics and metalwork, whilst Hawkes (1939) and Margary (1935; 1939) discussed the results of air

photographic work around Castor. Mattingly (1932; 1945) incorporated the more significant coin finds into broader issues covered in the *Numismatic Chronicle* but these, and rare excavations by local amateurs such as the Reverend H.O. Cavalier at Nobottle (1932), create an impression of a paucity of fieldwork during this time. A survey of the number of recorded discoveries noted in the 'Sites Explored' section of the *Journal of Roman Studies* between 1921 and 1960 supports this view, with only three excavations recorded until the resurgence of new fieldwork in the region in 1952 (fig. 5.8).

Since the 1950s Northamptonshire has seen a rapid expansion in the numbers of all types of sites but especially those of the iron age and Roman periods. Initially, much of the work was done by amateur archaeologists concerned largely with fieldwork rather than excavation and by the mid-1970s Taylor (1975) was able to record five local archaeology groups, three school societies and a local history society all working in the Nene Valley alone. The effect of their work and, from the late 1960s, that of professional organisations such as the Northampton Development Corporation, was dramatic and is seen in the maps of known Roman settlement in the Nene Valley in 1931, 1956, and 1972 produced by Taylor (fig. 5.9 after Taylor 1975 fig. 7.1, 114-115). The continuation of this process was amply illustrated by the RCHM atlas for the county (1980), which for the Nene Valley appears to show a dense and almost continuous spread of settlement during the Roman period (fig. 5.10). In other areas of the county there has been far less of a tradition for fieldwork and the presence of extensive areas of permanent pasture in the north and west of the county further limited the number of new discoveries made. Here both the RCHM atlas and the county SMR record few iron age and Roman sites per parish except where small scale intensive work by local enthusiasts such as D.J. Barrett around Marston St Lawrence (A in fig. 5.10) produce clusters on the map.

Such distributions also mask the way in which discoveries were made and provide little guide to the nature of individual discoveries. Each point can represent anything from stray nineteenth-century finds to full modern excavation and does not indicate biases in the methods used by different groups. The distribution of these sites within the Nene Valley shows marked discrepancies across the region on top of those already noted. Excavation from the late 1960s onwards has been concentrated in areas of urban development and large scale iron ore and gravel extraction. Figure 5.11 shows the location of iron age and Roman discoveries in the

Nene Valley between 1956 and 1980 compared to these forms of development. The link between them is no coincidence and has produced a bias in coverage that has rarely been considered but which may well have a marked effect on interpretation of iron age and Roman settlement in the region (cf. chapters 6 & 7). It would be no exaggeration to suggest that, for the Roman period in particular, accounts of the region are largely accounts of the Nene valley and its immediate environs. This issue is raised in section 5.3 where the criteria for choosing areas for the detailed studies are listed. At the outset of this study it was apparent that information from field and aerial survey could be an important part of any work aimed at reconstructing the past landscapes of the region. Northamptonshire provided a reasonable area for investigation as it was not untypical of other areas of eastern England in having a good overall record of investigation but mostly within the structure of local amateur or rescue archaeology.

It might be felt that air photographic coverage would help redress this geographical imbalance, but the factors affecting crop mark formation and reconnaissance history reveal that by and large this is not the case. The soil conditions affecting crop mark visibility across the county were discussed at some length in chapter 3 and show a great deal of variability. Using the criteria laid down by Evans and Catt (1987) and Evans (1990b), and summarised in table 3.1 above, a generalised map of crop mark visibility can be produced (fig. 5.12) to show the relative productivity of air photographic reconnaissance across the region. This indicates that the poorest areas for crop mark formation are often those that have been poorly served by rescue and research excavations (cf. figs. 5.10 & 5.18). This is not surprising given that much rescue excavation is based on the known presence of crop marks. A qualitative appreciation of this problem was apparent to the Northamptonshire County Council Archaeology Unit (NCCA) during the 1980s (Foard pers. comm.) and is reflected in the reconnaissance history maps for the region shown as figures 5.13 and 5.14.

It is important at this point to note that the flight path information (fig. 3.2) is in many ways a more reliable indicator of the distribution of general reconnaissance than the information on the number of photographs (fig. 5.14), as the latter reflects crop mark visibility as much as it does intensity of coverage. Figure 3.2, however, could only be reproduced for the flights carried out by the NCCA sponsored photographers during the late 1970s and 1980s and therefore

excludes much of the work carried out by the Cambridge Committee for Air Photography and by Hollowell (1971).

Despite these qualifying comments, Northamptonshire has a good record of extensive aerial photography and this is currently the focus of a descriptive plotting survey as part of the RCHM's National Mapping Programme. Again little, if any, of this information has been published but is now available on archive from Northamptonshire Heritage and was used for the contextual studies in chapter 6. The only published example of an air photographic survey is of the Welland valley around Maxey in *A Matter of Time* (Bowen & Butler 1960) and subsequently updated as part of the Fenland project (Simpson *et al.* 1993). Aerial photographic plots have also been produced for the Raunds Area Project but are currently awaiting publication.

Although field survey has been a major component of the work carried out by local groups virtually none of the results have been stored or published in an accessible format. Much of the information is incorporated in the county SMR or as brief notes in *Northamptonshire Archaeology* or *South Midlands Archaeology*. As Taylor (1975, 110) noted, the information has been recovered and recorded in a variety of ways, often hindering the comparison of work from one parish or area with that from another. Despite Taylor's then optimism (1975, 119), most of the extraordinary quantity of field survey data from the county has not been worked into a format that allows any assessment of what each dot on the distribution maps represent. Although each of these discoveries notes an important presence, there is little or no way within their existing format that each 'site' can be characterised as anything more than just that, a location for some unknown past activity.

Larger scale systematic field survey of the county has been rare despite, and perhaps because, of its proximity to the East Anglian Fen. Certainly since the late 1970s most extensive field survey work in the wider region has focussed on the Fenland Project (Hall & Coles 1994). One notable exception is the work of David Hall, who between 1974 and 1989, carried out an extensive survey of all the parishes of Northamptonshire along the lines of the Fenland survey. Hall's survey methodology (summarised in Hall 1985 & 1987) was intended as an extensive regional exercise and is best treated as such (cf. chapters 6 & 7). It does, though, have the considerable advantage of being the only systematic survey that attempted to cover areas of

the county away from the main river valleys and is a useful source of information for analyses at a county scale.

The most accessible detailed surveys are those of the Raunds Area, co-ordinated by Steve Parry (forthcoming), and the limited sampling exercise carried out by Maisie Taylor as part of the lower Welland valley survey (Pryor *et al.* 1985). The Raunds survey is of particular value in that it was intended from the outset to be an intensive non-site survey. This makes it ideal for the detailed analysis of most artefact locales within the local landscape but is limited in its overall coverage to just three parishes. When published, however, it will provide a useful point of comparison with the analyses carried out in chapter 6.

At a national level, syntheses of the iron age and Roman periods rarely discuss this region in detail. The perception of the area as being at the edge of events centred elsewhere has detracted from accounts of the great diversity of data collected. For the iron age, in particular, excavations in advance of gravel and ironstone extraction and a tradition of local fieldwork since the 1960s has totally altered the picture of settlement. Despite this, Cunliffe, in his latest detailed synthesis of iron age settlement in Britain (1991), devoted five pages to the whole of the east midlands. Regional summaries such as Branigan's for the Catuvellauni (1985), Todd's (1991) and Whitwell's (1982) for the Coritani (or Corieltavi), or Harding's on lowland Britain (1974), have tended to focus on 'core' areas. In the examples above, these have been Hertfordshire, Lincolnshire and the Thames Valley respectively.

More significant are the works of Chris Taylor (1975; 1983; Brown & Taylor 1978) and David Knight (1984), which contributed greatly to iron age studies in the county. Their summaries showed the extent and intensity of iron age settlement in the Nene valley in particular but also increasingly up the tributary valleys around Wellingborough, Kettering and Northampton. Knight's work is important as one of the few attempts at an analytical study of settlement in the region. Through a series of spatial analyses he identified two partly contemporaneous and spatially overlapping systems of settlement: a dispersed system predominantly of late bronze/early iron age to middle iron age date, and a centralised system from the middle to later iron age. Knight's conclusions were based on a detailed morphological breakdown of settlements and a number of geometric analyses which are best discussed in relation to the study that follows.

For the Roman period regional analyses are all but absent for Northamptonshire. The RCHM volumes and Taylor's summaries (1975; 1983) are essentially descriptions of the quantity and diversity of settlement but offer very little by way of further analysis. Johnston (1969) and Wild (1974; 1978) usefully discussed some of the socio-economic aspects of settlement and pottery production in the Nene valley but there has been little follow up to their work. Griffiths' PhD (1986) focused on the analysis of second century settlements and analysed them purely within a framework that emphasised market economics. The lack of synthesis is all the more striking when compared with the body of work on iron age and Roman settlement in the East Anglian Fen. The Fenland is not a key focus of this case study, but provides an extremely useful point of comparison. Individual sites of significance such as Water Newton (*Durobrivae*) often appear in larger scale syntheses for the Roman period, but are all too often considered in isolation from their local context. Thus *Durobrivae* is discussed without consideration of the very large villas that cluster around it or the absence of such sites around Maxey 12 kilometres to the north along King Street. In the studies below it is hoped that this problem is partly remedied by the contextual integrated approach adopted.

5.2 THEORY

The case study of iron age and Roman landscapes that follows worked at two main scales: first by characterising the nature and location of foci of activity (some of the places of chapter 1) and second by studying how these locales were woven into interrelated landscapes through studying the relationships between them. In chapter 1 (section 1.2 & fig. 1.1) a model of spatial structure was suggested that allows for the conceptual understanding of the human environment at a number of scales. One such scale, the realm of being to place, is more appropriately studied through a detailed contextual evaluation of evidence produced by excavation and other related 'site'-based approaches. This is not the primary focus of the case study, which concentrates on places and their construction into landscapes (chapter 6), and on regional patterns and contrasts between different landscape forms across the county (chapter 7). In figure 1.1 these are broadly represented as the scale of place to landscape.

In chapter 1, I suggested that human landscapes are constructed from the existential or lived-in spaces of individuals or communities (here defined as those tied to the same place of dwelling). If landscapes represent this directly experienced world, then their scale is dependent upon the spatial range over which a community acts. In section 1.2 I argued that spatial experience is focussed on places and that landscapes are formed by the interconnection of the directly experienced places of an individual or community. In highly mobile societies, therefore, the landscape is more likely to be viewed from a decentralised perspective in which many places are of relevance. Support for such a view predominantly comes from anthropological studies where numerous examples of such constructions of landscape exist (eg. Berndt 1976; Tanner 1979; Ingold 1986; Morphy 1993). Sedentary communities' landscapes tend to be more centred around the place of dwelling or home as it is repeatedly the daily origin of human experience from which routine actions commence. Most examples of this form of landscape order come from historical or geographical case studies (eg Cosgrove 1984; Relph 1985; Jackson 1984; Weiner 1991; Ben-Artzi 1992). These are, of course, generalisations and the two world views represented above are best thought of as extremes in a continuum of cultural responses (Tilley 1994). An appreciation of this issue shows the impossibility of objectively defining the boundaries of a landscape as they changed with social routines. It is more helpful to study the form that landscapes took.

The study therefore focuses on two interrelated aspects of human landscapes. First, the analysis and characterisation of the varied foci of activity (locales) recorded by artefact groups and soil changes, and architectural forms identifiable through excavation, air photography, and occasionally geophysical survey. Second, a discussion of how landscape architecture may have been used in structuring forms and methods of social interaction between focal places. One theme adopted stresses linking routes of movement (ways) through space and points of denial of access or demarcation (boundaries). In chapter 6 it is argued that such an approach can help us understand the complex construction and use of space and social interaction at a communal and inter communal scale. A second approach, introducing the complementary concepts of territoriality and tenure, is outlined in connection to some of the broader issues raised by the case study in chapter 8.

In chapter 7 some of the suggestions about landscape structure and organisation are related to issues of the regional archaeology of the county. The forms of landscape identified in the detailed studies are assessed to see if there are distinct landscape regions across the county. The available archive is such that this is largely dependent on field-walked data and so chapter 7 focuses upon understanding how patterns in material culture foci varied at the regional scale. Stress is placed on the importance of understanding pottery scatters as simply the material correlates of some of the activity foci of past landscapes. In the past we have all too often made untested or implicit assumptions about the nature of pottery scatters in constructing settlement or site typologies. These are seen as unwarranted and a handicap to better understanding past landscapes. Instead an explicit and source critical approach is advocated in which we treat scatters as a poorly understood 'unknown' in which any patterns of composition and distribution are interpreted in a more explicitly defined framework. These are then re-evaluated in chapter 8 in order to look at the social basis for the landscape changes discussed in chapters 6 and 7.

5.3 METHODOLOGY

In the context of a thesis it would have been impossible to carry out a comprehensive new field survey and thus the greatest challenge to the case study lay in integrating the extant archaeological record for the county with some of the theoretical aims outlined above. Given the historical background of research in the county (section 5.1), three datasets were chosen for use in the case study. First, was the large body of artefactual material collected by David Hall between 1974 and 1989. Hall adopted the same methodology as used for the Fenland Project and the data display the same attendant advantages and disadvantages for analysis (cf. Haselgrove 1991 & chapter 7). At this point, it is sufficient to note that the extensive nature of the survey and its site-orientated philosophy limited its use for the detailed landscape analyses. Hall's survey had one major advantage in attempting to cover the poorly studied rural, pasture dominated lands to the north and west of the county and that are rarely responsive to air photographic survey. Figure 5.15 shows the gross distribution of 'sites' recorded by the field-

walking survey that were analysed in the case study. The strengths and biases in this data are assessed in relation to their use in the chapters that follow (chapters 6 & 7).

The second source of evidence was a gazetteer of excavations and geophysical surveys (appendix 1). For each excavation, phase plans were constructed on the basis of artefactual and stratigraphic data. As a main concern of the case study was the comparison of broadly contemporaneous activity, it was important to instigate an initial assessment of the available chronology for the region. Pottery was by far the most ubiquitous artefact from the excavations and so was used as the main source of chronological information. For the late iron age and Roman periods a pottery archive was constructed using the good range of existing series available from the county and summarised in appendix 2. This was used for the quantification and analysis of the field walked pottery used in chapter 7 but also provided a useful guide in assessing the dating of excavations in the gazetteer. A review of available data about pottery chronology for the first millennium BC, however, suggested that no comprehensive series existed. Knight's pioneering survey of the evidence (1984, chapter 1) had constructed a crude threefold typology that was in need of overhauling if useful comparisons were to be made between locales dating to before the first century BC. As a preliminary exercise the published iron age pottery from the gazetteer excavations was evaluated. Building on Knight's work, the iron age gazetteer entries were studied in order to produce a relative chronology for the most common forms on the basis of stratigraphic relationships and common association or non-association. Initially all commonly occurring forms were recorded as a simple type series following Knight's terminology (1984 chapter 1). These were then grouped according to their common co-occurrence, and separated by any clear stratigraphic differences. The five groups constructed were then compared with the limited number of radiocarbon dates available to provide some sense of their absolute chronology.

Figure 5.16 shows the forms of the five groups recorded. The initial study suggested that groups 1 to 4 formed a broad chronological progression but possibly with a high degree of overlap. Group 5 did not appear to be a particularly good chronological indicator although it was rarely if ever found associated with group 4 ceramics and was commonly associated with group 1 and 2 types. To see if this scheme was an appropriate chronological guide, contexts where pottery and radiocarbon dates were associated were recorded. Figure 5.17a lists sites where

dates and pottery were found in the same stratigraphic context. Figure 5.17b lists those examples where dates and pottery were not found in the same context but could be assigned to the same phase on other grounds. Appendix 3 contains a list of the calibrated dates. Only the former group can reasonably be suggested to date the pottery types, but the second group provides an additional and important guide to groups 3 and 4 in particular. The samples from Weekley and Odell can be traced to particular contexts with pottery but not from the sources available to this preliminary study. An initial survey of the dates suggests that group 1 pottery dates to the eighth (and possibly the 9th) to fourth centuries BC. Group 5 pottery has a similar start date and is often found with group 1 types but seems to have continued in use into the third century BC. They are most commonly dated to the sixth-fourth centuries and may have become the predominant forms during this period. Group 2 forms are reliably dated by only one sample but the dates from figure 5.17b suggest them to be a fourth-first century BC. Group 3 pottery is dependent on the dates from Weekley and Odell, which if reliable suggest that they were in use during the second and first centuries BC. Group 4 pottery is commonly dated to the first half of the first century AD for the region and this broadly accords with the dates from Odell. Although only a preliminary guide, these date ranges were used to provide broad chronological horizons for comparing landscape features of the first millennium BC in chapter 6.

The gazetteer of excavations and geophysical surveys from the county included all sites that displayed three necessary criteria: well-recorded locations, good (or at least reasonable) dating or phasing, and usable scaled plans. Appendix 1 contains the gazetteer sites and the bibliographic references used in their study. Some examples just outside the county were included for the purposes of comparison and are discussed in chapter 6. The gazetteer was needed to provide detailed information about the form and chronological development of locales (mostly settlements) and is central to the analyses carried out in chapter 6. The strengths and weaknesses of these data are discussed more there, but figure 5.18 shows the distribution of the gazetteer sites reflecting the historical bias of archaeological investigation noted above (fig. 5.11). In particular the very poor representation of sites in the north and west presents a serious problem for researching the region that is discussed further in chapters 7 and 8.

The final dataset was the air photographic archive for the county which was sampled to provide contextual information for the three detailed studies in chapter 6. Primary recording and transcription of all the photographs for Northamptonshire using AERIAL was available as digitised 1:10,000 OS map overlays. Northamptonshire Heritage is currently running a programme of inputting this data into a GIS system, but at the time of writing too little had been completed for this to be of use. The criteria for selection of the three air photographic blocks relate directly to the selection of the three detailed studies which are outlined in section 6.1. The main purpose of the air photographic data was to provide the wider architectural context of the studied landscapes. Wherever possible, information from the excavations was linked with a study of ESRs of the crop marks and geophysical surveys in their vicinity to produce phased plots that widened the contextual understanding of excavated locales.

CHAPTER 6 THE LANDSCAPE SURVEYS

6.1 INTRODUCTION

The primary aim for the case study was to select three areas of the region where a detailed evaluation of the development of the local landscape through the first millennium BC and Roman periods was possible using existing information (cf. chapter 5). Three criteria were used to choose the location and extent of these study areas. First, was the desire to assess spatial variation in the development of landscapes across the region as a whole. The material culture and burial studies mentioned in chapter 5 indicated that there were significant differences between parts of the county in the late iron age and Roman periods. Therefore, it seemed important to note whether any such differences could be noted in the organisation of landscapes.

Second, the county is marked by significant variability in its topographical and physical landscapes (cf. section 5.1). A key aspect of the methodology adopted (see chapters 1 & 5) was an analysis of ways in which past societies moulded the physical characteristics of their surroundings into cultural landscapes expressed partly through their architecture. This need not invoke a form of environmental determinism as groups can, within certain physical limits, ignore some of these characteristics. It does, however, allow for the identification of the acute understanding of environmental surroundings often shown by pre-industrial societies (cf. Harrison 1988; Poole 1986; Schieffelin 1976; Tilley 1994). It was, therefore, important to select some variety of physical setting to see whether iron age and Roman societies in the region adopted specific strategies for their use.

The final criterion was determined by the limitations of space imposed by a PhD thesis. As the case studies were based on available data from the county, the selected study areas had to be where a sufficiently high level of work had already been carried out to be able to reconstruct aspects of the past landscapes. This factor was subject to all the biases of recovery and archaeological history outlined in section 5.1, and was bound to act as a constraint on the selection of areas according to the two previous criteria. Given these factors, a preliminary analysis was carried out to define three areas suited to such a study. The Raunds Area Project

could not be used for this, but provided a useful point of comparison for some of the discussions that follow.

Figure 6.1 shows the county divided into a series of topographical and pedological regions. This, the information outlined in chapter 5, the gazetteer sites listed in appendix 1, and the fieldwalked data in appendix 4 show the distribution of the three main data sets used for the study. On the basis of this information three study areas in the Lower Welland Valley, the Middle Nene, and to the south of Northampton were chosen (1-3 in fig. 6.1). The first, centred around the villages of Maxey, Tallington and Barnack, lay at the far north east of the region in the low-lying wide expanses of river gravels skirting the western edge of the Fenland. The second, around Ecton and Wollaston, covered a key part of the river Nene and its flanking hills where the river valley narrowed before dividing into a number of smaller tributaries and the upper reaches of the Nene around Northampton. The final area covered parts of the sands and claylands overlying limestones that flank much of the southern side of the county and separate the Nene from the Ouse. These areas, in conjunction with some information already available for comparison from the Raunds area survey (4 in fig. 6.1), provided a good range of areas across the region, except the broad upland areas that dominate the north and west of the county. Unfortunately, these areas have simply received insufficient archaeological investigation to provide enough information, though current work in the region is starting to redress the balance.

In the sections below, the three study areas are organised to describe each:

- a) by area and by smaller block within each;
- b) with an outline of the nature of available information;
- c) through an integrated chronological outline of local landscape developments from the earlier first millennium BC to the later fourth century AD.

The aim was to show the nature of settlement and landscape architecture, and the use of space through time, and their implications for social change. At the end of each section an overview is provided for the whole of the study area, with comments on some discernible trends and differences through time and space. The chapter is then concluded with a thematic discussion in which the evidence from all three studies is combined to assess the architectural definition of locales (places) in section 6.5.1, the openness and boundedness of landscapes

(6.5.2), and the spatial juxtaposition of locales (places) within the landscape (6.5.3). The latter, in particular, then provides a series of wider characteristics for the location of places (or occupation locales) that are the basis for a selection of wider analyses looking at the region as a whole (chapter 7).

6.2 THE MAXEY/BARNACK AREA (fig. 6.2)

The first case study was divided into three smaller blocks for the purposes of discussion. It covers an area of the Lower Welland Valley between the villages of Maxey and Barnack. Lying to the far north east of the region, the area is dominated by broad expanses of river gravels that, at the western end, are flanked by low limestone hills. In the accounts that follow numbers in bold refer to the gazetteer number for sites listed in appendix 1. Most of the discussion below is based on the sources noted for each gazetteer entry unless otherwise stated or specifically noted. The threefold chronological titles used, Earlier First Millennium BC, Later First Millennium BC and Roman, are intended only as broad guides. The Earlier First Millennium refers to locales with group 1 and 5 ceramics alone and dates to broadly the eighth-fourth centuries BC (cf. section 5.3), the Later First Millennium BC to locales with pottery of groups 2, 3 and 4, spanning from the fourth century BC-circa AD 70, when Romanised pottery forms become prevalent.

6.2.1 Maxey (fig. 6.3)

The first block chosen was a section of Maxey island to the south and west of the modern village (cf. fig. 6.2). It is part of a series of cropmarks covering much of Maxey parish and beyond, much of which has now been destroyed by quarrying (cf. Bowen & Butler 1960; Gurney *et al.* 1993a). The southern side of the area is bordered by Maxey Cut and a band of alluvium along either side of it. To the north run the new and old courses of the River Welland. In some respects the area is typical of many low lying river gravels in having a topography in which subtle localised changes are rarely noticeable on maps or plans. Visually this is a landscape of open vistas in which it is difficult to identify clear topographical features in the near

and middle distance. Generally the ground falls away slowly to the east and thus affords wide views towards the Fen edge and to lower lying partly alluviated areas to the south.

Figure 6.3 shows the cropmarks for the area and illustrates the sheer complexity of occupation on the gravels. The chronological starting point of this discussion is the clear change in orientation and structure of the Maxey landscape that occurs with the appearance of pit-alignments from the earlier first millennium BC. At Maxey this is not only characterised by a change in structure but a shift in orientation of the main features of the landscape from NW-SE to broadly E-W and N-S.

The discussion below is based partly on the air photographic evidence and an analysis of fieldwalking finds collected by David Hall. Primarily though, it rests on an evaluation of four excavations in field OS124 (65), east and west fields (64), Bardyke field (63), and at Plants Farm (66). Due to the limitations of this information and the shortage of space available to discuss other issues here, the majority of locales discussed are those of settlement (or dwelling). The relationship of these to other more ephemeral contemporary locales is by and large impossible to discuss, perhaps a consequence of the site-orientated excavation philosophy behind much of the published work. Instead, emphasis is placed on characterising the changing nature of the landscapes in relation to places of dwelling and in movement between them.

The Earlier First Millennium BC

The earliest stages of the transition from monumental to agricultural landscapes are poorly recorded in the study area, with only fragmentary information on late bronze and early iron age activity. The pit alignment at Plant's Farm (fig. 6.4A) is largely undated, though the evidence of others locally and regionally such as at Tallington (88), Briar Hill (14), Gretton (46) and Ringstead (Jackson 1978) suggest a date in the early first millennium BC. An extensive group of pits in field OS124 are dated by group 1 (cf. section 5.3) ceramics and appear to respect a shallow east-west ditch (itself undated) which runs up to the edge of a small 'henge' type monument (at A in fig. 6.5). Simpson (1981, 67) suggested that this ring ditch was possibly a Neolithic henge on the basis of a flint arrowhead and a sherd of Grooved ware. Animal bones from the ditch were, however, radiocarbon dated to 1047-398 BC (UB 456, calibration following

Pearson & Stuiver 1993), a date not out of keeping with the group 1 pottery recovered from the pits. Uncertainty over this dating, however, is exacerbated by the presence of further pits with group 1 pottery in this area, one of which cuts ring ditch II. Even if the ring ditches are an earlier monument, it is clear that it was again a focus of activity with ring ditch I still visible in the earlier first millennium BC. Here, as in the Tallington excavations (section 6.2.2), evidence for other structures is largely absent, but the nature of the excavation does not exclude the possibility that post holes were missed. In the area of the Bardyke/East & West field excavations (63 & 64), structures of this date are absent but mid-late bronze age activity locally may be indicated by the presence of flint artefacts in the vicinity of the Henge (indicated by cross hatching in fig. 6.5).

The first structures that can be identified in this area are the small square-ditched enclosures that Pryor (Pryor *et al.* 1985) interpreted as square barrows. The excavated examples were undated but stratigraphically earlier than the later middle iron age phase (cf. fig. 6.6) and have been assigned to the earlier first millennium BC by analogy with examples elsewhere. Unfortunately, the circumstances of their excavation were far from ideal and much information may have been lost in the stripping process. The interpretation of these features as barrows is problematic in the absence of any evidence for burial, but their clear association with the oval barrow and henge monument from earlier phases is of interest in this context. One of these square enclosures appears to have incorporated a four poster structure and an alternative interpretation for them could be excarnation platforms (Carr pers. comm.). As a group they clustered around the henge and oval barrow and served to re-emphasise the spiritual/ceremonial nature of the immediate locale. This group appears to have been bounded to the north by the main east-west axial boundary of the area as a whole (A-A on fig. 6.3). Unfortunately this boundary remains largely unexcavated and undated, but may represent a key axial feature of the landscape from this time on. Though limited, the evidence seems to indicate that the square barrows continued the relationship suggested from field 124, in which an earlier ceremonial place was incorporated within a new landscape, now divided by pit alignments and other possible boundaries. One such pit alignment at Plants Farm (66, fig. 6.4A) is largely undated (it was infilled in the middle iron age) but by analogy with elsewhere in the region is likely to date to the earlier first millennium BC and appears to form part of a major division cutting across the 'island' (see fig. 6.3).

Later First Millennium BC

Evidence for middle iron age activity (here broadly dated to 4th/3rd-1st century BC) is far more abundant, particularly in the area of the Bardyke and East-West fields excavations. Here occupation can be divided into two phases on stratigraphic grounds (figs. 6.6 & 6.7). The earlier phase marks a key change in the landscape locally, with the construction of a series of gullies or ditches demarcating an area to the south and west of the excavations from an open area to north and east. There is also a partial shift in emphasis away from the henge (the outer ditch of which was now dug through), but its central mound and the square ditched structures were respected. The new ditches appear to have formed a series of rectilinear fields with a settlement enclosure at their eastern end. Entry to this enclosure and also out into the open areas covered by most of the excavation was via entrances in their northeastern corners. The result was a tripartite division of the landscape into a bounded area of rectilinear fields/enclosures to the south west, an open area to the east, and to the north west an area incorporating many of the ceremonial/burial monuments of earlier periods.

At a superficial level the subsequent phase (fig. 6.7) seems to mark another significant change as the previous enclosures were abandoned and a new series of boundaries dug. However, the overall effect was very similar with, if anything, a clearer definition of the three areas mentioned above. Initially this was achieved by the construction of a substantial ditch separating the south western quarter. A small enclosure added to its northeastern corner incorporated the ditches of two of the square barrows in its construction. Later the north western quarter was physically separated by a ditch extended north from the existing boundary and blocking the eastern entrance to the enclosure. These phases seem to mark an important shift in which settlement/agricultural, open (grassland or woodland?), and burial/ceremonial spaces were separated from each other and demarcated through the construction and maintenance of physical boundaries.

To the south east the two middle iron age phases of the east/west fields excavations were mirrored by similar boundaries in field 124 with an initial narrow slot (palisade?) or ditch being replaced by a substantial ditch. The few features excavated to the south of these all appear to post date the middle iron age and suggest the area, seemingly enclosed, did not contain structures. A feature of the later middle iron age phase in both excavations, is the

transformation of the boundaries from narrow to large ditches (from 1 metre to over 2.5 metre wide). It might be suggested that the latter in themselves constituted a form of monumentality in that they required considerable effort to construct and appear to have been renewed on a number of occasions. At Plants Farm (fig. 6.4) these phases were marked only by the infilling of the pit alignment, possibly signalling the demise of this distinctive form of landscape boundary. The location of the settlement enclosure in the subsequent phase, however, suggests some form of structure such as a hedge may have perpetuated the boundary line in this area.

The close association of both buildings and small enclosures with boundary locations also marks a new development at this time. The small enclosures do not appear to be occupied, but are located on boundaries or boundary junctions. In terms of their relation to movement from place to place, the enclosures were not constructed to incorporate settlement and their entrances face away from the occupied areas. The main boundaries were redug on a number of occasions and there is little evidence for points of access across them. The effect seems to have been the creation of relatively self-contained domains, isolated from their neighbours except perhaps within the limited confines of the boundary enclosures.

It is also during the middle iron age phases that the east-west and north-south alignment of the landscape was clearly established and broadly east-west entrances to roundhouses and enclosures became the norm. There is not space to adequately discuss the significance of this here (cf. Oswald forthcoming), but east-west and north-south alignments do seem to have been important, even when their construction appears inappropriate. The clearest example at Maxey appears during the later iron age, where the formerly open area in east field was split in two by another substantial boundary ditch that zig-zagged its way south and west from the main axial boundary outside the excavation (fig. 6.8). There appears no obvious reason why this should have been necessary, unless maintaining a north-south or east-west alignment was considered preferable. The pre-existing middle iron age boundaries in west field were probably still visible at this time (suggested by the presence of group 4 pottery and a Colchester brooch in one of its fills). If so, the area was now divided into four with a major shift in dwelling eastward. Settlement and other structures were now located either side of the new boundary, but again closely associated with it. Points of access between the four areas were rare, but now an entrance was clearly elaborated by a massive double gateway. This gateway area subsequently became an

important focus for developments and its construction seems, therefore, to have entailed the creation of a significant new place.

Towards the close of this phase there are the first indications of a change toward elaboration and architectural differentiation of the settlements in the Maxey area. Near the new boundary in East field a small compound was constructed incorporating a small circular structure and a gully was cut across the main boundary in west field alongside a new enclosure. Similarly, at Plants Farm a new settlement enclosure was constructed over an earlier boundary line which is now broken by an entrance.

Roman Period

By the later first century AD (fig. 6.9) the changes in the construction and use of the landscape around Maxey accelerated as the main boundary was incorporated within a bipartite complex of compounds defining separate foci to the north east and south west of East field. The north eastern enclosure was provided with an elaborate eastern entrance defined by flanking ditches producing a defined path of entry toward the two roundhouses at the rear. The south western locale was divided into a series of small compounds. Both places incorporated the former boundary into their structure and in the process broke down its appearance as a clear delimiting boundary.

To the south of the former boundary an unusual square structure with east and west entrances was constructed, that Pryor interpreted as a shrine by analogy with similar sites at Danebury, Heathrow, Uley, Slonk Hill, and Lancing Down. The architectural definition of this locale, probably for specific ritual practice, may have re-emphasised an existing significance for this area from the previous phase, when two roundhouses, one facing east-south-east the other west north west, may have encompassed an element of ritual purpose within their wider usage (cf. Oswald forthcoming, for the wider background to this argument). The shift towards architectural differentiation expressed in the shrine is paralleled by spatial fragmentation in the vicinity of the settlement and suggests spatial separation of routine or occasional practices. Subdivision of the occupied area also occurred at Plant's Farm (though the fragmented nature of the excavation makes interpretation difficult) and the settlement enclosure was offset westwards for the creation of ditched driveways running north-south and east-west (fig. 6.4C).

Entrances to the enclosure allowed access from both driveways creating access to defined pathways between settlements.

In the later Roman period (c.3rd-4th centuries AD, figs. 6.4D & 6.10) the shift towards centralising architectural effort on settlement and increasing spatial fragmentation continued. At Plants Farm and Maxey east-west fields identifying buildings is problematic possibly as occupation had shifted outside the excavated areas or because of the near surface-built nature of some buildings at this time. Both, however, are characterised by a plethora of small plots into which particular activities may have become increasingly separately defined. Though the evidence for this is poor at Maxey (possibly indicated by a compound delimiting corn driers and ovens at Plants Farm fig. 6.4D), examples elsewhere in the region appear to confirm this as something of a trend (eg. Jackson & Ambrose 1978; Simpson 1993). Furthermore, the compounds that define these late settlements appear to be linked by defined roads or driveways along the main east-west axis of the island. At Plants Farm the compounds were clearly linked to an east-west driveway noted on the air photographic plots (fig 6.3) and the Maxey East field settlement appears to shift north eastwards to lie alongside the multiple linears of the main east-west axis (fig. 6.10). Though this has not been confirmed by excavation the evidence of fieldwalked scatters (indicated by cross hatching on fig. 6.3) suggests that settlement was concentrated along the axial line (possibly now a linking driveway) from the late first century AD onwards .

6.2.2 Tallington (fig. 6.11)

The second detailed study focussed on the area between Tallington and West Deeping immediately to the north of the River Welland (cf. fig. 6.2). Cropmarks were again extensively recorded before much of the area was destroyed through gravel extraction during the 1950s and 1960s and much of the preliminary evidence of this was recorded in *A Matter of Time* (Bowen & Butler 1960). Unfortunately, little of the work carried out has since been published or discussed, and much appears to have been lost without record. The block lies outside Hall's survey and the following account is largely dependent upon the air photographic record and a series of limited excavations carried out during the late 1950s and early 1960s. Consequently much of the surviving records are poor by current standards. The excavations in field OS29

between 1961 and 1964 (88), however, do provide the opportunity to assess the initial construction and subsequent adaptation of part of this landscape during the first millennium BC.

The Earlier First Millennium BC

Fennell, Jones and Simpson's excavations investigated pit alignments, a double ditched boundary or driveway, and a rectilinear ditched enclosure (88 in fig. 6.11). Through combining these rescue projects with the air photographic evidence, it is possible to identify part of a complex sequence in the development of division of the immediate landscape during the earlier first millennium BC.

The initial stage in the change from the monumental landscapes is shown in figure 6.12A and appears to be the construction of single large pits or hollows (at A & B) in the vicinity of three undated but probably earlier ring ditches. These large (2-3 metre long and 1 metre deep) features are somewhat enigmatic but clearly preceded the construction of the main north to south pit alignment. The silty nature of their lower fills suggest they were open for some time before infilling and a small group of poorly diagnostic sherds from the pit at B indicates that this process may have taken place in the later bronze age.

The subsequent phase sees the construction and use of the north-south pit alignment which weaved towards the old courses of the River Welland. The existing pits were incorporated in the line of the new alignment, apparently acting as points of reference in the latter's construction. The initial phases of the pit alignment are well dated by diagnostic group 1 ceramics in their lower fills. At A in figure 6.12B the single pit had been replaced on a number of occasions. Here Simpson's excavations (Gurney *et al.* 1993a) indicated that the pit alignment deviated in the area of these pits, leaving a gap either side of them (see fig. 6.12B). The locale created appears to have acted as a key point of reference and place of access or transition between the eastern and western areas now formed.

In the following phase (largely undated) the focal significance of this locale was emphasised by parallel ditched pathways and/or boundaries to east and west of the pit alignment. The ditches were dug up to, but not through, the line of the pit alignment, with successive butt-ends at this point (fig. 6.13A). They thus formalised and restricted the direction of access to the area of pits and the gap in the alignment formed in phases 1 and 2 (probably

during the later bronze/early iron age) and further divided the areas to east and west. Examination of the air photographs and plans show that the parallel ditches were broken at only one point, where the ditches inturred to form an entrance in their northern side some 100 metres to the east of the alignment. Immediately to the north of the entrance, a post-built roundhouse was constructed, orientated such that it faced out onto the trackway (fig. 6.13A). Undated, this structure nevertheless stratigraphically pre-dated the rectilinear enclosure and was associated with at least three pits (fig. 6.13A). It is impossible to judge the relative chronology of the roundhouse and the double ditched way, though both demonstrably pre-date the enclosure and were constructed in relation to one another and the gap in the pit alignment to the west.

Finds from the lowest levels of the parallel ditches were poorly preserved but of group 1 (late bronze age/early iron age) ascription. Whilst still in use a rectilinear enclosure was added to the north of the double ditches with an entrance by the roundhouse facing out onto the trackway. It is possible that the roundhouse was still standing at this time along with an (undated) four poster structure. Again this phase is poorly dated by a few abraded probable group 1 sherds, but is provided with a *terminus ante quem* by the presence of Ancaster Breedon (group 2) wares in its top fills. At some point during phases 1 to 3 a new group of five pits was dug, extending the pit alignment across the earlier pit group at A and effectively separating the two areas to east and west. To the south a second length of pit alignment was also added during phases 1 to 3, which seems to have acted as a secondary, shallower, redefinition of the existing alignment.

Later First Millennium BC

Phase 5 in field OS29 was marked by the appearance of group 2 pottery, but relates to limited changes in the structure of the local landscape (fig. 6.14A). The rectilinear enclosure was still visible but its function becomes more obscure. No clear structures can be related to this phase other than an amorphous group of shallow interlinked hollows filled with charcoal, 'pot boilers' and butchered cattle bones. Simpson (in Gurney *et al.* 1993a, 51-4) describes them as working hollows though they may have been no more than quarrying pits or even tree holes. The presence of adjacent groups of post holes, however, suggests that the hollows were the

focus for a range of activities away from contemporary settlement. There is no further evidence for occupation at this time, though it is possible the four post structure in the north eastern corner (fig. 6.14B) was contemporaneous. To the west the absence of group 2 later material in the pit alignment may suggest that it was largely infilled by this date, though the general scarcity of dateable material in this phase leaves this open to question and does not preclude the continuing existence of a boundary line. The double ditches by contrast were clearly still open and in the area to the south of the rectilinear enclosure were redefined by the construction of a fence line.

In the area of the pit alignment, the parallel ditches were redug around the first century BC-first century AD (fig. 6.14B). Their butt-ends were dug through to create a uniform continuous feature passing east to west and then dog-legging south west. Though there is no direct evidence, the lack of any later first millennium BC or Roman pottery from the pits between the ditches indicates that they now underlay a continuous trackway. Elsewhere in the excavated areas there is little evidence for further activity other than small quantities of first and second century AD pottery accumulated as the trackway ditches infilled. By the third century AD even the trackway ditches seem to have filled in and the area was probably peripheral to occupation locally.

Excavations on Monuments 35 and 51

Further north and east of the field OS29 excavations, limited work by Peacock (1962) and Simpson (1966; Gurney *et al.* 1993a) was largely inconclusive and provides very little usable information. A single section across the large rectilinear enclosure to the north (A in fig. 6.11) provided no dating evidence and inspection of the interior located no structures other than a pit and a ring gully 5.6 metres across that was visible on the air photographs. Finds from the latter show that it was probably a Neolithic structure similar to that discovered by Pryor and O'Neill at Barnack (8, section 6.2.3) despite its superficial similarity to the ring gully at Maxey (cf. fig 6.16) and the excavator's original assertion that it was an iron age roundhouse.

Peacock's (1962) excavations close to King Street (B in fig. 6.11) were equally inconclusive, revealing only fragmentary parts of what was obviously a significant complex of enclosures and boundaries. Little can be said of the development of this part of the landscape

other than that some of the ditches date from the first century BC to second century AD and that pits alongside the western side of King Street contained significant third to fourth century AD structured deposits including a pewter plate, a bronze bowl and an altar stone. A roundhouse gully in the south east quarter of the site was stratigraphically earlier than one of the enclosure ditches but was itself undated. It does, however, appear to have been part of an unenclosed site during its usage.

6.2.3 Barnack (fig. 6.15)

The third study block divides broadly into two areas. The eastern area has been the subject of two neighbouring small scale excavations (9) that can be linked with good crop mark evidence. To the west a recent evaluation by Cambridgeshire County Council Archaeology Unit (CCCAU) and rescue work in the late 1970s (8) provide some additional information but suffer from a lack of chronological information about the features excavated. The air photographic evidence (fig. 6.15) shows two substantial double ditched trackways or boundaries running north to south from the River Welland that seemingly delimit the eastern edge of pit alignments in this part of the valley. To the east lies a complex of ring ditches and to their south an enclosure complex associated with a probable villa (at A).

The Earlier First Millennium BC

The eastern excavations (9) recorded no significant features before the appearance of group 2 wares and so discussion here focuses on discoveries made in the quarried areas to the west (8 & 8 in fig. 6.15). Figures 6.16-6.18 show the suggested development of the immediate landscape excavated by Pryor and O'Neill in 1978 and 1979 (the westernmost 8 in fig. 6.15). Conditions for the excavation were far from ideal as investigation only took place immediately in advance of extraction. The western half of the site in particular suffered as a consequence of overstripping and many smaller features such as post holes were almost certainly lost. The limited number of sections dug in the penannular enclosure and trackway ditches further hinder interpretation as little or no dating evidence was recovered. Despite this it is possible to show that the discoveries made have important implications for understanding the nature of development of the first millennium BC landscape.

The small ring gully in the eastern half of the excavations (fig. 6.16) was probably the earliest structure, though poorly dated. Excavation suggested that the ring gully originally contained a row of stakeholes and that it subsequently filled up from the inside with bank wash and gravels. This may suggest that the gully enclosed a mound, possibly constructed from the shallow quarry pits that surround it. Soil micromorphological analysis suggested that the pits, again undated, were rapidly backfilled with topsoil after their excavation. The penannular enclosure ditch was dug to contain a row of substantial upright timbers and then backfilled to support them. The survival of the post pipes in section suggests that the palisade was not subsequently removed but rotted or was burnt in situ. Given this, the absence of finds from the fill of the palisade ditch is not surprising and it is unfortunate that so few features in the interior of the enclosure were excavated and no radiocarbon dates obtained. Dating of the enclosure, therefore, is largely dependent upon its relationship to the pit alignment running broadly south east to north west across the site. On excavation it was clear that the pit alignment headed directly towards the palisaded enclosure but then swerved around its north eastern quarter, cutting the edge of the backfilled palisade trench. Examination of the sections showed that the pit alignment abutted the post pipes of the palisade, seemingly respecting them as part of a standing structure. The pit alignment then continued south east to curve around the earlier prehistoric mound and pits thus separating them from the palisaded enclosure.

Thus in phase 1 (fig. 6.16) the palisaded enclosure was constructed to the west of a pre-existing mound dating from at least the second millennium BC. The date of the palisaded enclosure is open to question but it was still standing at the time of the construction of the pit alignment in phase 2 (fig. 6.17). Unless the palisade stood for an extraordinarily long time, this would suggest a likely date for the enclosure's construction during the later bronze or early iron age. The primary fills of the pit alignment were devoid of dating evidence but silted gradually until the upper fills were deposited as topsoil containing middle iron age pottery during phase 3 (fig. 6.18).

The Later First Millennium BC

Phase 3 at Barnack 8 (fig. 6.18) was initially marked by the continued use and infilling of the pit alignment during the middle to later iron age, until the area was remodelled by the

construction of a series of narrow ditches in order to form a trackway. Only a small sample of the ditches were excavated and they contained no finds in the pit alignment section. To the west, however, the ditch cutting the palisade contained first century AD pottery in its uppermost fills, hinting at a date in the later first millennium BC for their construction and use. All evidence for activity within the excavated ^{area} ceased by the end of the first century AD.

In the eastern excavations (9) the appearance of group 2 pottery coincides with the construction of a long boundary ditch running north-south across the valley. The air photographic plots suggest that this ditch is part of a more extensive series of boundaries that divided the area into a number of large domains (figs 6.15 & 6.19A). Though it must be remembered that none of the latter are directly dated, they are considered to be broadly contemporaneous with the excavated boundary on the grounds of their elementary structural relationships (see chapter 3) and are indicated by stippling.

The Early Roman Period

The eastern area excavations and air photographic evidence indicate that by the later first century AD the main north-south boundary had shifted eastward (possibly during the late iron age) and a ditched driveway now ran east-west parallel to the course of the river, dividing the large domains into smaller blocks. This process appears to have coincided with the development of a settlement at A in figure 6.19B, that from fieldwalking evidence at least, does not appear to have had a middle iron age predecessor (Alison Taylor pers. comm.).

At Barnack 8 (fig. 6.15) the trial excavations found no direct evidence for settlement. On the floodplain, however, a combination of geophysics and trenching identified a series of drainage ditches that served to control the braided streams of the river thus keeping the area to the south relatively dry. The wider plan of these features is not clear but they may have been linked to the development of a villa settlement at A in figure 6.15, attested by air photographic and fieldwalking (see section 6.3.5).

The Later Roman Period

By the mid-third century AD the nature of settlement in the eastern area excavations becomes a little clearer with the construction of a massive aisled building immediately to the

north of the driveway (fig 6.20 inset A). The small area opened by Simpson does not make a wider understanding of the building's context easy, but a combination of fieldwalked and air photographic data indicate that it was part of a probable villa settlement whose main buildings lay to the north west (indicated by cross hatching in fig. 6.20). If the reconstruction of the post holes as a single building is correct, it is undoubtedly one of the largest aisled buildings in Roman Britain. It should, however, be noted that two post holes marked were not identified on excavation (they were thought to have been destroyed by the later building) and thus may not have existed. If so, there may have been two buildings lying end on, parallel to the driveway. In the late third or early fourth century AD a new aisled building was constructed on the site (fig. 6.20B), which continued in use until at least the late fourth century AD. During this phase the settlement was enclosed within a large ditched compound that from the air photographic plots seems to have cut across the driveway to the east of the site. Within the excavated area the driveway may still have functioned during the fourth century, but it was no longer defined by ditches that were maintained. Functional interpretation of these buildings is a somewhat contentious issue, as they probably served as multipurpose structures for housing, agricultural storage and industrial production. In the case of the Barnack examples they clearly had iron working and agricultural uses but direct domestic occupation, which is difficult to attest in any case, is not obvious.

6.2.4 Landscape Development in the Maxey/Barnack Area

Earlier First Millennium BC

Evidence for the landscapes of the early first millennium BC is poor but there is some suggestion that some of the earlier ceremonial monuments were still significant focal places. The finds from west field and field 124 are difficult to interpret but show that both the 'hengese' were possibly still foci for activity. At Barnack 8, the palisaded enclosure probably dated to the second or early first millennium BC, and on morphological grounds can be compared with some late bronze age ringwork sites (see section 6.5). These locales and the square barrows at Maxey 64, however, now existed as part of a landscape that was divided up by continuous (as with the Tallington parallel ditches) or discontinuous boundaries into a series of large blocks.

Direct evidence for settlement is almost totally absent (with perhaps the exception of the Tallington roundhouse) and most of the clearer evidence for activity associated with group 1 and 5 ceramics (c. 8th to 4th centuries BC) comes from the pit alignments. Figure 6.21 shows the distribution of pit alignments and other features that can reasonably be dated to the earlier first millennium BC for the whole of the Maxey/Barnack case study. In addition ring ditches that possibly or certainly were still visible are included for comparison. It is immediately apparent that the distribution of crop marks is far from even, with evidence away from the river gravels particularly sparse. Given these problems, however, it is still possible to study the layout and structure of the visible pit alignments in order to provide some clues as to their purpose.

First, the patchy distribution of pit alignments may be more significant than simply being due to the vagaries of crop mark visibility. It is noticeable that pit alignments are absent from some areas that have very good crop mark development and reasonably extensive excavation. The best examples come from the area across the Maxey and Eton excavations (between A & B in fig. 6.21), and in the eastern crop mark group at Barnack (C). In neither is there any suggestion that the area was delineated by pit alignments.

A second characteristic of the alignments is the twofold nature of their layout and structure. On the one hand, a number of the alignments appear to be part of long distance, simple linears, running parallel or perpendicular to the course of the rivers, and dividing large parts of the landscape into tracts (eg. around Tallington & Plants Farm, at D & E in fig. 6.21). Elsewhere, the alignments are complex and convoluted, appearing to have been constructed to take into consideration existing landmarks, such as at Barnack (F), and possibly to a lesser extent at Tallington (D).

At first sight these pieces of information do not appear significant but there are some indications of how this partially bounded landscape was constructed. Although the evidence is obviously fragmentary, there is no significant suggestion that the pit alignments were laid out systematically over the whole area but rather over blocks within it. Thus areas to north and south of the Welland around Plants Farm (fig. 6.21, E) were divided up into a series of relatively regular territories probably laid out around pre-existing markers, but this is not extended elsewhere. This suggests that, though areas of the landscape were appropriated, they tended to be relatively small, creating a patchwork of bounded and unbounded areas. Gaps in the evidence

for alignments, if not a function of the data, also support the view that areas such as Barnack (C) were open or perhaps still woodland at this time. Palynological studies of the area (summarised by French in Simpson *et al.* 1993, 141) show that around Tallington the early first millennium BC landscape was dominated by pastoral grasslands. Arable cultivation existed but within a 'parkland' landscape containing occasional stands of trees. Unfortunately no such evidence is available around Barnack, but French suggested that the eastern end of the study area was ostensibly an open grassland landscape from the late neolithic onwards but with a progressively smaller proportion of tree cover, particularly during the iron age and Roman periods. Locating settlement at this time is impossible given the information currently available, but the ephemeral unenclosed nature of recognised settlements from the wider region (cf. section 6.5) suggests that they have been destroyed by deep ploughing or missed by observation in the gravel quarrying, air photography and fieldwalking. Alternatively, settlements may have been located outside the main cropmark and excavation areas on the higher limestone slopes that flank the valley.

The crop mark plots for study area 1 also show a series of multiple linear ditches that cross large parts of the landscape (eg. F & G in figure 6.21, at B & C in fig 6.3, & B in fig 6.15). Very little excavation has been carried out on these systems, and on the rare occasions when they have been sectioned, as at Barnack (8), they frequently contain no evidence for their dating. These excavations and others at Lynch Farm (61), Ketton and Tixover in Leicestershire (Mackie 1993) indicate that they tend to be finally infilled during the late iron age and first century AD. Evidence for the date of their construction however is largely absent but recently published information from Lincolnshire (Palmer-brown 1993) indicates they may well originally date to the earlier first millennium BC. This must remain a tenuous assertion in the absence of better evidence but does help to explain the way the pit alignments at Barnack (fig. 6.15) and Maxey (D in fig. 6.3) appear to respect these features.

Later First Millennium BC

During the middle iron age the Maxey/Tallington/Barnack landscapes were altered through systematic boundary definition of open and burial areas from combined settlement and cultivated land. At Maxey and Barnack (64 & 9) this division became firmly established through

structural enlargement of the boundaries and an emphasis on their continuing maintenance. A cultural landscape was thus constructed in which considerable time and effort was expended on defining large bounded zones (or 'domains'), within which there was little differentiation or subdivision. Paths of movement within domains were not structurally defined or restricted. Movement between zones by contrast was not easily possible and not along recognisable paths across the wider landscape.

Structures that formed the architectural foci of settlement were closely associated with the definition and maintenance of these 'domains' and show no signs of being considered as specially defined locales in their own right (eg. fig. 6.7). Such small enclosures as were present were also constructed at boundary or boundary junction locations between these domains and, though difficult to interpret, possibly acted as defined locales for meeting, communication, exchange or communal rituals associated with the maintenance of tenurial limits or social obligations between domains (eg. figs. 6.7 & 6.14A). In this respect they may have been key places within the landscape sited at points of tenurial or social transition that deserve to be studied afresh, despite their superficial lack of structural information. The latter point is of particular significance in the light of recent insights into structured deposition and the noted 'richness' of the ditch fills of these enclosures (cf. Pryor *et al.* 1985, 83 & section 6.5).

During the later iron age the landscape was transformed, through the construction of elaborated points of access between domains (fig. 6.8) and the abandonment or incorporation of the larger boundaries into settlements (fig. 6.4B Plants Farm). At Maxey (fig 6.8) this process was accompanied by unenclosed occupation until the later first century AD. Under such a strategy the newly created gateways are likely to have held particular social significance as places of transition, cutting across long established boundaries and tying neighbouring communities together more closely. Similarly, at a previously unoccupied locale at Plants Farm, a settlement enclosure was newly established to overlie, and thus encompass, a former boundary junction, again provided with an entrance passing through it (fig. 6.4B). In this way the autonomous, inward looking landscapes of the middle iron age were broken down as places appear to have become more interlinked within a wider network of settlements.

The Roman Period

During the course of the later iron age and early Roman periods (up to the later 2nd century AD), this process continued. The domain boundaries were often converted to act as one side of droeways (eg. Plants Farm fig. 6.4C and possibly Maxey fig. 6.9), and other new ditched trackways were constructed (Barnack figs. 6.18 & 6.19B) or converted (Tallington fig. 6.14B) to extend across the wider landscape. This was accompanied by a shift in settlement location, initially towards these transitional boundary crossing places and then in the early Roman period to lie alongside routes of communication.

At Plants Farm and Maxey East field, the settlements were enclosed, an action that further broke up the earlier boundaries and incorporated them in settlements (figs. 6.4B & 6.9). To the south, at Maxey 65 occupation was again defined by a complex of ditches or gullies and the infilling of the larger boundary ditches. To the west, the situation is less clear but a combination of fieldwalking and air photographic evidence from Barnack suggests a shift in settlement at some point during the late iron age and early Roman periods. Around Barnack 9 (fig 6.19B) field-walked data (CCCAU pers. comm.) suggest that the settlement at A was abandoned before the Roman period and occupation established alongside the new droeway. To the west (Barnack 8) there is no clear evidence for iron age settlement but the villa and complex of enclosures at A in figure 6.15 were associated with fieldwalked pottery dating only to the early/middle to mid/late Roman periods (Barnack, appendix 4).

By the third century AD these changes were complete, with the landscape now characterised by architecturally complex settlements, linked to one another and the world beyond by defined trackways. Movement was now centred around settlements, a shift that possibly suggests a long term trend towards increased recognition of the separate identity of the place of dwelling. The landscape changes were paralleled from the late first to third centuries by the increasing spatial differentiation of activity areas within settlements. At Maxey, Plants Farm and possibly Barnack east a multiplicity of fenced compounds defined areas in which agricultural processing and industrial production become more apparent if not more specialised. Identifying the nature of settlement becomes difficult as changes in architectural expression produced buildings that often left few subsurface traces which may have been subsequently ploughed out (cf. section 6.5).

At a time when settlements appeared increasingly tied to a wider social landscape via the construction and maintenance of droveways, they also increasingly became the foci for architectural expression. At Maxey and Barnack 9, new construction or redefinition of existing boundaries was focused on the core settlement areas by the third to fourth centuries. Features away ^{from} settlements appear to have been abandoned and the excavated areas at Tallington and Barnack 8 (figs 6.14B & 6.18) were peripheral to any activity by the third century AD. It is, however, important to note that the ditches may have been gradually replaced by stable hedge lines as is commonly the case with long stable boundaries today.

The aisled buildings at Barnack 9 were typical of a commonly adopted architectural form in the Lower Nene and Welland valleys from the mid-second century onwards (see section 6.5). The precise functions of these structures are difficult to define and it is quite feasible that they were intended to act as multipurpose buildings. In their size alone they can be considered a form of architectural monumentality and were usually associated with quite intensive evidence for crop processing and iron working. They also tend to be found in association with villa buildings (as probably at Barnack 9) or as part of much larger settlements (as at *Durobrivae*). It is possible that their absence on smaller sites, or as isolated buildings, suggests their use as ancillary or 'tied' buildings whose status and function related to the wider concerns of villa or agglomerated settlements. This is an issue discussed further in sections 6.5 and 8.3. The absence of excavated villa-type buildings from the Maxey/Barnack area does not reflect a genuine absence as the fieldwalked and cropmark evidence from Barnack (fig. 6.15) and Maxey (D in fig. 6.3) attests. The increasing architectural effort placed on these buildings by the second to fourth centuries, however, further demonstrates the increasingly dwelling-place-centred emphasis of the later Roman landscapes of the area.

6.3 WOLLASTON/ECTON AREA

Figure 6.22 shows the location of the detailed areas analysed for the second case study. This was centred on the parishes of Wollaston and Ecton where the Nene Valley opens out to the east forming a large crescent-shaped embayment between Wellingborough and Earls Barton. Its western half lies on river gravels either side of the tributary streams of the Nene, which

rise into hills on the clays and limestone of the Upper Estuarine deposits. Most of these hills lie on the Oolitic Limestone which marks the southern boundary of the county in this area. Area 1 covers the eastern half of the embayment and Area 2 the rest of the river gravels and floodplain in the parish of Grendon. Area 3 lay either side of the main tributary stream to the north of the Nene, between the edge of the limestone escarpment and the floodplain. To the northwest area 4 lay north of Ecton atop a significant north to south running ridge typical of the hills flanking the northern side of middle Nene valley. This, together with the final area around Great Doddington, provided some contrast to the low lying river terrace locations covered by the remaining study blocks.

6.3.1 Wollaston

Figure 6.23 shows all the information available from air photography, excavation and geophysical survey for the first of the study areas. In the account that follows a combination of this information and Hall's fieldwalking data have been used to supplement the information provided by four excavations carried out in advance of quarrying and road construction (fig. 6.23). Unlike the Maxey/Barnack area the excavations here (and at Ecton and Great Doddington) were not confined to valley bottom or gravel terrace locations, thus providing some information on the nature of settlement and landscape development on the uplands flanking the valleys.

Earlier First Millennium BC

At Wollaston Quarry (107) the earliest recorded activity is seen in the laying out of a series of pit alignments crossing most of the excavated area (fig. 6.24). Within this phase there appear to be at least two stages of activity. Initially, a single line was constructed running parallel to the course of the Nene (A-A in fig. 6.24) dividing lower lying areas of the floodplain from higher ground on the gravel terraces. The alignments in its vicinity (with the exception perhaps of C-C) were probably secondary additions, respecting the line of the former and running at right angles to it, dividing the valley into sections along its length.

At the northern end of the excavation, alignment D crossed a series of currently undated paleochannels and marked the northern limit of pit alignment E. Subsequently a

parallel alignment was added to D as far as the easternmost paleochannel. It is significant that here, as at Tallington (cf. section 6.2.2), the double alignments do not appear to have been constructed simultaneously, a view supported by differences in the depth and shape of pits in neighbouring lines of alignments F and G. Overall, the alignments appear to have been constructed without regard to pre-existing features of the landscape other than the broad lie of the land. The exception was alignment B which curved away from the primary alignment A, and alignment G which ran alongside the course of a tributary stream, thus creating a triangular strip of land in between.

Other features dateable to the earlier first millennium BC are difficult to find but figure 6.24 shows three roundhouses that have been assigned to this phase largely on stratigraphic grounds. Finds from the northernmost buildings are awaiting further study but appear to be of group 5 type and thus difficult to date. Both stratigraphically predate the main structures of the settlements on these sites dated by common group 2 forms to the fourth-first centuries BC. The absence of group 1 ceramics from these structures may suggest the buildings were constructed later than the pit alignments or that there are functional or symbolic reasons that lead to structured deposition of the two types in different, contemporaneous, contexts.

Irrespective of the precise relationship between the alignments and the roundhouses, there is a strong spatial association between them. All of the roundhouses lay close to the eastern side of the main alignment and seem to have been situated within separate 'domains' defined by the pit alignments. The ephemeral nature of the buildings, the paucity of dating, and the subsequent developments on each site make identifying other contemporaneous features difficult. Despite this it seems probable that they were open settlements which had little or no clearly defined layout other than the oft observed eastern orientation of the roundhouses themselves.

To the east of Wollaston 107, away from the gravel terraces, excavation on the Wollaston bypass (fig. 6.23 106 & fig.6.29) give some indication of the occupation on a spur directly overlooking the valley. The earliest phases again suffer from a paucity of dateable material but commenced with the construction of a pit alignment which ran along the spur down into a tributary valley. This was cut by a ditch, also undated, but underlying the early Roman features (fig. 6.29B). The partial remains of a roundhouse and some associated pits, however,

contained small quantities of group 5 ceramics. The boundary association between the building and pit alignment is again apparent, and the line of the phase two ditch in relation to this may not be coincidental.

The simple isolated nature and boundary context for the early first millennium settlements at sites 106 and 107, however, contrast with the situation at Wollaston 108 (fig 6.30) where salvage excavation revealed part of a palisaded and ditched settlement dated by group 1 and 5 ceramics. None of the four hut circles identified overlay each other and although their contemporaneity cannot be assumed they may have been part of a more sizeable nucleated settlement.

Later First Millennium BC

The three settlement foci at site Wollaston Quarry (107, fig. 6.23) became established places for settlement during the rest of the iron age. At A, B and C in figure 6.25 the settlements developed into enclosed farmsteads with the dominance of group 2 ceramics, probably during the third-second centuries BC. On stratigraphic grounds each of the settlements appears to have been occupied for some considerable time, but the conservative nature of the ceramics and the absence of group 3 and 4 types from A and B make closer dating difficult. Figure 6.25 illustrates features assigned to this phase on stratigraphic grounds, but given the longevity of use of group 2 ceramics some features shown may still have been in use in the later iron age (fig. 6.26, 1st/2nd century BC-early 1st century AD). The earliest discernible changes came with the redefinition of the pit alignment boundaries as ditches or possibly palisades in the vicinity of the settlements (shown as unshaded features in fig. 6.25). This may have been accompanied by the establishment of a clearer spatial structure for locales within the settlements at A and B (cf. section 6.5). Once set out, structures were to remain fixed and continually redefined for the remainder of the period of occupation. When, in this sequence, the settlements were enclosed is not clear, but two stratigraphic details give some guide to the probable nature of development. First, both enclosures A and B post-date the ditches that redefined the pit alignments. Second, the small elliptical enclosures were originally freestanding until, in their later phases, they were connected to the enclosure ditches by linking gullies that lie early, if not demonstrably at the beginning, of the enclosure ditch sequences.

Though far from conclusive this information provides some suggestion that the settlements in their established form had early unenclosed (or possibly palisaded) phases, later enclosed by substantial ditches.

Settlement C lying at the southern edge of the excavations had a more complex development which is difficult to interpret given the small area exposed. On stratigraphic grounds it is again possible to suggest that the settlement had a long life during the middle and later iron ages but here, occupation shifted or expanded away from the line of the main pit alignment. In the earlier phases of this settlement (shown unshaded) an open or palisaded focus lay close to the main boundary (A-A in fig. 6.24). Subsequently, the area was incorporated within a D-shaped enclosure linked to the main boundary. The final stages of occupation within the enclosure can be dated to the first century BC-AD by the presence of small quantities of group 4 ceramics in an essentially group 2 assemblage.

Further changes occurred along the line of the main boundary with the construction of three linked compounds and a possible driveway south of the stream. The compounds were constructed at the junction of an existing double pit alignment and a newly created ditch to the west of the main boundary. The westward shift of the boundary created a wide trackway running from the stream past settlement C. Any movement along the track was impeded by a shallow ditch or palisade running across it from the compounds to the west. Further passage across the landscape to the north of the stream was blocked by the ditches that replaced the double pit alignment by settlement B. The effect of these changes seems to mark the beginning of a limited process of opening up passage across the landscape by creating new space at the edge of existing 'domains'. A piecemeal shift of the double boundary created a space along which access to the stream was now possible from land beyond that directly adjacent to it. Passage was not unrestricted as the ditch or slot that ran out from the existing 'domain' boundaries may have acted as a point of transition through which access to an important resource and/or place of symbolic significance was possible only through negotiation or obligation.

During the latest phases of the iron age (on stratigraphic if not largely diagnostic ceramic grounds) the landscape was fundamentally changed along the main axial boundary (fig. 6.26). South of the stream the former trackway and compounds were replaced by a simple ditched trackway with a narrow entrance into the land to the west. This was mirrored north of the stream

as a trackway was constructed alongside settlements A and B by the creation of a secondary western boundary ditch. Access to the trackway seems to have been important as the former boundary between A and B was moved eastward to include the north facing entrance of settlement B.

The area west of the trackway now became a more significant focus for construction with new boundaries and enclosures, though no settlement, dividing previously undifferentiated areas into smaller fields and boundary junction compounds. The functions of the latter are difficult to assess in the absence of structural features and before full analysis of their artefactual and environmental evidence. The lack of significant artefactual deposits, however, may suggest they were used for a range of basic agricultural purposes such as stock control at the edge of the wetter areas along the Nene floodplain.

The Roman Period

By the time diagnostic Roman ceramics appear at Wollaston 107 around the third quarter of the first century AD all three former settlements had been abandoned (fig. 6.27). Pottery in the uppermost fills of the enclosure ditches of A and B suggest, were still in use, but the main foci of action had now shifted to the west of the trackway. Settlement C may have continued given the considerable quantities of ceramics found, but no evidence for buildings survived within the limited area excavated. Further north a new settlement was established opposite settlement A centred on the badly plough damaged remains of a simple stone foundation rectangular building at D on figure 6.27 (the extent of the building is marked by cross hatching). This building was surrounded by a complex of small yards, compounds and enclosures connected by a narrow trackway some 3 metres across. The shift in settlement does not appear to have been repeated near settlement B, but the lack of excavation to the west of this area leaves such an assertion open to doubt.

The earlier Roman period (late first-second centuries AD) also saw the laying out and maintenance of a remarkable series of parallel trenches to the north of the area previously delimited by pit alignment D and its successors. Detailed examination of these trenches showed that they acted as beds for double rows of bushes in parallel lines spaced some 8 metres apart. Though currently the subject of a series of analyses, it seems highly likely that the

area was used for intensive horticulture or even viticulture (from palynological samples, Meadows pers. comm.). Continuing excavation to the north shows that these beds extended over an area of at least 4 hectares. The beds involved a considerable expenditure of time and effort to construct and maintain and, as far as can be judged, were placed in an area that previously showed no archaeological activity. Their position within the landscape is considered in more detail below (section 6.5.3), but it is important to note here that this development (broadly dated to the end of the first or early second centuries AD) probably coincided with the emergence of a villa 350 metres to the north.

Away from the valley floor, the landscape also changed in the earlier Roman period but not until the second or third quarter of the second century (fig 6.29C). A new series of ditches running parallel to the former pit alignment was laid out to form a driveway and fields or compounds associated with a probable settlement immediately to the east of the excavated area sitting on top of the ridge. A corn-drier lying inside an enclosure to the north east of the excavation was dated to the later second century AD and demolished when the area was remodelled for the construction of a bath house in the third century (fig. 6.29D). During the late third or early fourth century the existing north west-south east boundary ditch and the easternmost driveway ditch were redug on a more massive scale (c. 5 & 2.9 metres wide respectively) and seem to have enclosed the settlement to the east.

The demise of the system of bedding trenches at Wollaston 107 is difficult to date but certainly by the mid-late third century AD the area had changed again as shallow drainage ditches were laid out to form a complex of small enclosures (fig. 6.28). Further south the settlement at D may have been abandoned by the late third or early fourth century AD, but the fragmentary nature of the surviving structure prevents a clear understanding of this period and some, at least, of the enclosures in this area were still used. The trackway was maintained and re-metalled during the third and fourth centuries, but the flanking ditches were no longer maintained and gradually infilled. To the south, the absence of any fourth century material suggests this area was increasingly peripheral to settlement during the later Roman period, even though parts of the existing field systems may still have been used.

6.3.2 Grendon

Figure 6.31 shows the location of the detailed studies used in the Grendon area. In addition to the available air photographic and fieldwalking data, a series of excavations carried out in advance of gravel quarrying provide patchy but extensive view of the structure and variety of landscape features across much of the valley bottom (sites 43, 44, 109 & 110).

Earlier first Millennium BC

Evidence for earlier first millennium BC activity is limited to the rescue excavations carried out in Grendon quarry between 1976 and 1980 (fig. 6.23, 44). Here a system of pit alignments extended through four modern fields that was centred around a complex junction close to a tributary stream of the Nene (fig. 6.32). Earlier activity within the excavated areas was limited to a second or third millennium ring ditch and a large pit or pits partly underlying a modern field boundary (G in fig. 6.32). The alignments appear to have been constructed in a number of sections labelled A to F. Alignments A to D radiated from a single pit lying diagonally at their junction that probably acted as a marker or focal point. From here alignments C and D ran relatively undisturbed for at least 500 and 300 metres respectively to west and north delimiting a former second millennium BC burial and ceremonial complex (fig. 6.31). At the western end of alignment C a small scale excavation revealed the presence of three earlier pits (Jackson, no date). These undated features underlay the alignment and may either have been the original pits of alignment that were recut or an earlier activity locale.

Pit alignment A (fig. 6.32) curved southward to run parallel with the stream and curved around the pit or pit group at G. At some subsequent date alignment E was added parallel to the northern side of A. Alignment B, also running parallel to the stream and along the contour of a slight slope, had a second parallel length F, probably added as a secondary redefinition of its course. Approximately 1400 metres to the north, part of another alignment was identified during salvage work at Wollaston 109 but its isolated context makes further interpretation impossible.

To the south west lay an extensive burial and ceremonial complex that had been a focal place in the landscape from the neolithic to the middle bronze age, but no evidence was recovered in the excavated areas for early first millennium BC activity (fig. 6.31, 43). The clear

way in which later features respected most of these monuments, however, suggests that they were still upstanding features during the late first millennium BC.

Later First Millennium BC

At Grendon 44 the mid-late iron age saw little major change to the eastern complex of boundaries formed by the pit alignments (fig. 6.33). Ditches were dug to redefine parts of alignments E and F but the main focus of activity shifted north, with the construction of an enclosure (A in fig. 6.33). The enclosure ditches shown in figure 6.33 were only observed in advance of quarrying and little dating evidence was recovered, but were infilled by the early Anglo-Saxon period. They are shown on figure 6.33 largely on the basis of analogy with similar such structures elsewhere in the county and on the basis of the observation that they appeared to be later than the pit alignment where they met to the north of the main excavation. There was no evidence of any associated structures or pits relating to this enclosure.

To the west of the alignments in figure 6.32, however, construction of a small rectilinear enclosure (A in fig. 6.31) and an enclosure at B in figure 6.31 appear to have been part of a significant restructuring of the landscape on a north east-south west axis. Small quantities of group 2 ceramics from both enclosures suggest a broadly third-first century BC date for this phase, which was followed by the construction of enclosure C (fig. 6.31) and its associated boundary ditch in the late iron age (first century BC/AD). The area of earlier burial and ceremonial monuments to the north (D in fig. 6.31) shows no evidence for activity throughout the iron age and seems to have remained a peripheral or extensively utilised part of the local landscape.

In the vicinity of the other second and third millennium BC monuments at Grendon (43, fig. 6.39), however, a small settlement was established in the middle iron age. A single large roundhouse, possibly originally unenclosed, was sited to the east of an earlier burial mound at the southern end of the group. The mound was enclosed by a middle iron age ditch that predated the main trapezoidal enclosure. In a second phase the roundhouse gully was redug to link it with flanking ditches that divided the enclosure into eastern and western (or front and rear) parts. The enclosure was not associated with any larger scale boundary, but rather appears to have been appended to the existing mound enclosure, which was redug at this time. In its

second phase at least, the settlement's construction emphasised the association between present use and an ancestral or ancient place. Architecturally, this was accomplished by both the direct linkage of settlement to mound enclosure and the funnelling effect created by its trapezoidal shape, through passage into it from east to west. In this respect the Grendon enclosure is one of the clearer examples of the possible association between east/front: life/present and west/back: death/past discussed by a number of authors in relation to later iron age cosmology (cf. Oswald forthcoming). Such an explanation, however tentative, provides a social logic to the choice of location and structure to this unusual place in an area that had not apparently been occupied or a focus of action since the second millennium BC. Its demise is difficult to date, but the absence of diagnostic group 3 and 4 ceramics suggests this may have occurred by the second or first centuries BC.

At Wollaston 109 another section of local landscape was also realigned along a north east-south west axis, first through the construction of a small rectilinear ditched enclosure (fig. 6.36), and then by a larger double-ditched enclosure associated with three linear boundary ditches (fig. 6.37). Neither of the enclosures contained roundhouses and do not appear to have acted as settlements but were the focus of a range of activities that created pits, structured deposits of cattle skulls (Gwilt pers. comm.), and short fence lines that may have subdivided the interior. The second enclosure (fig. 6.37) could be dated to the second or earlier first centuries BC on the basis of decorated group 3 bowls and is a distinctive form of non-settlement enclosure paralleled elsewhere in the region (cf. section 6.5). At this point it is important to note that the later enclosure did not have an identifiable internal bank but may well have had a wall around the inside of the innermost ditch.

With the exception of the phase two enclosure at Wollaston 109, the wider absence of group 3 and 4 ceramics from all the sites above and at Wollaston makes identification of definitively late iron age activity difficult. Chronologically, this gap may be more apparent than real for the reasons outlined in section 5.3 and because some of the iron age fieldwalking assemblages recovered away from the excavated areas do contain group 4 ceramics (see section 6.5). Salvage excavations at Wollaston 110 (fig. 6.23) revealed at least two, and possibly three, unenclosed roundhouses poorly dated by a few group 2 and 5 sherds to the earlier middle iron age. Unfortunately, the nature of the excavation prevents a clearer

understanding of this locale but it may have constituted an unenclosed early settlement on the gravels in this area.

Roman Period

For the Roman period the excavated evidence from the Grendon area is of limited use. At Wollaston **109** (fig. 6.31) the excavations and watching brief recorded no features later than the iron age enclosures. At Wollaston **110** a limited watching brief recorded fragmentary parts of Roman field boundaries but no further evidence for occupation. The trapezoidal enclosure Grendon **43** had largely filled in by the later first century AD but may have been incorporated within a new field system built over the earlier ritual landscape (fig. 6.39). The field system was not associated with any settlement identified through excavation, but Hall's survey recorded an early to middle Roman occupation locale at A and indicated by cross hatching on figure 6.40 (Appendix 4, Grendon 1).

To the east the area delineated by the pit alignments and ditches at Grendon **44** changed with the construction of ⁴ system of bedding trenches similar to those at Wollaston **107** (fig. 6.34). This system was only partially excavated and consequently is poorly dated, but the presence of a few fourth century sherds in the ditches of the subsequent phase (fig. 6.35) suggest they are probably an early to middle Roman phenomenon. The excavations revealed no evidence of an adjacent settlement and the field walking and air photographic data do not record any evidence within 200 metres to the north or west. It is, however, possible that contemporaneous settlement lay to the south or east. The later stages of Roman occupation of this area are recorded by the presence of third and fourth century AD pottery in the field system at Grendon **43** (fig. 6.40) and by the reuse of the intensively cultivated horticultural land at Grendon **44** (fig. 6.35) where a new system of drainage ditches was laid out.

6.3.3 Earls Barton (fig. 6.41)

The Earls Barton block lies across the gravel terrace of the river Nene astride one of its side streams. Cropmark evidence for the area is good but only two related excavations between 1979 and 1980 (**32**) provide more detailed contextual evidence. The limited information this

provides however, is useful for comparison with the more extensively investigated areas across the river.

Earlier First Millennium BC

The excavations at Clay Lane failed to identify any definitively early (group 1) structures. The only probable evidence for activity in the immediate area came from the identification of pit alignment cropmarks running east-west and north-south across the area and shown on fig 6.41.

Later First Millennium BC

The Clay Lane excavations of 1980 discovered a complex palimpsest of settlement activity dating to the middle and later iron ages (groups 2 & 3 with a few group 5 types). Many of the structures recorded contained group 2 ceramics that could not be ordered into a clear chronological sequence. The phase plans illustrated in figures 6.42-6.44 were, therefore, ordered largely on stratigraphic grounds. Figure 6.42 shows the earliest group 5 and 2 settlement bounded by a series of north-south and east-west running shallow ditches and palisades. The degree of contemporaneity between the individual elements is impossible to establish, but the roundhouse at A, and east-west ditch, B, were probably earliest as they contained some forms of transitional group 1/5 type ceramics. The sequence of ditches running north-south from C-C in figure 6.42 appears to have been an important and long lived boundary adjoining the pit alignment and possible driveway to the north.

In the subsequent phase (fig. 6.43) the area delimited by the main north-south boundaries was enclosed with an entrance to the south marked by a large gateway. As with settlements A and B at Wollaston 107 (section 6.3.1) it is again impossible to be sure whether the four main structural groups originally pre-dated the enclosure. Once established, though, they all held fixed locations and were maintained over a substantial period of time with at least three major recuts of their defining gullies. The westernmost north-south linear boundary also continued to be maintained, separating the enclosed settlement from the fenced or palisaded roundhouse to the west and its associated rectilinear enclosure.

The appearance of group 4 pottery at Clay Lane is linked to the first stages of change in the organisation of the main settlement enclosure (fig. 6.44). The small rectilinear enclosure, A,

was still defined but the roundhouse drainage gullies were replaced by new gullies and a north-south fence line which divided the enclosure into four. The northwestern and northeastern areas probably still enclosed roundhouses, the southwestern quarter included the rectilinear enclosure, and the southeastern incorporated the area formerly occupied by a small complex of drainage gullies. This arrangement was later broken by the construction of a small rectangular fenced or walled structure with opposing east and west entrances immediately to the east of the enclosure entrance. The main enclosure ditch was still open but was no longer recut, gradually filling up during the first and second centuries AD. None of the features to the west of the enclosure were dateable to this period, but it is possible that the fenced enclosure was still in use. During the later iron age phase there was also the first indication of a shift in activity southwards. A series of pits were dug outside the enclosure to the south, and in the second main excavation (B in fig. 6.44) a large east-west ditch divided the area for the first time.

The Roman Period

The excavations at Clay Lane recorded little evidence for activity during the mid-late first century AD. Excavations in the vicinity of the later Roman buildings, however, showed the area to have been covered by a fine alluvial silt, filling the upper layers of the main east-west ditch dug in the late iron age, and itself covered by the subsequent Roman buildings. The silt therefore dates to the first century AD and buried most earlier features to the south of the Clay Lane site before the construction of a rectangular stone foundation building at the end of the first or early second century AD. A section dug through the silt revealed further post holes underlying it which, though undated, indicated an earlier timber structure.

During the late first or early second century AD the first stone foundation buildings were constructed (fig. 6.45). To the south was a two roomed rectangular building with a timber verandah on its eastern side. Accompanying this building, and possibly lying within the same walled enclosure, was a stone founded roundhouse. Both buildings were constructed in a style now known to be common to the area (section 6.5) but the limited area of excavation makes interpretation of its wider context difficult. A watching brief and limited trial excavations to the south west of the quarry, however, showed that the settlement's establishment was

accompanied by the construction of a system of small fields or enclosures over the recently silted area of the floodplain.

By the later second century AD the roundhouse was abandoned and possibly demolished but the compound wall may have remained. The rectangular building was expanded during the second century to create a simple four-roomed building fronted by a corridor or stone founded verandah (fig. 6.46). This in turn was abandoned by the late second or earlier third century AD and evidence for the continued use of the former settlement is scarce. A very large pit dug and recut on three occasions during the later second and third centuries was infilled during the third century and may mark the final abandonment of the settlement. Evidence for later third and fourth century AD occupation of the wider area is poor, but the discovery of limestone hardcore surfaces and a further boundary wall to the north east of the excavated buildings may suggest that occupation had shifted eastward outside the quarry. This, however, was not confirmed by the field-walking or air photographic data.

6.3.4 Ecton (fig. 6.47)

Ecton ridge has very good crop mark evidence where the underlying limestone and Northampton sands outcrop close to the surface along its length. Along the steep slopes to either side erosion, colluviation and the complex range of soils make response to air photography more patchy. Away from the gravels of the Nene, the area has only been subject to limited ironstone quarrying (in the nineteenth century) and consequently has received little archaeological excavation. The one major exception and focus for this part of the study was the excavation carried out along the Ecton main pipeline during 1992 and 1993 (33).

Earlier First Millennium BC

On stratigraphic and ceramic grounds the settlement could be divided into two broad phases with the earlier one dominated by group 5 pottery, the later by group 2. Only one pit, at A in figure 6.48 contained group 1 types though the narrow nature of the excavation corridor could allow for many more to the east or west. In the earlier phase of settlement recovered at Ecton, occupation focused on two separate, and rather different, locales. At B in figure 6.48 two ring gullies connected by a drainage gully mark the location of roundhouses. To the west (or

behind) these lay two small clusters of pits in an otherwise open area. All of these features were overlooked by a large circular, ditched enclosure, approximately 18-20 metres across. No structures were identified within this enclosure other than a single large post pit that may have stood alone or marked the centre of a shallow founded building since lost to ploughing. Roughly 10 metres to the north of the circular enclosure, and a similar distance to the south of the roundhouse gullies, were two palisades with gaps allowing movement north and south along the ridge on which the settlement stood. The palisades may have marked the northern and southern boundaries of the settlement but, in the absence of cropmark evidence, cannot be shown to have necessarily enclosed the area in between. Unfortunately the destruction by nineteenth century ironstone quarrying of the area to the south of the palisaded settlement, also makes it impossible to know if occupation extended further in this direction.

Approximately 60 metres further north lay a rectilinear fenced enclosure, beside which stood the shallow remains of a curvilinear slot for the post settings of a roundhouse some 13 metres in diameter. The juxtaposition of these features makes their direct contemporaneity unlikely but both predate the ditched enclosure shown in figure 6.49. Although only partially within the excavation corridor it seems likely that these features were part of a second settlement along the ridge dating broadly to the fifth to third centuries BC.

Later First Millennium BC

In the subsequent phase (fig. 6.49), the southern settlement continued with some alteration in the location, and possibly number, of roundhouses and the demise of the palisades. To the north, change was far more noticeable, as a series of rectilinear ditched enclosures were constructed along a north north west to south south east alignment. These seem to have been part of a string of enclosures lying alongside, or in line with, a long boundary ditch visible as a cropmark along much of the length of the ridge. Enclosures A and B were only partly excavated but B appears to have been a small elliptical double-ditched enclosure, recut on many occasions and similar to those found at Earls Barton 32 and Wollaston 107. Group 2 pottery and a penannular brooch found in a ditch of the enclosure have been suggested as dating B to the second or first centuries BC (Holmes & Meadows 1995). Enclosures C and D flanked a driveway running east-west across the axis of occupation along the ridge in the latter

stages of this phase. C enclosed no buildings but post holes recorded in D suggest that some form of structure lay inside the entrance.

6.3.5 Great Doddington (fig. 6.50)

The Great Doddington block covers a spur facing south east at the eastern end of the limestone ridge running through the parishes of Great Doddington and Earls Barton (fig. 6.23). Here the limestone geology is capped by boulder clay and glacial Bruner Pebble Bed deposits. Air photographic coverage has been extensive but the unfavourable nature of the soils has led to only limited cropmark development, largely in the vicinity of the one significant excavation (39), and on the edge of Wilby parish about a kilometre to the west. The latter was walked as part of Hall's survey (appendix 4, Wilby 1). Though a smaller block than the previous four, it provided further information about occupation on the limestone and boulder clay capped ridges flanking the Nene valley.

Earlier First Millennium BC

There was no demonstrably early first millennium occupation at Great Doddington, though the precise dating of the phase 1 settlement is difficult to determine given the group 2/5 transitional nature of the pottery. If the radiocarbon dates from Gretton ditch B are a useful guide to the dating of this period, then phase 1 at Great Doddington lies broadly within the range 400-180 BC (cf. section 5.3).

Later First Millennium BC

The excavation at Great Doddington 39 only revealed a 20 metre wide strip across the settlement complex identified from air photographs. Correspondingly, interpretation of the phase 1 settlement in particular is difficult. Figure 6.51A shows the damaged remains of two possible roundhouses that lay alongside a palisade running along the contour of the ridge. The eastern gullies were part of the foundation trench for a roundhouse, but direct evidence for a structure within the ovoid drainage gully was absent and may not in fact have enclosed a building. The cropmark evidence does not indicate that the palisade formed a major boundary

along the ridge and it may thus have simply screened the south east of the settlement, or enclosed it.

Phase 2 was marked by the appearance of group 2 ceramics and a few examples of undecorated group 3 globular bowls. The change in material culture was accompanied by continued settlement occupation, with at least four separate roundhouses and the destruction of the palisade (fig. 6.51B). Roundhouse A had two phases of construction involving a slight shift in location and only roundhouse B was provided with a substantial drainage gully. All the roundhouses lay inside a massive D-shaped ditched and banked enclosure, orientated along the same axis as the earlier palisade, though overlying it. As is so often the case, it is impossible to establish the chronological relationship between the changes in the settlement and the construction of the enclosure, but all clearly belong to a phase broadly dateable to the fourth-first centuries BC. The wider absence of decorated group 3, and group 4 pottery from Great Doddington, except a small quantity of first century AD types in the top fill of the enclosure ditch, suggests the settlement was abandoned by, or during, the first century BC.

6.3.6 Landscape Development in the Wollaston/Ecton Area

Earlier First Millennium BC

As with the Maxey/Barnack example above, the early first millennium BC landscape is still poorly recorded. The large scale of some of the excavations, and greater diversity of location in the Wollaston/Ecton study however, does provide a somewhat more rounded picture of landscape development. The earlier first millennium BC landscape was dominated by pit alignments along the terraces of the Nene Valley and up some of the hillslopes flanking them. They do not appear to have extended over the hilltops and ridges away from the valley even where cropmark evidence is still generally good (as around Ecton, fig. 6.47). The excavations at Wollaston 107 and Grendon 44, and the cropmarks around Wollaston, Grendon and Earls Barton (figs. 6.23, 6.31 & 6.41), show a complex and sophisticated system of boundaries aligned to run parallel and perpendicular to watercourses and the local topography. There is little suggestion that some of the alignments were constructed around earlier monumental landscapes although some were orientated around pre-existing markers in the form of single

pits or pit groups. Around Wollaston 107 and Grendon 44 the alignments form an almost continuous group but they are not apparent elsewhere and may only have extended over a patchwork of blocks interspersed with open or older ceremonial landscapes as around Grendon (fig. 6.31).

The only clear evidence for the location and nature of settlement associated with group 1 ceramics comes from Wollaston 108 (fig. 6.30A). Though partial, the evidence suggests a substantial palisaded enclosure around an agglomerated settlement lying on one of the flanking hills of the Nene valley. Group 5 ceramics were associated with the establishment of a number of simple open settlements alongside the pit alignments, and other palisaded sites at Ecton and possibly Earls Barton. It is currently impossible to establish the degree of contemporaneity between these sites and the Wollaston palisaded settlement but their numbers might suggest that settlement expanded or dispersed during the early to early middle iron age (5th-4th centuries BC). This issue is assessed further in section 6.5 below.

Later First Millennium BC

Groups 2 and 3 pottery are associated with a quantitative leap in information about settlement and other focal places within the Wollaston/Ecton area. At Wollaston 107 and Earls Barton the early settlements were embellished with a repetitive range of structural elements that were arranged according to a relatively strict spatial syntax (cf. section 6.5.1). The whole locale being monumentalised by massive enclosing ditches, these small settlements became a common feature of the gravel terraces between the third and first centuries BC. Other broadly contemporaneous settlements such as Ecton (fig. 6.49) and Strixton (fig. 6.30B & C), however, show that these spatial 'rules' were far from universal.

In the areas divided by pit alignments territorial boundaries were maintained, and sometimes enlarged or replaced by continuous ditches. There is little evidence for droveways or other points of access across the wider landscape until the construction of a short section at Wollaston 107 (fig. 6.25). Even this pathway, allowing access to a water source, was seemingly regulated. Only in the latest phases of group 2 period occupation at Wollaston 107 and in the early Roman period at Wollaston 108 were ditched trackways constructed along the edges of existing boundaries to allow transit across the wider landscape. Away from the pit alignments

the situation was more varied with a ditched driveway constructed between existing enclosures at Ecton (fig. 6.49) sometime late in group 2 and no clear evidence for driveways at Grendon 43, Strixton and Great Doddington. This situation appears to continue the dichotomy, created by the pit alignments, between constrained bounded landscapes, and neighbouring unconstrained landscapes where boundary features seem to have been created only in relation to settlements established during the usage of groups 5 and 2 pottery (c. 4th-2nd century BC).

During the use of group 2 and 3 pottery the enclosure of settlements was paralleled by the construction of non-settlement enclosures at boundary or transitional locations in the landscape. The enclosures at Wollaston 107 (fig 6.26) and Ecton (fig. 6.49) may have played a role in agriculture, acting as stock pens or storage places at certain times, but some, such as Wollaston 109 (fig. 6.37), also appear to have been used in acts of conspicuous deposition and were monumentalised through the construction of walls or revetted banks and ditches.

As with group 3 pottery, evidence for locales dateable to group 4 is scarce. At Earls Barton (fig. 6.44) the settlement underwent a period of reorganisation until a small square structure, possibly a shrine, was built shortly before or at the time of the settlement's abandonment. The absence of group 4 pottery from most of the Wollaston excavations may not be significant given the possibility that group 2 ceramics continued into the first century AD and the clear presence of later first century Roman occupation in the same area. It is, however, clear that the small enclosed settlements were abandoned during the first century BC and earlier first century AD and show few any signs of later re-occupation.

Early Roman Period

By the later first and early second centuries AD the landscapes of the Wollaston/Ecton area had undergone fundamental change as former places were no longer in use and new foci were established. Farmsteads were established within pre-existing field boundaries, themselves constructed in the later iron age. Where additional boundaries and enclosures were constructed they formed new driveways (eg. figs. 6.27 & 6.29C) or fragmented existing larger tracts into smaller fields or compounds (fig. 6.27).

Whole areas of the floodplain that had previously been open were bounded by field systems (fig. 6.45 & around 110 in fig. 6.31) and areas with earlier ceremonial landscapes no

longer respected (43, fig. 6.40). These systems appear to have been part of a concerted effort to drain low lying or previously 'marginal' agricultural areas as part of a marked shift in agricultural practice that included the inception of horticulture or viticulture (figs. 6.27 & 6.34). Curiously, this seeming intensification in the valley was not repeated in the upland areas investigated. With the exception of the developing villa at Wollaston 106 (fig. 6.29C & D), the ridges and hills overlooking the Nene seem not have undergone marked enclosure with previously important locales at Wollaston 108, Great Doddington, Strixton and Ecton all seemingly unoccupied. It is possible these areas were utilised as part of more extensive agricultural practice as small quantities of early and middle Roman pottery have been recorded from the latest fills of these sites. Unfortunately the restricted extent of excavation in the upland areas means that little can be said about whether settlement continued nearby, except where supported by fieldwalking data such as at Ecton (appendix 4, Ecton 1). Here, as on the gravel terraces, boundaries away from settlements were no longer maintained possibly because of an increasing settlement-centred focus on architectural expression noted elsewhere.

Later Roman Period

During the course of the second and third centuries AD the landscape changes noted above largely continued with the new settlements appearing stable. During the latter part of the third and earlier fourth centuries however, a number of changes occurred. At Wollaston 107 and Earls Barton the small settlements were abandoned, though some of the enclosures and compounds surrounding them continued to be used. This contrasts with the evidence from Wollaston 106 where excavation and field walking (appendix 4, Wollaston 16) suggest continued occupation well into the fourth century. The field walking evidence for the study area recorded eight scatters, none of which appear to have been established after the mid-second century AD. None of the excavations identified newly constructed locales either and the apparent decline in maintenance and use of wider field boundaries (eg. fig. 6.28) indicates a decline or a shift towards less labour intensive definitions of boundaries. The latter proposition may be supported by evidence for the disappearance of the horticultural areas and their replacement by simpler systems of drainage ditches probably related to a switch to pasture.

6.4 HUNSBURY/QUINTON AREA

The final case study looks at an area to the south of the Nene valley near Northampton. Here the valley narrows as it cuts through a gap in the Jurassic ridge at the confluence of two of its main tributaries (fig. 6.52). The hills are dominated by boulder clays and sands that are only responsive to air photography in patches. Immediately to the south of the Nene, Hunsbury ridge has been subject to archaeological interest since the nineteenth century that is discussed in section 6.4.1, but elsewhere there has been little work except around Quinton towards the Nene-Ouse watershed, where limited excavation has provided some useful insights (section 6.4.2).

6.4.1 Hunsbury

Figure 6.53 shows the first detailed study areas covering the western end of a prominent spur, capped by Northampton sand. The ridge lies at a nodal point in the county's topography where the Nene valley narrows as it splits into three smaller tributaries to north, south and west. Discoveries at the iron age hillfort (53) during iron ore extraction in the nineteenth century were followed in the last twenty years by excavations in advance of urban development around Wootton Hill Farm (fig. 6.53, 111 & 112), Briar Hill (14, 15 & 16) and Camp Hill (20). Together, they provide valuable evidence about settlement and landscape development off the gravel terraces of the Nene and in the vicinity of one of the major iron age monuments in the county, counter balancing the limited air photographic survey and field walking such areas have seen.

Earlier First Millennium BC

The hillfort at Hunsbury became significant for iron age studies with the recovery of large quantities of artefacts during quarrying in the latter part of the nineteenth century (Dryden 1885; George 1917; Fell 1936). Much of the interior of the fort was destroyed, with little recording of features discovered. The only detailed evidence comes from sections dug through the enclosing earthworks in 1952 and 1988 (Jackson 1995a). These revealed an early box rampart enclosing an area of approximately 1.6 hectares and dated by group 5 ceramics and radiocarbon

dates to the eighth-fourth centuries BC. Recent re-evaluations of the site (RCHM 1985; Jackson 1995a) have suggested that two entrances were provided (A and B in figure 6.53). The gaps apparent today at C and D were created during the quarrying. The nineteenth century records of the site (53 & Gwilt pers. comm.) indicate that relatively ^{little} of the material recovered was of earlier first millennium BC date. No features could be definitively associated with this period, but it is likely that some of the 300 or more pits discovered were dug during this time. The absence of other structural features cannot be considered significant given the poor conditions in which recording was carried out and the limited experience of the time. Whether the site was a settlement is currently impossible to establish, but it clearly represented a significant monumentalised place in the landscape that may originally have been enclosed by a simple palisade (Jackson 1995a, 17).

To the north, excavations on Briar Hill (fig. 6.53, 14 & 15) revealed parts of two parallel pit alignments running east-west along the northern slope of Hunsbury ridge. The alignment shown in figure 6.54 appears to have been built in two sections to east and west of a single large pit at A, the western part of the alignment clipping the northern edge of the earlier ceremonial complex. Two palisaded or fenced compounds with group 1 and 5 pottery were constructed in the newly bounded area to the south and aligned along the same axis as the pit alignment, within the Neolithic complex. No evidence of post built structures was recovered, but given the ephemeral nature of most earlier first millennium BC buildings their absence is not necessarily conclusive. Elsewhere on the site, post-built structures did survive well, however, (see fig. 6.55) and the enclosures did not appear to incorporate any other structural evidence. With one exception, all of the pits lay outside the compounds and to their east and north east.

The other alignment was originally marked by a series of small pits and posts possibly forming a double fence line (fig. 6.53, 15). Some of the pottery may suggest a late bronze/early iron age date for the inception of this boundary on parallels with assemblages from West Harling (Clark & Fell 1953) and Fengate (Pryor 1984), but much of the assemblage is similar to examples of group 1 ceramics from elsewhere in the county (eg. Gretton 46 & Weekley Hall Wood 102).

Later First Millennium BC

The appearance group 2 and 3 pottery was associated with a series of changes on Hunsbury ridge. On Briar Hill, the palisaded compounds were no longer used and activity shifted westward with the construction of a fenced boundary and small rectilinear enclosure within the former neolithic monument (fig. 6.55). Two L-shaped rows of posts seem to have delineated a passageway and compounds leading up to the eastern side of the enclosure, with pits dug around its southern and western sides. This small complex was clearly associated with a new boundary, though which came first is not possible to establish.

At Hunsbury the box rampart was burnt down and a glacis rampart constructed over it. The date of these events is unknown but was probably associated with the digging of the majority of pits in the interior associated with ceramic groups 2 and 3 (4th-1st century BC). The extraordinary quantity and variety of finds from the mid-late iron age pits inside the hillfort suggest its role as a focus for the conspicuous deposition of resources or wealth (cf. section 6.5.1).

Some 200 metres to the south of the hillfort at Wootton Hill Farm (fig. 6.53, **111**), an enclosed settlement was constructed over an earlier (group 5) ditch (fig. 6.56). This west facing enclosure had many similarities in form and layout with the gravel terrace sites at Wollaston **107** and Earls Barton, including the monumental nature of its surrounding ditch and gateway. It is possible that the enclosure 50 metres to the north was contemporaneous, but trial trenching failed to recover any dating evidence. A larger, double-ditched, enclosure to the north of the hillfort (**16**, fig. 6.53) has been dated by excavation to the iron age but not to a specific period within it. A single trench through its interior failed to identify any structural evidence and superficially it bears some resemblance to the phase 2 enclosure at Wollaston **109** (fig. 6.37). A large ditch visible on air photographs running up to the south western corner of the enclosure is known to have predated the mid-first century AD kilns and occupation at Camp Hill (fig. 6.53, **20**).

Group 4 pottery has commonly been found in the area and much of it almost certainly comes from local kilns such as those discovered at Camp Hill and Hardingstone (fig. 6.52, **48**). Both were associated with settlements that continued into the second century AD, but the circumstances of their excavation prevent an assessment of their layout. None of the earlier

locales continued as significant foci during this period (1st century BC-1st century AD), with perhaps the exception of Wootton Hill Farm, where the enclosure was replaced by interlocking compounds defined by shallow ditches (fig. 6.57). These may have been part of a larger settlement visible on air photographs extending as far west as Wootton 112 (fig. 6.53). Within the area of the Wootton 112 excavations ditches, post holes and timber slots dated by group 4 and later first century AD Roman pottery indicate the likely presence of a settlement, but no plan of these survives.

Roman Period

By the later first century AD the landscape of Hunsbury changed markedly as the earlier monumental enclosures were all no longer identifiably used places. At Briar Hill 14 the northern edge of the excavated area was used for small scale quarrying (probably for iron ore outcropping near the surface). Hunsbury hillfort, and the Wootton 111 and Briar Hill 16 enclosures were abandoned, whilst new locales, created in the late iron age (group 4), became established. Excavation at Camp Hill, air photographs, and records of surface finds (RCHM 1985, from E in fig. 6.53), indicate two complex occupation foci that continued until the second century AD before being abandoned. At Wootton 112 the first stone building (fig. 6.58A) was built sometime in the first half of the second century AD and then subsequently elaborated until, in the third or possibly early fourth century, it was extended north westward with the provision of a bath suite and linking corridor (fig. 6.58C). Unfortunately, a second stone building at a right angle to the first was only planned and could not be phased within the sequence of the villa, though it certainly post-dated the later first century timber features.

6.4.2 Quinton (fig. 6.59)

This area lies in the south eastern corner of the third case study (fig. 6.52). Lying on the northern slopes of the watershed between the Nene and the Ouse valleys, it is characteristic of the area in being dominated by small narrow valleys carrying tributary streams of the Nene. The soils and modern rural context of the area mean it has a poorly known archeological record. The soils are largely unresponsive to air photography and the small amount of available field-walked data recovered nothing of the period under study here. It does, however, have the advantage of

including two of the larger excavations in the county carried out on the upland calcareous boulder clays that dominate large areas of the county south of Northampton and along the Jurassic ridge between there and Wakerley.

Later First Millennium BC

There is no evidence recorded for earlier first millennium BC occupation in the study area. The excavations at Piddington (75) have recorded at least two post built roundhouses that predate the first group 4 pottery from the site (A & B in fig. 6.61A). The small quantity of material recovered was not very diagnostic but a few sherds suggest this phase of occupation is broadly fourth-first century BC in date. If so, they appear to have been part of an open settlement lying outside, and to the south east, of a ditched enclosure (unshaded in fig 6.61A). At Quinton (74), pre-group 4 pottery occupation is limited to a ditched enclosure containing pits (fig. 6.60A unshaded features).

The subsequent, more marked, phase of occupation at Piddington was dated by group 4 pottery (fig. 6.61A). Understanding the organisation of the settlement is hindered by the limited extent of the excavation but it was a complex agglomerated locale that fieldwalking suggests extended over an area of some 2 hectares. At Quinton (fig. 6.60A) occupation probably shifted northwards with the construction of a large rectilinear shallow ditched enclosure with at least one, and probably two or more roundhouses. In the area of the previous enclosure a large slot foundation roundhouse was constructed to the north of a new ditch.

Early Roman Period

During the later first century AD the previous settlement layout at Piddington was abandoned as a six roomed rectangular building was constructed to the north of a new east-west boundary ditch (fig. 6.61B). Though not impressive by later standards, this building was relatively large and sophisticated for its date in the region (cf. section 6.5.1). In the first half of the second century the main house remained little altered but a second building was raised over the southern boundary ditch and along its axis. For a time this building would not have appeared much less grand than the main house until an extended corridor and facade was provided for the latter in the third quarter of the second century (fig. 6.61C & D). Quinton

followed a similar process of reorganisation (fig. 6.60B). During the late first and early second centuries AD two buildings, one a familiar three roomed house, the other possibly a barn, were constructed at opposite sides of the earlier enclosure. These buildings continued in use into the third quarter of the second century when the former was demolished.

Later Roman Period

From the mid-second to the mid-fourth century AD the main house and its neighbour at Piddington were extended, unified by the addition of two bath houses, and then further extended (figs. 6.62A & B) to produce a substantial enclosed villa by the late third century AD. The marked prosperity of the Piddington settlement continued into the second quarter of the fourth century when the building rapidly fell into decay as parts of it were demolished and a number of rooms were reused as part of an intensively occupied small settlement (fig. 6.62C). Little is known about the wider context of the Piddington villa other than it stood at the southern end of an extensively occupied area covering approximately 3 hectares along the west bank of a tributary stream running north to the Nene.

At Quinton the fragmented area excavated makes interpretation difficult. The three roomed building was abandoned during the latter part of the second century but the northernmost area continued to be used well into the fourth century. A combination of fieldwalking and probing have demonstrated the presence of further stone structures around A in fig. 6.60B which may have been part of a main building occupied throughout the second to fourth centuries AD (Friendship-Taylor 1979b).

6.4.3 Landscape Development in the Hunsbury/Quinton Area

The two areas discussed above lie at opposite extremes of case study 3 with contrasting topographical and pedological conditions, and differing histories of research. Around Hunsbury the greater intensity of excavation and air photography revealed many landscape features not dissimilar to those found around Wollaston, Grendon and Earls Barton. Further south the limited information available indicates a different situation that has some parallels at Ecton but that appears unique among the case studies.

Early First Millennium BC

Evidence for earlier first millennium BC settlement is restricted to the lighter soils of the Hunsbury area. Given the difficulty in identifying features from this period in the absence of pit alignments, the lack of evidence from Quinton must be viewed with caution. At Hunsbury, the northern side of the ridge was demarcated by pit alignments running parallel to the course of the river Nene. To the south of the alignments lay the hilltop itself with the important earlier monumental focus at Briar Hill and the hillfort of Hunsbury. Although the excavation orientated nature of the evidence from Hunsbury and the fragmentary nature of the air photographic information mean that other alignments may have been missed, the hillfort probably stood in an unbounded part of the landscape with commanding views in all directions up the Nene and its tributary valleys. In this respect the alignments, as elsewhere in the case studies, were largely a river valley and flanking slope phenomenon at a time when major settlements were often located on overlooking hilltops (cf. section 6.5.3).

Locales with group 5 ceramics are largely absent from the Hunsbury/Quinton area and it is not until the appearance of group 2 pottery that further developments are apparent. The exception is the two enclosures at Briar Hill 16. Neither appear to have been occupied as part of a settlement, but their location within the earlier monument and their associated pits suggest they may have acted as more than stock enclosures.

Later First Millennium BC

At Hunsbury the interior was certainly used as a major focus for the deposition of an impressive range of material culture during the fourth-first centuries BC. It is not possible to say whether this was part of a resettlement of the hillfort and the refurbishment of its ramparts but the western entrance became the focus for (usually disarticulated) human burial (cf. Dryden 1885; Baker 1891). This coincided with the re-use of the Briar Hill 14 complex as a new non-settlement enclosure was constructed within the western edge of the henge beside a fence line (fig. 6.55). This, together with the two double ditched enclosures (at 16 & F in fig. 6.53) indicate that Hunsbury Ridge became a significant symbolic or ceremonial focus during this time. Settlement (if the hillfort was not one) was restricted to the periphery of the ridge with examples identified at E and 111 in fig. 6.53.

In the second area the excavated evidence suggests the establishment of settlement at Piddington (fig. 6.61A) and an indeterminate locale at Quinton (fig. 6.60A). At Piddington the settlement was unenclosed and contrasts with the rectilinear forms at Wootton Hill 111, Wollaston 107 and Earls Barton but shows some similarities to Ecton. The limited air photographic evidence illustrates one example of an agglomerated enclosure group at A in figure 6.59 which shows parallels with some of the complexes on Ecton ridge (fig. 6.47) and at Strixton (fig. 6.23, 87). These agglomerated and unenclosed groups contrast with the situation in much of the river valleys.

By the late first century BC or earlier first century AD the major monuments on Hunsbury ridge were either abandoned (as at the hillfort) or dramatically altered (as with Wootton Hill Farm, fig. 6.57). Settlement may have continued at Wootton Hill Farm outside the excavated area but, if so, was now part of a complex of small enclosures and compounds extending over a wider area. The abandonment of Hunsbury as a place of wider significance seems to have accompanied the rise of the very large focus across the river in a low lying location at Duston (31). On Hunsbury ridge new settlements were established at Camp Hill and at Wootton 112. In the Quinton area the complex settlements that developed did so at established foci. With only two examples it is impossible to understand whether this was a common local trend but trenching at Hardingstone (48, fig. 6.52) suggested a lengthy occupation in one location from group 2 and 3 ceramics (2nd-1st century BC) through the mid-late first century AD.

The Roman Period

During the later first and second centuries AD locales established as settlements in the late iron age largely continued to develop. On Hunsbury ridge the evidence is poor but settlement continued at Camp Hill and Wootton 112 until the abandonment of the former by the middle of the second century AD. The settlements at Wootton 112, Quinton and Piddington changed form but remained in same locations and architecturally were initially similar to each other. None of the earlier foci, such as the hillfort and the double ditched enclosure, were re-used and no later field boundaries were constructed across any of these areas.

By the third century AD differences emerged in the individual histories of the three reasonably recorded settlements. Piddington, having been refurbished and altered on a

number of occasions developed into a substantial villa during the third century. Within the excavated areas at Quinton the settlement initially stayed as it was during the early second century, but then showed some signs of change as the southern building was abandoned. Wootton 112 developed gradually into a unique villa by the late third or early fourth century. From the second and third quarters of the fourth century, all three sites show significant signs of their collapse as villas with little evidence for continuity of occupation into the latter part of the century at Wootton and Quinton and dramatic changes at Piddington (cf. fig. 6.61C).

6.5 DISCUSSION

The summaries above outlined the evidence for landscape foci and their development in three selected areas of the region. A number of issues were raised which together would require too much time and space to discuss thoroughly in the context of a thesis. Instead, the following sections discuss three themes at the heart of the kind of landscape studies proposed in chapter 1. In one way they work as a series of expanding spatial analyses from place to landscape and eventually, with chapter 7, to region. In another, they are intended as studies of the changing character of places (6.5.1), the role of landscape architecture in linking or separating places (6.5.2), and finally the changing location of places (6.5.3), as keys to an understanding of social and demographic change.

Section 6.5.1 is a chronological account of archaeological locales that can be equated to some of the likely places of these past landscapes. In particular, it focuses on key changes in the morphology of locales, their architecture, and their use of space. The evidence from the three case studies forms the main focus for discussion, but additional examples or contradictory cases are included from the array of sites listed in appendix 1 (cf. fig. 5.18). This is intended to provide additional cases of rare or unique occurrences within the sample discussed above and to widen the scope of these analyses to the study region. Do, for example, the few excavated iron age settlements from the west and north west of the county bear any resemblance to those from the case studies?

Sections 6.5.2 and 6.5.3 investigate two ways of looking at landscape change. The former studies the inter-relationships of focal places with the wider architecture used to

construct and bound people's landscapes, the latter analyses the changing physical locations of places in relation to issues such as agricultural practice. Though related, the two give differing perspectives on the changing nature of rural settlement and on patterns of occupation and interaction.

For the first millennium BC each of the discussions uses the somewhat crude but relatively robust ceramic series outlined in section 5.3. There is obviously great scope for more complex and short term changes having occurred within these phases than have been identified here. The aim here, however, has been to concentrate on some of the wider chronologically and spatial trends in landscape change that occurred between the middle of the first millennium BC and the fourth century AD.

6.5.1 Activity Foci and the Changing Character of Places

The Earlier First Millennium BC (c. 8th - 4th century BC)

With the exception of the pit alignments, evidence for activity from the region is poor. The equivocal nature of the evidence from Maxey, Tallington, and Barnack, and the possibility that some of the features containing only group 5 pottery such as the round houses at Wollaston 107 (fig. 6.24) are contemporaneous, makes interpretation of the nature of focal places difficult. The circular enclosure at Barnack 8 is undated but may have been a late bronze/early iron age ringwork, as might that from Maxey 65. Stratigraphically these ascriptions make sense and in plan their similarity to other such settlements is noticeable (fig 6.63). If so, the similarity of such sites to earlier burial and ceremonial monuments when seen as cropmarks may help to explain why they have so often been overlooked.

The roundhouse, four postern and pit at Tallington are likely to be of early first millennium BC date but the lack of diagnostic material leaves a degree of uncertainty. Within the case studies, only Wollaston 108 seems to be a clear example of a settlement dated by group 1 pottery. The poor conditions of excavation limit what can be said, but it was probably a curvilinear palisaded settlement. The ephemeral post-built nature of the surviving structures is not uncommon in the region, as examples from Gretton (46), Weekley Hall Wood (102) and Great Oakley (40) testify. These sites, together with the evidence from Fengate (35), illustrate the

poor level of evidence currently available but do provide some interesting insights into the nature of early first millennium BC settlements from the region.

Each of the locales was either open or only partially enclosed by a palisade and there was no recurring spatial structure in their layout. Their architectural elements were slightly built and insubstantial compared to later developments and there is little to suggest that they were centres of architectural elaboration. Indeed, the majority of the sites are ephemeral compared to their contemporaneous pit alignments. With the exception of Wollaston 108 and the hillforts discussed below all were closely associated with linear boundaries. Given the open and dispersed nature of these settlements it is difficult to judge their likely size. Most, however, appear to have been small with few buildings. The lack of stratigraphy makes it impossible to judge the degree of contemporaneity of the roundhouses at Wollaston 108, but it is possible that there was at least some degree of settlement agglomeration.

Alongside the open or palisaded settlements were constructed a small number of hillforts such as Hunsbury (53) and Rainsborough (76). These may originally have existed as palisaded enclosures similar to that at Wollaston (cf. Jackson 1995a & Avery *et al.* 1967). In this regard the early box rampart hillforts in the county may have been constructed as monumentalised versions of palisaded settlements. Unfortunately the lack of excavation here, and at other hillforts in the county such as Borough Hill (12), Farthingstone (34) and Irthlingborough (56), hinders their interpretation to the extent that even asserting their status as settlements is problematic. Only Rainsborough has positive evidence for settlement in the form of a single roundhouse associated with group 1 pottery.

In section 5.3 I discussed the problem of dating group 5 ceramics and suggested that where found alone they may date to the latter part of the early iron age and earlier part of the middle iron age (5th-4th century BC). In this regard they might provide a useful link in understanding the development of settlements and other activity locales during a poorly understood and dated part of the iron age. Examples of such foci are grouped for discussion here, but it must be remembered that some examples may in fact relate to earlier (7th-6th century BC) or later (3rd century BC) developments.

Settlements with group 5 pottery are more varied, though this may partly be due to their uncertain chronology. A number, however, such as Wollaston 106 and 107, were small

ephemeral foci located close to contemporaneous boundaries. Most (with the exception of Maxey 64, fig. 6.6 & Ecton, fig. 6.42) were unenclosed, though many were flanked by palisades, fences or shallow ditches (eg. Great Doddington, fig. 6.61A & Earls Barton, fig. 6.42). Some settlements now included small, but deep-ditched, enclosures, whose functions have received little attention (eg. Pennyland & Hartigans), as have similar enclosures away from settlement (eg. Briar Hill 14, fig. 6.54).

The Later First Millennium BC (Groups 2 & 3 Pottery c 4th - 1st century BC/AD?)

By the time group 2 ceramics were used in the region a number of changes were underway affecting the size, structure and morphology of settlements. Focal places were continually redefined, bounded and often monumentalised in ways that reflected their immediate landscapes. In those areas already delineated by pit alignments, settlements and other locales were closely associated with them and boundary junctions. This action (partly visible with group 5 locales) may have taken place before these places were themselves bounded by enclosing ditches and gullies. The dispersed unstructured nature of group 1 and 5 settlement was replaced by locales with developing spatial organisation, increasing boundary definition, and the locational stability of particular activity areas (eg. house platforms, small compounds & pit groups). Though there is no need to see an overriding spatial syntax behind settlements in the bounded landscapes, the case studies and additional examples from neighbouring areas suggest a series of local, context specific, strategies for the 'correct' layout of settlements. Probably the best example is illustrated in figure 6.64 where the evidence from two of the Wollaston 107 settlements is combined with that from Earls Barton and Wootton Hill 111 in constructing the schematic plan, E. All the settlements were enclosed by substantial earthworks and had a single entrance along one side usually elaborated by massive gate structures, clearly defining areas inside and outside the settlement. The roundhouses faced east and were located away from enclosure entrance unless, as at Wootton Hill, the settlements orientation made this impossible. A small sub-rectangular area, enclosed by shallow gullies that were frequently re-defined, was located to the near left hand corner of the enclosure as entered. These enigmatic structures appear at many sites of this date (eg. Blackthorn, Ecton & Stanwell Spinney) in the middle Nene valley and seem to have enclosed areas of ground into

which posts or simple post-built structures were raised. Again Wootton Hill was the exception, where the location of the roundhouse prevented this. To the near right hand side on entering lay areas only loosely defined by fence lines and gullies that, unlike elsewhere, were not continually re-defined along the same lines. Pits were only dug along the inside of the enclosure ditch, with the exception of rare examples associated directly with roundhouses. All these structural elements were kept clear of the centre of the enclosure leaving an open space at the heart of each settlement. All these settlements share two additional details in common. They all lie within a short distance of one other and all were added alongside pre-existing bounded parts of the landscape. Other possible examples of such localised spatial syntaxes for small settlements may be suggested by Maxey 66 and Werrington 103, and Wakerley 98 and Longthorpe 60. The precise architectural layout small settlements took was flexible to local considerations. In clearly bounded landscapes the settlements respected and incorporated boundaries, thereby linking dwelling places to their wider architecture at a time of increasing spatial differentiation within the wider landscape (section 6.5.2). In undemarcated former monumental landscapes, pre-existing monuments were utilised by incorporating them in enclosure or boundary construction linked to new settlements. At Grendon 43 (fig. 6.39) and Aldwincle 2 the settlements were constructed so as to incorporate ancient places in their overall form.

In areas that were not architecturally marked in previous periods, settlements took on a greater multiplicity of forms. Though containing many of the same 'necessary' structural elements (eg. roundhouses, pits & small sub-rectangular compounds), they were not subject to the same spatial constraints (eg. Ecton 33, fig. 6.49 & Stanwell Spinney 84). Interestingly though, once established, particular structures or activity areas again remained remarkably stable, their enclosing gullies or ditches being continually re-dug to define a stable place.

Larger settlements were almost absent from the case studies (with the likely exception of Ecton 33), but excavations elsewhere in the county suggest they were not uncommon. Many of these sites (eg. Ringstead 79 and Brigstock 18) have received little investigation or are awaiting phasing (eg. Stanwick 85 & Crick 27) and are thus difficult to interpret. It is nevertheless important to consider them in relation to the perhaps erroneous picture provided by case study landscapes dominated by small settlements. Though more complex and varied in

their layout, these settlements show many of the features noted above. The available evidence from Stanwick, Crick and possibly Pennyland indicates that the larger settlements were initially formed through the agglomeration of smaller settlement units, each lying within separately defined enclosures. There is little architectural evidence that the larger settlements were ordered hierarchically unless the monumentalised house enclosures excavated at Brigstock **18** and Fengate **35** (hut 3) took this role. This does not exclude the possibility of imbalances in the social relations of individuals or groups occupying the enclosures, as portable material culture or less archaeologically visible actions may have been significant in defining such roles (cf. section 8.3).

The larger settlements and the far greater numbers excavated in the county may suggest agglomeration and/or expansion in settlement during the fourth-first centuries BC. Within settlements there was now a concern to define spaces, and in the monumentality of enclosures and gateways in particular, a seeming expression of the permanence and stability of places. These architectural concerns were frequently extended to the wider landscape (cf. section 6.5.2) and to other foci of activity established away from settlements that now become more visible architecturally. One such locale at Wollaston **109** (fig. 6.37) was monumentalised and was a relatively common non-settlement place within the middle Nene. Unusually, and in common with the enclosures excavated at Blackthorn **11** and Irchester **54**, the enclosure was elaborated by stone walls or revetments that enhanced its visual impact. These enclosures, always initially free standing, enclosed significant pit groups and rich artefactual assemblages. The Blackthorn and Wollaston enclosures, along with a similar enclosure at Briar Hill **14** (fig. 6.55), all contained decorated globular bowls of group 3 type which may have been deposited only in significant boundary locations (Gwilt pers. comm.). Whatever their specific purposes (cf. 6.5.3. & section 8.3), these foci and the construction of other simpler boundary junction enclosures (eg. Wollaston **107** fig. 6.25 & Maxey fig. 6.7) suggest that parts of routine or occasional practices were increasingly being separated into defined spaces both within settlements and away from them. This suggestion (also noted by Hill 1995, fig. 12.1) may have been part of a process that began during the earlier middle iron age (eg. Briar Hill **14** fig. 6.54) but which became more visible through architectural elaboration.

By the later iron age the impression of settlement differentiation and expansion, and boundary monumentalisation, changes, at a time when the wider landscape is opened up to greater movement (cf. section 6.5.2). Dating activity to the later first century BC and early first century AD is problematic given that the absence of group 4 ceramics does not necessarily equate with the absence of continued occupation. Despite this caveat it is possible to note a series of changes, many of which extended through the first and second centuries AD.

Given the dating problems there is still some suggestion that many locales shifted, were abandoned or changed use in the later iron age. At Wollaston **107** two of the three settlements show little or no dateable activity (cf. fig 6.26). Ecton **33**, Grendon **43**, Strixton **87**, Great Doddington **39**, Stanwell Spinney **84** and the west field at Maxey **64** likewise appear to have been abandoned, sometimes in favour of nearby locations (eg. Maxey fig. 6.8 & Grendon fig. 6.40), along with the majority of the unusual non-settlement enclosures. At Wootton Hill **111** settlement may have continued outside the excavated area but, as at Wollaston **107**, Grendon **43** and Earls Barton **32** enclosure boundaries were either actively back-filled or allowed to silt up, as less monumental but more complex groups of compounds were constructed. Interestingly, this process appears to have varied in time and space across the three case study areas. In area 1, for example, the settlement at Plants Farm (Maxey **66**) and Maxey **64** (along with examples from Werrington **103**, Orton Longueville **71**, possibly Longthorpe **60** and the larger settlement at Fengate **35**) continued into the mid first century AD. In the north east of the region the changes usually took place during the latter part of the first century or even the earlier second century AD. In area 2, however, most occurred during the use of group 4 ceramics, though identifying settlements of this date other than at Earls Barton and possibly C at Wollaston **107** is difficult. This may be an artefact of the problems of ceramic dating noted in section 5.3, but it is equally likely that the lack of quality excavation of earlier phases on some of the Roman settlements is to blame. Certainly, the evidence from Wootton Hill **112** and Camp Hill **20** (as at Duston **31** & Brixworth **19** across the Nene) suggests newly constructed settlements on Hunsbury ridge when the hillfort was no longer a focus of depositional practice. Conversely, the limited evidence from the claylands at the southern end of area 3 indicates that settlement continued in broadly the same locations at Quinton **75** and Piddington **74** despite marked changes in the location and definition of their boundaries.

The larger settlements continued despite some morphological changes in their layout (eg. Stanwick 85 & Fengate 35) and at Moulton Park 68 a small group 3 foci expanded. In this sense ^{there} was something of an emerging dichotomy between the highly variable futures of smaller locales from area to area with those of existing or emerging larger settlements which, by and large, were not abandoned or moved during the late iron age. This is an issue that is discussed further in section 6.5.3 and chapters 7 and 8 below.

As well as the breakdown in the monumental boundary/enclosure syntax of some settlements at this time, other changes were enacted through the architecture of buildings. Roundhouses were still the overriding building form, but on some settlements there is evidence for structural diversification that may have been intended to more explicitly express purpose. West facing roundhouses were not unknown during the earlier parts of the iron age, but were extremely rare within the region. During the late iron age, however, some existing focal places were redefined with west facing roundhouses, as at Maxey 64 (fig. 6.8 & Wakerley 98) or by double entranced (east-west) forms as at Maxey again and at Aldwinckle 2 and Weekley 101. At Earls Barton 32 a new square structure with opposing entrances was constructed at the entrance to the settlement shortly before its abandonment and relocation to the south (C in fig. 6.44). This structure is similar to the Maxey 64 'shrine' which was constructed (over the west facing roundhouse) at a slightly later date. Thus, there appears to have been a change in emphasis during the late iron age and into the later first century AD in which the monumentalised enclosure of important places was abandoned in favour of a more explicit architectural expression of purpose. Settlements were divided into complexes of paddocks and compounds possibly related to specific tasks, were not laid out according to any noticeable spatial syntax, and had less easily definable limits. In a sense, the significance of spaces within settlements was transposed from their location and defined extent to their visible structure.

The Roman Period (c. AD 70-350)

Many of the changes underway in the late iron age continued during the later first and second centuries AD. There were, however, a number of additional developments, some extending across the region others that were limited to specific areas. Particularly striking were the considerable changes in the architecture of buildings that produced the 'Romanised' forms

familiar from the mid-second century onwards. Change swept across all the areas studied, but the range and choice of architectural forms adopted show clear differences between, on the one hand, the lower Nene and Welland valleys (including study area 1), and the middle and upper Nene (with areas 2 & 3) on the other. The dichotomy may have begun in the previous period in the time lag between change and the variations in the spatial syntax of settlements in different areas. During the course of the later first century AD, the two areas developed distinctive local traditions of architecture that may have reflected social or political differences between them.

In the lower Nene and Welland valleys, the latter part of the first century and early second century AD saw the continuation of the timber roundhouse tradition at Maxey 64 & 66 that was mirrored at Orton Longueville 71, Fengate 35, Wakerley 98 and Weekley 101. With the exception of the possible shrine at Maxey 64, few new architectural styles ^{were} being adopted and ^{there was} little hint that the incorporation of the area into Roman control changed existing trajectories in the way settlements were being re-structured. It should, however, be noted that the absence of modern excavation on the known villas in the area may mean that the current record is biased away from settlements that developed highly Romanised forms, thus over-emphasising more conservative elements of settlement locally. Certainly this is implied by the limited evidence from Helpston 51.

To the south the evidence from areas 2 and 3 and neighbouring excavations produce a very different picture in which roundhouses were frequently replaced by a range of small rectangular stone foundation 'cottage'-type buildings during the late first and early second centuries AD. The fragmentary building at Wollaston 107 (D in fig. 6.27), and examples from Earls Barton 32 (fig. 6.45), Wootton Hill 112 (fig. 6.58A), Piddington 74 (fig. 6.60B), Quinton 75 (fig. 6.62B), Redlands Farm 77 and Brixworth 19, and further south at Cosgrove 25, Mileoak 67, Stanton Low 83 and Bancroft 6 give some idea of the extent of this change. Alongside the new traditions, roundhouse architecture continued in an altered form through the adoption of stone for foundations, with second century examples from Earls Barton 32, Bozeat 13, Bancroft 6 and Stanwick 85 being the earliest locally. The stone-built roundhouse tradition remained relatively rare until the third century when they were constructed in great numbers, with 17 at Stanwick as well as examples from Overstone 72, Thorplands 89, Stantonbury 82,

Bancroft 6 to name a few. Occasionally, they were constructed in isolation as at Brigstock 17 where they seem to have been used as rural shrines. In this function they have been found as rare examples at large settlements outside the main Nene valley concentration (eg. Colleyweston 23 & Castor 21).

To the north of the region the lack of identifiable buildings dated to the first half of the second century presents a problem that may be caused by the excavation bias noted above. Roundhouses were largely abandoned by the middle of the second century at a time when a new building type was adopted at many settlements. Aisled buildings, as Hadman (1978) recognised, had a patchy but widespread distribution in lowland Britain but were a major form in the lower Nene and Welland valleys and through Lincolnshire but which (contra Hadman), were not adopted in the middle and upper Nene valley or indeed, most of Northamptonshire. The earliest example is probably a simple and somewhat ephemeral building from Normangate Field, Castor (21) that was constructed prior to the middle of the second century and may have represented an early expression of the form locally. If so its simple and ephemeral structure is such that other examples may not have been identified in some excavations and partly explain the lack of buildings at some of the second century locales in the area. Whatever the precise situation it is clear that during the second and third centuries aisled buildings, initially entirely in timber, then in timber and stone, were used as a common multipurpose structure that would have been widely seen in the lower Nene and Welland valleys.

During the course of the third century the architectural dichotomy noted above continued. In the lower Nene and Welland aisled buildings became the common form that the examples from Castor 21, Orton Longueville 70, Lynch Farm 61, Barnack 9 and Great Oakley 41 indicate reached a floruit in the third century. Sometimes initially found as single examples (eg. Wakerley 98) during the later third and fourth centuries, they increasingly existed only as parts of larger settlements in association with probable villa buildings (eg. Barnack 9) or as part of agglomerated settlements such as Lynch Farm 61, Orton Longueville 70 and Castor 21 (a new example is currently under excavation at West Deeping, Hunn pers. comm.). If the small complexes of compounds in use at Maxey 64 (fig. 6.10) and Wakerley 98 were not settlements by the later third and fourth centuries, then it is apparent that identifiable small settlements became rarer as the landscape became dominated by larger foci that took a variety of forms. On

the one hand were the very large villas known from antiquarian excavation, air photography and geophysics that loosely clustered around the small town of Water Newton/Castor (eg. Ailsworth 1, Apethorpe 3, Castor 22, Cotterstock 26 and Helpston 51). On the other, were agglomerated settlements that gradually developed into an integrated plan (eg. Orton Longueville 70) or as groups of separate compounds (eg. Lynch Farm 62).

In the middle and upper Nene there was no such clear cut division as many small settlements continued and were elaborated (eg. Earls Barton 32 fig. 6.46, Brixworth 19 & Piddington 74 fig. 6.61D) into the third century. From the mid-late third century some started to fail and were probably abandoned as settlements, though sometimes re-used for agricultural or industrial purposes (eg. Earls Barton 32, Wollaston 107 and possibly Towcester 95). The failures may have been a small proportion of the total, but there is no evidence for the establishment of new settlements to parallel that found in the first and second centuries (cf. section 6.5.3).

During the fourth century the excavated evidence suggests a continued process of attrition and possible hierarchisation as individual settlements went into decline or were abandoned (eg. Piddington 74 fig. 6.62C, Cosgrove 25, Thorplands 89, Redlands Farm 77), whilst remaining settlements often continued to expand or be further enhanced (eg. Bancroft 6 & 7, Stanwick 85, Brixworth 19, Great Weldon 42). As the fourth century progressed the surviving substantial villas increasingly followed a particular architectural trend. Their diverse structures were often provided with linking walls or wings that both unified the villa's visible form and separated the centre of the settlement from the outside world (eg. Cosgrove 25, Great Weldon 42, Stanwick 85 & Piddington 74 before its decline). They were sometimes provided with outer walls or ditches that enclosed the whole villa compound (eg. Bancroft 6, Cosgrove 25 & possibly Wollaston 106 fig. 6.29D).

Unfortunately, as the vast majority of excavations of Roman settlements in the middle and upper Nene have focussed solely on the buildings, it is difficult to assess how they related to their wider context. In the case studies only Wollaston 107 (fig. 6.27) shows the complex of small enclosures and compounds that characterised settlements and other locales until their abandonment in the late third and fourth centuries. Other examples are few, but Stanwick 85, Bancroft 6 and Redlands Farm 77 provide some additional information that indicates that

structures lay within complexes of plots defined by shallow ditches, gullies and fences and, by the fourth century, walls. During the third and fourth centuries ⁱⁿ areas away from settlements or agricultural/industrial compounds like Maxey 64, Wakerley 98 and Wollaston 107, boundaries were rarely redefined other than along roads or trackways which were still maintained (eg. Tallington 88 fig. 6.14B).

The sections above sketched some apparent differences in the architecture adopted by communities in differing parts of the region which are further discussed in section 8.3. Here however, it is important to note that the different trajectories taken in separate areas were probably a result of varying socio-political, cultural, economic and demographic conditions within a complex body of regional societies. To treat these changes as a necessary consequence and integral part of Romanisation at a provincial scale may miss much significant variation in the nature of Romano-British society.

6.5.2 Locales and Landscape Architecture

The Earlier First Millennium BC (c. 8th-4th century BC)

In so much as the meagre evidence available allows inferences to be made, there are two main aspects that characterised the wider nature of the landscapes of the earlier first millennium BC. Some of the settlements discussed above were not themselves bounded but were located close to important double ditched pathways/boundaries that traversed landscapes in the process of being demarcated by pit alignments (eg. Weekley Hall Wood 102, Gretton 46 & possibly Tallington 88, fig. 6.13A). The purpose of the ditches is not particularly well understood but the disparity in dating between the ditches at Gretton 46 (see section 5.3) suggests that not all were originally constructed as pathways. They seem to have been constructed to guide or bound movement from the settlements to other non-settlement locales at significant boundary places along the pit alignments (eg. Tallington 88 fig. 6.13A & possibly Gretton 46). The alignments, laid out to incorporate blocks of the wider landscape, were constructed around earlier ceremonial/burial monuments where present or around marker pits where not. A wider discussion of these structures is inappropriate here but a few comments are necessary. Pit alignments' boundary function is oft stated but little studied, despite their unusual

intermittent form. In focussing on their detailed structure it is possible previous studies have missed the point in that they were constructed in relation to the other places of the landscape and may have been intended to be perceived in relation to them. In the Maxey study contemporaneous locales were focused around earlier ceremonial monuments (figs. 6.3 & 6.5). From these places the Maxey 66 alignment, whatever its structure, would have appeared as a single linear boundary. This is a consequence of the change in appearance of an object as the distance from it increases. Using Higuchi's (1983) analyses as a guide, the individual pits of an alignment would only be visible at a distance of 200 metres or less. Thus the boundary appeared permeable or impermeable according to how close an observer stood. In this respect it is interesting that when settlements and boundaries lay close to one other the latter were constructed as continuous ditches. In the majority of cases the demonstrably early (group 1) settlements were at distances where the alignments would have appeared impermeable, only changing when approached. The variable permeability of pit alignments may have been a deliberate and sophisticated way of negotiating the demarcation of key areas of land in landscapes that had previously been largely open. They did not physically prevent movement across them but appeared as dividing lines when viewed from contemporaneous settlements. The marker pits or earlier monuments located along the boundaries possibly acted as key places of contact between groups that are discussed further in section 8.3. The double ditched droveways would have demarcated 'acceptable' routes of access between the boundaries and settlements. What little evidence we have for palisaded settlements and hillforts suggests that they lay at the periphery of the new bounded landscapes in locations overlooking them (cf. section 6.5.3)

The appearance of group 5 pottery was accompanied by settlements that were established both within the pit alignment landscapes and in new areas nearby them. In the pit alignment landscapes new settlements such as Wollaston 106 and 107 were closely associated with boundaries. These settlements were accompanied by structural changes in the wider landscape as sections of the pit alignments were redefined by ditches (eg. Wollaston 107 fig. 6.24 & Grendon 44 fig. 6.33). Many other new settlements were also closely associated with, and bounded by, palisades, fences or shallow ditches (eg. Great Doddington 39 fig. 6.51) in areas that stood in, or at the fringes of, pit alignment landscapes (eg. Maxey fig. 6.6 & Earls

Barton 32 fig. 6.42). The precise nature of the Maxey and Earls Barton settlements is not clear from the excavations but they were clearly associated with the early localised development of continuous linear boundaries.

Alongside the emphasis on boundary association and construction, new small ditched enclosures were built. Some, such as at Briar Hill 14 and Maxey 64 (figs 6.6 & 6.54), were constructed within earlier ceremonial monuments and probably defined places for rituals associated with ancestry or death. Such an interpretation does not exclude the possibility of their use for crop storage or stock control as both ritual and agricultural activity may have been inextricably linked, with structures used in the agricultural cycle located in these 'old' places for cosmological reasons.

The Later First Millennium BC (c. 4th-1st century BC)

Initially this period was characterised by the continued closing down of access across the landscape as new and frequently monumentalised boundaries (eg. Maxey fig. 6.7, Barnack 9 fig. 6.19A, Wollaston 107 & 106 figs. 6.25 & 6.29B) were constructed. An increased emphasis on the systematic boundary definition of the landscape was mirrored by the development of monumentalised boundaries in and around focal places noted in section 6.5.1. In areas that were already delineated by pit alignments (eg. Wollaston 107 & Grendon 44) the ditches re-emphasised and closed pre-existing boundaries. Areas neighbouring the pit alignment and ditched landscapes were annexed by the construction of new boundaries and their associated enclosed locales (eg. Barnack 9 fig. 6.19A & Maxey fig. 6.7). Though fragmentary, the evidence suggests the new bounded spaces and construction of locales around the fringes of formerly unoccupied parts of the landscape (at Wollaston 109 & Grendon 43 for example, figs. 6.36 & 6.39) led to an infilling of the landscapes of the river valleys (cf. section 8.3).

The cultural landscapes thus constructed emphasised the definition and maintenance of all kinds of boundaries as a 'basic means of dividing up the world and shaping the social group within' (Hill 1995a, 83) and I might add, defining those 'without'. Where sufficiently large areas have been investigated (eg. Maxey fig. 6.7 & Wollaston fig. 6.25), it is clear that the linear boundaries incorporated most of the contemporaneous focal places along their lengths or at

junctions between them. The boundary orientated landscapes enclosed large undifferentiated spaces that together I have loosely termed 'domains'. Given the fragmentary evidence from the region it is difficult to say more, but these may have formed the basic social/tenurial units in intensively utilised and settled parts of the landscape where competition for space became a priority as unoccupied sections of the landscape became scarce (cf. section 8.3).

The increased boundary definition of many places, not just settlements, was significant in openly expressing a sense of control or differential access to them. Locales that were the focal places for agricultural practices, ritual, or production and exchange were thus formalised. Points of access across the boundaries seem to have been rare and where present were clearly demarcated and monumentalised. Only towards the end of this period (2nd-1st centuries BC) were new points or ways of movement across the wider landscape provided and even then they were initially demarcated and controlled (eg. Wollaston **107** fig. 6.25).

During the later phases of group 2 ceramics and with the adoption of group 3 and 4 pottery in the late iron age, access across the landscape was opened up through the construction of ditched droveways (eg. Tallington **88** fig. 6.14B, Wollaston **107** fig. 6.26, Ecton **33** fig. 6.49, Weekley **101** & Pennyland **73**). The droveways, almost always constructed by offsetting one side of an existing boundary and adding a second ditch probably had two benefits. First, by following the boundaries droveways formalised the links between most of the existing places of the boundary orientated landscapes. This further restricted the direction of approach to places that had already begun with their enclosure. Such an explanation only partly accounts for the mode of their construction, however, as once established droveways allowed transit across the wider landscape along routes no longer interrupted by barriers. This change (continued and formalised in the Roman period) may initially have been achieved by restructuring an existing understanding of the domain boundaries. Boundaries act as a two dimensional liminal plane defining the point at which one space ends and another begins. Their transitional qualities (lying between separately defined and recognised spaces) may have incorporated an understanding of a neutral place that was neither in one space or the other. These qualities could then have been adapted and expanded through the creation of a three dimensional space, namely the droveway between the ditches that was neither part of one space or the other but separate, and accessible from both sides. The piecemeal nature of the

construction of the driveway at Wollaston **107** for example (fig. 6.25), suggests that initially, they were adapted by neighbouring communities. The circumstances and rationale for such a change are better discussed in the wider context of chapter 8.

Alongside the latter stages of the restructuring of access (1st centuries BC & AD), there were also signs of the breakdown of monumentalised boundaries both around activity foci and across the wider landscape (eg. Maxey fig. 6.8, Tallington **88** fig. 6.14B, Wollaston **107** & **106** figs. 6.26 & 6.29, & Earls Barton **32** fig. 6.44). This was paralleled by an increasing emphasis on the architecture of settlements and their division into a multiplicity of spaces. On a wider scale, previously undifferentiated spaces at the heart of the domains were also fragmented into smaller plots (eg. Maxey figs. 6.8 & 6.9, Wollaston **107** figs. 6.26 & 6.27) creating a landscape of 'fields'.

During the later first century AD and into the second many of the noted trends continued but the conquest and incorporation of the area into the Roman province added some significant new changes. In a number of areas boundaries were remodelled to extend or unify the appearance of driveways (eg. Maxey **66** fig. 6.4C, Wollaston **107** fig. 6.27, Fengate **35** and Stanwick **85**). The smaller plots created in the fragmentation of larger domains during the later iron age also continued, but significantly extended as efforts were made to control the drainage of the floodplains along the Nene. At Wollaston **110** and **107** (fig. 6.27) and Irchester (Meadows pers. comm.) an extensive series of drainage channels were dug alongside permanent or seasonal watercourses as field systems were constructed over parts of the floodplains (eg. Wollaston **107** fig. 6.27, Earls Barton **32** fig. 6.44, Lynch Farm **61** & Barnack **8**). These developments were accompanied by watermills (Redlands Farm **77** & Towcester **95**) or other riverside installations such as the wharves at Stanton Low **83** and the bridge at Aldwinckle **2**. Additionally, the evidence from Grendon **43** (fig. 6.40) suggests that old monumental landscapes, that had been respected in the iron age were now disregarded as fields extended over them. This seems to indicate a marked intensification in the use of floodplains during the early Roman period. On the other hand, it may only relate to a change in the way they were utilised for a new and wider range of agricultural production. The drainage channels and field ditches may have represented the desire to demarcate or appropriate spaces previously used or held in common. Unfortunately, the absence of published environmental

data from the floodplains for the late iron age and Roman periods restricts the level of interpretation currently possible.

Perhaps the clearest new features of the Roman landscapes in the region however were roads. Unlike the droveways these did not follow the pre-existing structure of the landscape. Excavated examples from Ashton **5**, Towcester **94** and Weekley **101** show these straight, well constructed roads, cut across existing boundaries often leaving fragmented parts of older plots to either side of their course. Such a spectacular display of authority over conquered land, and the settlement and landscape changes that accompanies their construction, was probably one of the clearest signs of change by the middle of the second century AD. The significance of this development is also discussed in section 8.3 in considering their role in defining the Roman regional geography of the case study.

By the later second and third centuries AD what might be called mature Roman landscapes were developing. The droveways and roads constructed during the late iron age and earlier Roman period were maintained, linking settlements to each other and to the wider network of roads. During the later third and fourth centuries there appears to have been less emphasis on the maintenance and definition of trackway ditches and field boundaries away from the immediate vicinity of settlements (eg. Maxey fig. 6.10, Tallington **88**, Wollaston **107** fig. 6.28, Barnack **8** & possibly Barnack **9** fig. 6.20). This could imply a decline in the landscape, particularly when considered with the absence of new fields and enclosures, but may rather have been a product of stability of tenorial boundaries. Fields, pathways and enclosures were now marked by mature hedges for example, as the boundary ditches gradually infilled. By the third century this was accompanied by the abandonment of the more striking examples of agricultural innovation on the floodplains. At Grendon **44** and Wollaston **107** the horticultural plots were replaced by simpler systems of shallow ditches that drained lower lying areas, and the mills at Redlands Farm **77** and Towcester **95** were no longer working. The focus of architectural effort was on settlements and shrines which may have become increasingly inward-looking by the later fourth century as a number were enclosed (cf. section 6.5.1).

6.5.3 The Location of Places

Biases in the excavated record necessarily make inferences about the changing location of settlements and other activity foci here, qualitative rather than quantitative. In order to expand the discussion the limited evidence available for the earlier first millennium BC from the gazetteer was compared with Knight's (1984) analysis ^{of} settlement distribution patterns. Knight suggested that most early iron age occupation (broadly equivalent to groups 1 & 5 here) sites are best interpreted as individual farmsteads, with common but limited evidence for textile, iron and bronze working. This, he interpreted as evidence for a dispersed system in which local subsistence farmers were supplied by peripatetic craftsmen. Clustering in the regional distribution of sites was largely caused by biases in the archaeological record. Knight's characterisation of the situation is useful but he is perhaps guilty of oversimplifying the situation and failed to consider the possible roles of hillforts and larger palisaded settlements.

The scarcity of group 1 sites noted by Knight may be significant as part of landscapes characterised by isolated settlements, but their ephemeral nature makes them difficult to identify and their excavated distribution is restricted to areas of extensive topsoil stripping in quarries. This bias has tended to restrict the known distribution of settlements to the lighter soils of the gravel terraces and their flanking limestone hills. The few fieldwalking find spots, however, have not altered this picture significantly (cf. Knight 1984 map 11, 152).

Knight's single category of simple farmsteads around which all major activities were centred oversimplified the case, as recently published work from the county suggests landscapes with three and possibly four significant forms of focal places associated with a developing system of semi-permeable and continuous boundaries (cf. sections 6.5.1 & 6.5.2). Small settlements of the type envisaged by Knight were undoubtedly a significant form, as the examples from Tallington **88**, Gretton **45**, Weekley Hall Wood **102** and Fengate **35** suggest. These have nearly always been found in the ditch and pit alignment landscapes located along the valleys and their flanking hillslopes. In addition to these open settlements, there were larger palisaded settlements of the kind discovered at Wollaston **108** associated with group 1 pottery and at Ecton **33** with group 5 types (figs. 6.30A & 6.48), and possibly seen in the earliest phases of some of the hillforts. The evidence is poor, but all the known examples were located on ridge tops or spurs with extensive views to (and from) the valleys below. It is difficult to judge

their location in relation to the pit alignments given the lack of investigation away from the gravels, but none were demonstrably within the bounded landscapes but rather lay at their periphery. The hillforts at Borough Hill 12, Rainsborough 76, Hunsbury 53 and Irthlingborough 56 can all be dated to the seventh-fifth centuries BC in their earliest forms. The functions are poorly understood, but a preliminary examination of their locations suggests the significance to the wider geography of the region and is discussed briefly in section 8.3.

The excavations at Maxey 65 (fig. 6.5) and Great Oakley 40 indicate that further locales may have been constructed around places away from settlements where pits were dug. In the absence of more detailed analysis of their contents and construction it is difficult to suggest reasons for their creation, but they may have related to the re-marking or regeneration of important places of reference sometimes located at the sites of older monuments.

Many locales with group 5 pottery were simple settlements alongside pit alignments or on the hills surrounding the valleys and sometimes bounded by palisades or shallow ditches (eg. Maxey 64, Earls Barton 32, Great Doddington 39). Pennyland 73 and Ecton 33 stand out as larger settlements that included small, ditched enclosures as well as palisades. The possibility of overlap between the dating of group 1 and group 5 ceramics makes it difficult to discern any chronological trend in this, but the latter do by and large appear more substantial settlement foci.

Later First Millennium BC (4th-1st centuries BC)

Locales with group 2 and 3 pottery show a number of significant changes taking place. First, is the striking increase in the number of known locales, though there are a number of possible explanations for this. Their monumental structure makes many of them highly visible archaeologically and thus more likely to have been recorded. The discussion in section 6.5.1 also noted that the number of locales partly related to the dispersal of activity foci across the landscape clearly seen in the stone walled or revetted enclosures at Blackthorn 11, Wollaston 109 and Irchester 54. Many were located at various points of change in the topography or nature of the land or at pre-existing places marked by earlier monuments. Wollaston 109 lay on the boundary between the floodplain and terrace gravels of the Nene close to the the river and liable to seasonal waterlogging. Irchester 54 stood on the end of a

limestone spur jutting out into the gravel terraces of the Nene at its confluence with the River Ise. Blackthorn **11** stood on the watershed between two tributaries of the Nene and visible from both slopes. Briar Hill **14** stood inside the neolithic henge and close to an existing enclosure. All were initially free standing and may have been located at important conceptual boundaries or places of transition away from settlement and the bounded landscapes described above.

A closer examination of the excavations listed in the gazetteer (appendix 1), however, possibly provides some support for a significant expansion in the numbers of settlements during the middle iron age. Pre-existing settlements largely continued to be occupied and remained broadly the same size (eg. Wollaston **107**, Great Doddington **39**, Hartigans **50**, Ecton **33**, Pennyland **73** and Bancroft **7**). The hillforts at Hunsbury **53**, Rainsborough **76** and Irthlingborough **56** all continued to be used, though it is impossible to be sure in what form. In addition, however, there were now a number of settlements established both along the river valleys and in the surrounding upland areas such as Aldwincle **2**, Longthorpe **60**, Moulton Park **68**, Orton Longueville **71**, Piddington **74** and Wakerley **98**. All were small and, circumstantially, this might be evidence for the 'budding off' of new settlements during a period of settlement expansion, though a series of alternative interpretations are outlined in section 8.3 below. Towards the end of the iron age this process can still be seen at Maxey Plants Farm **66** and Werrington **103** in the lower Nene and Welland valleys, but by the later first century BC and earlier first AD the pattern began to fundamentally change.

First, a large number of earlier settlements did not continue through the later iron age into the mid-late first century AD. Examples include the two Wollaston **107** settlements and other locales at Grendon **43**, Brigstock **18**, Great Doddington **39**, and Twywell **96**. Elsewhere, settlement shifted or altered form quite dramatically as at Maxey **64**, Wakerley **98**, Bancroft **6** and **7**, and Wootton **111**. The hillforts and many of the other non-settlement enclosures were also abandoned. These changes were accompanied by the foundation of new foci at previously undefined locations such as at Brixworth **19**, Great Weldon **42**, Mileoak **67**, Towcester **94** and **95**, Wootton **112** and probably Grendon **43**. Together they indicate a period of rapid change around the turn of the millennium linked to the developments noted in sections 6.5.1 and 6.5.2 above as the bounded landscapes were reorganised.

During the later first and second centuries AD, many of the settlements established in the later iron age continued, though most underwent architectural change. Those that did not, such as Werrington 103, Aldwincle 2 and Moulton Park 68, were relatively rare. Settlements at new locations (eg. Earls Barton 32, Cosgrove 25, & Towcester 94) may have been merely new locations for existing settlements (eg. Wollaston 107, Wakerley 99), but others were created by Roman occupation of the region (eg. Redlands Farm 77, Ashton 5). These developments were associated with the clear shift in agricultural practice and the expansion of boundaries onto low lying floodplains and older ceremonial landscapes mentioned above (section 6.5.1). Away from the valleys the evidence is poorer but there is little or no hint that a corresponding expansion of boundary demarcation occurred. The lack of boundaries in the upland areas may have ^{been} related to a range of factors, from differences in drainage to variations in landuse and tenurial expression, which are better outlined after a discussion of the additional evidence provided in chapter 7 (cf. section 8.3).

Many settlements were located beside droveways and roads by the first century AD, but during the second and third centuries they increasingly migrated to, developed beside, or were linked to, existing routes across the landscape (eg. Maxey 64, Stanwick 85). Excavation along the Roman roads has been limited, but they seem to have acted as foci for the establishment of settlements that were to become small towns by the later second and third centuries (eg. Ashton 5, Towcester 91, Castor 21). This corresponded with the abandonment of settlements noted in section 6.5.1 that it was suggested was part of a process of nucleation. How such a process came about is discussed further in chapter 8, but here it is important to note that the grave shortage of excavations away from the lighter soils of the river valleys constitutes a major handicap to what can be said about the landscapes of these areas. The few available examples from Quinton 75, Piddington 74, Bozeat 13 and Brixworth 19 indicate settlement continuity in the boulder clay uplands into the mid-fourth century. Unfortunately, the small scale and building-orientated nature of these excavations make it impossible to assess their location in relation to their wider landscape.

Despite the difficulty of using the excavated evidence in the gazetteer to understand the themes above, it has some obvious advantages in providing detailed chronological and structural information that could not be recovered from survey alone. The limited extent of most

of the excavations and obvious biases in their distribution (cf. chapter 5) are difficulties that particularly restrict interpretation of landscape change away from settlements. Some of these issues are better addressed through the use of field survey data from the region and are the basis of the analyses carried out in chapter 7.

CHAPTER 7: REGIONAL ANALYSES

7.1 INTRODUCTION

Chapter 6 outlined some trends in the development of places and landscapes in three small areas of the study region. The concluding sections briefly introduced some additional examples that extended the discussion and raised some instances of different landscape constructions. The three case studies highlighted a number of trends in the changing nature and structure of landscapes in the region between the early iron age and the fourth century AD. Mostly orientated towards excavated data, the studies tended to reflect the biases present with this site-focused and largely rescue-based resource (cf. chapter 5). The relatively limited extent of the studies also called into question their representivity for the structure of the places and landscapes of the uplands to the north and west of the county.

In order to extend the discussion it was necessary to attempt to use data with a wider spatial coverage than that provided by the detailed studies. Analyses similar to those in chapter 6 are not possible for considerable parts of the county without further fieldwork and excavation. Given this situation a less ideal, yet useful source of information, was provided by the extensive database of fieldwalked material collected by David Hall over much of the county since the 1970s. Though far from easy to use (cf section 7.2), it provided an internally consistent source of information recovered from both the more intensively studied areas and much of the claylands and uplands of the north and west of the county. It was hoped that these data might provide information about whether some of the changes in locales noted in the three detailed studies were repeated elsewhere, or whether they showed significant differences. Sections 7.2-7.5 discuss some of the wide range of archaeological, taphonomic and methodological issues raised in chapter 2. Section 7.6 then outlines the analyses and their results, assessing similarity and variation in the form and distribution of artefact locales across the region.

7.2 THE DATABASE

The nature of Hall's survey was noted in chapter 5 but here it is important to discuss his

methodology and its limitations so as to be clear about what was feasible at the outset. Hall adopted the same fieldwork strategy as was used for the Fenland Project. Detailed descriptions of his fieldwork and recording methods have already been published (Hall 1985, 27-28; 1987, 14-17) and are thus not repeated here other than where it has affected the data. The survey was an extensive exercise in mapping the location and general extent of settlements and other foci. The available arable fields of each parish were walked at 30 metre line intervals to identify concentrations of material of all periods up to AD 1400. The wide interval between walkers reduced the coverage of any particular field to between 3.3 and 8.3 percent (cf. chapter 2 table 2.2) and increased the likelihood of failing to identify small or low density scatters of material. Each parish was only visited once and in most cases no more than 10 percent of the total area was walked. Detailed maps of the fields walked are being prepared but were not available at the time of the study. Such a low intensity of coverage combined with the problems of locale identification noted above prevented any serious attempt to understand the detailed local context of the 'sites' along the lines of the work carried out by the Raunds Area Project and, for example, by Williamson (1984) in Essex.

The Northamptonshire survey had a site-orientated philosophy and methodology in which recording of iron age and Roman material was triggered by a poorly defined density threshold sometimes linked to other evidence for occupation in the form of anthropic soils or manufacturing debris. The low intensity of coverage and the desire to recover only 'significant' groups has biased the data towards relatively high density scatters that almost certainly over or under represent activity during particular periods and scales. Essentially, the survey produced an archive that recorded only those activities which led to a total visible surface sherd density in the region of 70-180 sherds per hectare. This figure was calculated on the basis of the following information:

- a) Virtually none of the groups taken for analysis had recorded densities less than 6 sherds per hectare
- b) The groups used for analysis were all walked at 30 metre intervals with a probable ground coverage of between 3.3 and 8.3 percent
- c) At this level of coverage and recovered sherd count the ground density of sherds should have been in the vicinity of $(100/3.3) \times 6$ to $(100/8.3) \times 6$ sherds

per hectare.

Additionally, the survey collected all iron age and Roman material adopting this density principle without differentiating between the collection chronologically. Thus the decision to record a site was based on the density figure shown above without any consideration of the different quantities of pottery in circulation through time, their different properties, and the effects of length of occupation of a particular location on the accumulation of material. The data are not only biased towards scatters above a particular level of density, therefore, but towards the following archaeological trends:

- a) Locations where occupation was stable over a number of periods allowing artefacts to accumulate within a limited area. Thus periods or areas where settlement shifted may be under-represented in the record.
- b) Periods when ceramic usage, or rather deposition, was at its highest and/or when activity focused on concentrated disposal within relatively delimited areas rather than, for example, scattered through manuring. Under this scenario the iron age and Saxon periods are likely to be under represented as the lower quantities of pottery present usually produce low density scatters.
- c) Locales or periods when pottery was manufactured in robust fabrics that survived subsequent disturbance and exposure.

By current standards, therefore, the survey has a number of weaknesses, but it still constituted an extremely valuable and unique database that was internally consistent and that extended over both well and poorly studied parts of the region (fig. 7.1).

The problems above produced a database that resembles a series of unstratified excavated groups. The limits of each locale were arbitrarily decided on the basis of the extent of the ceramic concentration as a whole and so the relative size of a locale at any one period cannot be determined. Intra-site analyses through time and inter-site comparisons are only possible on the grounds of the assumption that the recovered groups represent a sample of the material deposited at a particular place *irrespective of the size of that place*. This requires something of a conceptual leap of faith where what was deposited at a locale (however spatially defined) was as significant as the area over which it was deposited. This works on the same basis as much excavated data when used for inter-site comparisons where, say, the quantity and range of

material deposited ^{are} compared irrespective of the excavated area. Though this can be criticised on a number of grounds, it is not an uncommon approach and one that has yielded interesting results in the past (eg. Hodder 1974a & 1974b; Haselgrove 1987; Booth 1991; Griffiths 1989). In section 7.5 the implications of such an approach are discussed in the context of the analyses that were carried out.

The database comprised 232 groups of artefacts recovered from across the region. Each was analysed using the fabric series described in appendix 2 and then grouped into 33 wares on the basis of fabric, form, provenance and chronology. These were then quantified by weight and count and the information recorded alongside details including total area and other materials (cf. appendix 4). A *chronological framework for the 33 ware groups was drawn from the published reports included in many of the excavated sites listed in the gazetteer in appendix 1, in Northamptonshire Archaeology's own fabric archive and that used by Pauline Marney for Milton Keynes and south western Northamptonshire (Marney 1989).* The results are summarised in figure 7.2 as a cascade diagram with the wares ordered chronologically. Solid and dashed bars convey a qualitative difference in the incidence of each ware with the former indicating periods with which the ware can be securely associated in the county. The diagram shows the degree of chronological overlap between some groups which should be borne in mind when considering the period phasing that was adopted for the purposes of this survey.

Table 7.1: Chronological Phasing of the Survey Pottery

Period	Dating	Fabric Groups
Iron Age (IA)	c4th-1st C BC	32.
Early (E)	c1st C BC - mid 1st C AD	5, 12, 23, 31.
Early/Middle (E/M)	Later 1st-3rd quarter 2nd C AD	8, 9, 20, 24, 27.
Middle (M)	c. AD 130-260	1, 3, 7, 16, 19, 22, 25, 26
Mid/Late (M/L)	Last quarter 2nd-mid 4th C+	2, 4, 6, 17, 18, 21, 29.
Late (L)	3rd quarter 3rd-mid 4th C+	10, 11, 13, 14, 15.
Anglo-Saxon (SAX)	5th-8th C AD	30.

In order to study changes through time, the wares were divided into chronological

periods on the grounds of the degree of overlap between them. Boundaries between periods were drawn where ceramic overlaps were least apparent. This created a sevenfold division of the material into the groups listed in table 7.1. Wares 28 and 33 were used as catch-all groups for fabrics that could not be assigned to any phase but could be assigned as generally Early-Late. Reasons for the dating of particular wares can be found in appendix 2. The greatest overlap between periods was between the Mid/Late and Late groups which both continue throughout most, if not all, the fourth century AD and present problems that are discussed further in section 7.6.

7.3 ASPECTS OF POSSIBLE POST-DEPOSITIONAL BIASES.

In chapter 2 factors affecting the composition and survival of ploughsoil ceramic groups were discussed at a conceptual level. Many of the suggestions made there would require new fieldwork or controlled experiments to be studied and thus lay outside the scope of the case study. It was hoped, however, that some of the lessons learnt could be applied to the survey data to assess whether biasing factors noted in chapter 2 were present in the groups under study. Two aspects of the survey groups could be used to provide crude data about post-depositional or recovery biases. The first (section 7.3.1) focused on the findings of the attritional analyses described in section 2.3.1 in linking sherd size and frequency distributions to the degree of reworking of an assemblage. The second (section 7.3.2) looked at how fieldwalked assemblages related to excavated evidence and how this may be linked to biases in deposition, attrition or recovery.

7.3.1 Fragmentation Studies

Section 2.3.1 described some of the changing characteristics of ceramic groups as they were broken down and how we might expect to see this in ploughsoil assemblages. Most of the discussion centred on the use of sherd size distributions and the differential rates of breakdown apparent between various pottery fabrics. Ideally this could be evaluated by controlled experimental work but this lay outside the scope of the case study.

For the case study the ceramic groups were analysed by counts and weights, the two

most commonly adopted measures for fieldwalked assemblages. Sherd dimensions were not measured as it is a time consuming process that would be difficult to justify using in most practical situations. As a possible alternative, however, it seemed likely that sherd weights might, if used judiciously, provide a proxy measure of sherd sizes for particular ceramics. To assess this, three very different but common fabrics found in the region were chosen to see if sherd weight might correlate with size and thus be used as a crude guide to fragmentation. The three fabrics chosen were: 4.2, a very common quartz tempered greyware found throughout the middle and upper Nene valley in a range of medium sized bowl and jar forms; 9, a grog tempered coarseware commonly used for jars in the first century AD in much of central Northamptonshire; and 3.1, a fossilised shell tempered fabric used for storage jars. As well as being common types, the three fabrics shared an important trait in being produced in a limited range of forms and sizes so that differential vessel thickness and fabric density, the most likely sources of variation between sherd size and weight, could be thought to be less of a problem. In this way the fabrics could be considered the most likely to show a good correlation between size and sherd weight. If correlation was poor other fabrics were unlikely to be any better.

In each case 100 sherds were chosen at random from a total of 20 different scatters from the survey. The two longest axes of each sherd were measured (similar to the practice adopted by both Nielsen 1991 & Kirkby & Kirkby 1976) and a single average dimension calculated, and then weighed to the nearest gramme. Each group was then plotted as a scatter diagram and regression analyses carried out to look at the line of best fit and level of correlation between the two measures. Figures 7.3 to 7.5 show the regression analyses for each fabric. For fabrics 4.2 and 3.1 the goodness of fit statistic is very high at 0.954 and 0.971 respectively, indicating the likelihood of a very good correlation between sherd size and weight. For fabric 9 the statistic was still good at 0.919 but some variation (apparent from the provenance of sherds on the scatter diagram) may be caused by rim and base sherds where vessel thickness can vary significantly. The relationship is non-linear because sherd weights are actually dependent upon the volume of ceramic present and the tendency for thicker vessels to survive in larger fragments. Though more descriptive than analytical, these measures were adopted as relative guides to linking sherd size to weight for the three fabrics in order to study the degree of fragmentation found in the case study groups.

The significance of the fragmentation studies lay in the possible effects of variable attrition on the fabric composition of assemblages and in how different quantification methods would be affected. In theory (cf. chapter 2), attrition could reduce sherds of one fabric to a size below that normally recovered at a faster rate than those of another. This would bias recovered assemblages in favour of more resistant fabrics. Variable attrition would initially produce greater numbers of sherds of the weaker fabric and bias their proportion of the assemblage upwards until their small size reached a point at which they were no longer recovered. Weight, on the other hand, should not be as affected as it is not significantly reduced until the sherds become too small to recover. In practice this is not the case as abrasion reduces sherd weights.

To assess the significance of these factors, all the assemblages containing both fabrics 3.1 and 4.2 were chosen in order to record their average sherd weights. Though crude, the average sherd weight was taken as a proxy indicator of the level of fragmentation of each of the 132 assemblages selected. These were then ordered according to the average sherd weight of all the pottery in each scatter. Due to the small size of most scatters the significance of a single sherd was often too great and so they were further grouped into categories of 22 assemblages according to their total average sherd weights. Weighted means were produced for each category for all sherds, and for fabrics 4.2 and 3.1. If fabrics 4.2 and 3.1 broke down at broadly similar rates, their average sherd size trajectories (though not absolute values) should be similar.

Figure 7.6 shows the trajectories for six groups of 22 scatters. Group 1 should represent the 22 least fragmented assemblages, group 6 the most. Though not easy to interpret it appears that the categories may show three distinct aspects of sherd breakdown. The first factor is marked by the change from group 1 to 2 and indicates the considerable diminution in all sherd weights (and thus sizes) that is common when relatively 'fresh' assemblages with large sherds are rapidly broken down by impacts. All three parts of the assemblages are affected similarly, though there is some suggestion that some fabrics (hidden in the total figure) are considerably more resistant than either 4.2 or 3.1. Groups 2 to 4 appear to mark a second step where groups lie in the 10-15 gramme range. Using the regression curves as a rough guide, this would equal 30-40 millimetres for fabrics 3.1 (13-15 grammes) and 4.2 (10-12 grammes) and probably marks the level at which sherd impact resistance is high enough to significantly reduce the rate of attrition. To check this, a small sample of 10 group 4 assemblages

was chosen to record their size frequency distributions. All were made up of sherds that clustered closely around the mean values and appeared to approximate to a Poisson distribution. Finally there was a marked difference between fabrics 3.1 and 4.2 in groups 5 and 6. The relative stability of fabric 4.2 in groups 2 to 6 suggests that a lower limit for impact destruction is reached and that the gradual decline seen is due to the limited effect of abrasion. Though groups 2 to 4 would suggest a similar fate for fabric 3.1, the rate of decline continues such that in the most fragmented groups its average sherd weight is around 5-7 grammes (approximately 20-25 millimetres in size). This implies that, for fabric 3.1, sherd reduction continues to a level around the limit at which sherds were recorded. This may be due to continued breakage but equally might reflect the susceptibility of fabric 3.1 to abrasion (which becomes more significant as surface area to volume ratios rise). Figures 7.7 and 7.8 illustrate the relative proportions of each fabric recorded by weight and count. Figure 7.7 indicates that in groups 5 and 6 sherd counts for fabric 3.1 hold up well but that weights drop significantly. Two explanations come to mind. First, as sherd sizes were reduced and impact resistance rose, abrasion became a significant factor in the loss of recoverable sherd weight. Second, that as fabric 3.1 sherd weights (and sizes) were reduced to a level close to recorded limits, new breakages produced sherds that were too small to record. Sherd numbers could remain proportionally high if other fabrics were no longer being broken, but fabric 3.1 weights would continue to decline. Fabric 4.2, with consistent (though slightly different) proportions by method of measurement and only very gradual reduction in sherd weights after group 1 (fig. 7.8), supports this possibility, its stability due to high impact resistance and a lack of susceptibility to abrasion.

Whatever the precise processes, it is clear that beyond an, as yet, poorly understood point, the composition of assemblages might be effected by the continued attrition of some fabrics. Both sherd numbers and weights provide consistent measures for both fabrics for most groups. In the most heavily fragmented assemblages (groups 5 & 6) however, some fabrics may be disproportionately effected if measured by weight. The studies above have only scratched the surface of the issues outlined in section 2.3.1 but, I hope, highlight some of the possible effects of attrition on assemblages composition and quantification.

7.3.2 Survey and Excavated Assemblages Compared

One way of checking for possible biases in the database was to compare them with quantified assemblages from excavation. Though there are obvious problems of comparability between the two (cf. chapter 2), it seemed likely that the excavated groups would provide some qualitative pointers to possible biases in the survey record. It is not often possible to identify a specific cause of variation, but some possibilities, relating to errors in the ascription of fabrics or biases in the survival of ceramics, can be suggested. As with the majority of studies here, sherds of the Iron Age and Saxon periods are not considered in the discussions below as they were too infrequently recovered.

For the Early period (equivalent to group 4 in chapter 6), six excavated groups provided accessible quantified assemblages. In order to minimise the possibility of comparing fundamentally different fabrics, the survey and excavated groups were simplified into three fabric categories: predominantly grog tempered wares; predominantly shell or calcareous fabrics; and others (usually quartz or ironstone tempered). Table 7.2 illustrates the great variation found between excavated assemblages even when relatively close to each other (as with Maxey & Fengate) and the notable difference between them and the survey mean. The excavated groups (with the exception of Walton 100) were dominated by shell/calcareous fabrics. The survey data, by contrast, suggest that grog tempered fabrics predominated in the Early period. This may partly be due to the susceptibility of shell tempered fabrics to attrition noted above and by Crowther (in Pryor *et al.* 1985), but can also be explained by the difficulty experienced in assigning many shell tempered sherds to a particular period. Most of the pottery recorded under fabric group 28 is shell or calcareous tempered and usually badly abraded. Irrespective of the precise reasons, it is apparent that the survey patterns analysed in sections 7.4.2 and 7.6 are biased towards grog tempered fabrics. In areas where these are rare, such as the lower Welland Valley, the survey data thus under-represents late iron age to conquest period assemblages (cf. section 7.4.2).

During the Roman period the excavated assemblages are summarised by phase in table 7.3. The Early/Middle and Middle periods are well represented thanks to the work of Karen Griffiths (1989) but later assemblages are dominated by the work of Pauline Marney around Towcester. Unfortunately the unrepresentative urban context of the Towcester material and its

obvious spatial limitations mean that it is difficult to be sure whether differences between Middle/Late and Late assemblages from excavation and survey are a result of general changes or local factors.

Table 7.2 Fabric Proportions (%) for Six Early Period Excavated Assemblages and for the Case Study Survey Mean.

Site Name	Gazetteer No.	Grog	Shell/Calcareous	Other
Walton MK36	100	95.1	1.8	3.1
Wootton Hill	111	15.5	81	3.5
Weekley	101	47.6	52.3	0.1
Fengate	35	18.3	60	21.7
Wakerley	98	9.8	84.4	5.8
Maxey	64	0	96	4
Survey mean	N/A	71.8	26.8	1.4

Despite this it is worth commenting on a number of differences between the excavated and survey assemblages and the chronology ascribed to some of the survey fabric groups. For the Early/Middle period the survey data correspond reasonably well with equivalent excavated groups. Of the featured groups the most problematic is Black Burnished Ware 1, which in excavated examples appears sporadically throughout the Roman period but in the survey was recorded as being predominantly a Late fabric. The survey database, as has been noted above, was partly constructed from Northamptonshire Archaeology's own fabric series. This has been developed from the many excavations recorded only in archive and noted that BB1 was predominantly a later third and fourth century phenomenon in Northamptonshire. The assemblages recorded here appear to contradict this view and call into question the Late ascription given to BB1 in the survey. This will have led to some bias in the survey database for the Late period, but the general scarcity of this fabric in Northamptonshire means that its absence from other phases is likely to have had little effect.

Table 7.3 Fabric Proportions for Roman Period Excavations from Northamptonshire. Site numbers refer to the gazetteer in appendix 1.

Site Name	Period	Grey wares	Colour Coats	Shell	Grog	BB1	Others
Mileoak 67	E/M	33.7	0	10.5	29.1	3.5	23.2
Quinton 75	E/M	21.3	0	17	29.6	4.3	27.8
Towcester 93 (P1)	E/M	48.7	0	1.9	14.3	1	34.1
Towcester 91 (P1)	E/M	8	1	9	8.5	12	61.5
Towcester 94 (P4)	E/M	47.5	0	3.9	2.7	1	44.9
Survey mean	E/M	45.4	0	11.2	16.2	0	27.2
Great Weldon 42	M	15.6	8.1	12.2	10.5	22.7	30.9
Piddington 74	M	25	1.6	21.9	4.3	6.9	40.3
Brixworth 19	M	43	0.5	2.1	24.3	5.2	24.9
Towcester 95	M	41.6	1.1	1.8	23	1.7	30.8
Earls Barton 32	M	24.5	0.6	31.1	36	0	7.8
Ringstead 78	M	9.5	3.1	17.3	17.3	8.4	44.4
Thorplands 89	M	56.8	0.3	18.1	12.4	2.1	10.3
Overstone 72	M	59.8	0	0.9	15.5	1	22.8
Towcester 93 (P2)	M	34.1	0	2.7	21	3.2	53.7
Towcester 93 (P3)	M	34.6	0.2	5.5	17.7	3.3	48.3
Towcester 91 (P2)	M-M/L	17.8	12.8	8	15.5	11	34.9
Towcester 94 (P5)	M	34.7	3.4	1	2.2	2.6	56.1
Fengate 35 (P6)	M	39.8	2.4	42.1	0	0	15.7
Survey mean	M	79	0	0.3	6.1	0	14.6
Towcester 93 (P4)	M/L	38	8.4	11.9	13.6	5	32.2
Towcester 91 (P3)	M/L	9.2	18	12.7	38	3.5	18.6
Towcester 94 (P6)	M/L	29.8	5.5	0.5	22	11.9	30.3
Irchester 55	M/L	25	11.9	58	0	0	5.1
Towcester 93 (P4)	M/L	22.9	18.6	26.4	11.3	2.5	24.1
Survey mean	M/L	12.8	53.9	13.4	10.7	0	9.3
Towcester 91 (P4a)	L	4.4	25.8	19.8	31.5	3.5	15
Towcester 91 (P4b)	L	7	18.8	19.3	38	3.3	13.6
Survey mean	L	34.1	15	0	0	13.4	37.5

During the Middle period the survey average and the excavated groups show marked differences as the proportions of greywares are higher and the calcareous fabrics considerably lower in the survey than from the excavations. Three factors are likely to have caused this. Two

of them, the possibility that calcareous fabrics are more easily destroyed in the ploughsoil, and that they constitute the majority of pottery not assignable to period, were discussed above. The third is that fabric group 21 (the later Harrold products), assigned a Middle/Late date, probably actually cover both Middle and Middle/Late periods. The possible effects of this on the survey are discussed further in the context of the spatial analyses in section 7.4.2. Additionally, only the excavated groups dated to the Middle period record the presence of colour coats because all the Nene Valley colour coats were assigned to the Middle/Late periods for the survey. This is because both the groups shown in table 7.3 and the Northamptonshire archive suggest that although Nene Valley colour coats are produced from the middle of the second century AD they are scarce until the middle of the third century. From this point on a wide range of greywares were produced in colour coats and production expanded dramatically.

For the Middle/Late and Late periods the problem of BB1 has already been noted but there is one further concern surrounding the high levels of grog tempered pottery recorded in the Late Towcester assemblages. This is caused by the large quantities of soft pink grogged fabrics present that have been assigned to the Middle/Late period in the survey. There is no way of separating the third and fourth century products of this industry and as is concluded below, it may have been more sensible to combine the Middle/Late and Late material. Experimenting with this was not feasible within the time available and the reasoning behind their initial separation remains sound. Most significantly, it seemed important to identify indicators for activity that could be securely dated to the fourth century alone in order to better understand landscape development towards the end of the Roman period.

7.4 INFERENCE FROM PLOUGHSOIL POTTERY: SOME QUESTIONS OF SUPPLY

The sections above have highlighted a few of the possible problems with the survey data that relate to post-depositional, collection and recording biases. Though limited, they hinted at the need, expressed in chapter 2, to consider these effects before using ploughsoil pottery assemblages to draw inferences about past locales in the landscape. Given a fuller understanding of these problems, anyone attempting to interpret the archaeological significance

of ploughsoil ceramics must then consider the fundamental question of the relationship between the artefacts recovered and the societies that produced and distributed them. In a key article in 1991 Millett noted the oft overlooked question of the level at which pottery supply and deposition fluctuated through time. In this respect it is important to remember that field collections only allow us to study the use and deposition of certain forms of material culture. They are not a direct indicator of settlement and thus population, but rather the material correlates of some of the past places of the landscape (cf. chapter 2). Millett's discussion concentrated on variation in pottery supply through time and this provides the focus of the initial study below (section 7.4.1). Differential access to ceramics is, however, also a spatial phenomenon that has been apparent since Hodder and Orton's (1976) treatise on the subject and short studies carried out by Fulford & Hodder (1974), and Millett (1980) on the distribution of certain forms of Roman pottery. In section 7.4.2 I hope to first demonstrate that the spatial distribution of dateable ceramics is a key factor behind much of the variation seen in survey data and secondly, suggest ways of analysing and using this information in studies of locale form and distribution (sections 7.5 & 7.6).

7.4.1 Pottery and Time

In order to compare changes through time it is essential to allow for variation in the volume of near surface and surface deposited ceramics. Ideally, this should be done with a database of samples collected from all surveyed units. Hall's survey strategy did not fulfil this requirement and through 'site' definition biased the database in the ways noted above. To use Hall's data, therefore, it is necessary to explicitly acknowledge an assumption that has to be made at the outset; namely that the sample collected from the 'sites' represents a reasonable approximation of the total population of recoverable ceramics across the region. Though there are obviously problems with this given the nature of the collection strategy, it was considered acceptable if the biases were kept in mind in interpreting the results and that information was only used as an internal guide to interpreting the survey dataset. In effect, the pottery distributions discussed below are only a guide to the supply and deposition of ceramics at certain kinds of locale that produced relatively high density scatters and are largely justified by the results they produce.

In the absence of a better regional dataset the assemblages were studied in order to produce comparable scales for what constituted high and low ceramic concentrations in different periods, whatever the absolute quantities. Millett (1991; Carrete *et al.* 1995) created a relative scale by dividing the range of quantities of pottery into quartiles and octiles. This was a more appropriate choice for scale than the mean as most similar pottery frequency distributions show some degree of kurtosis or skewing towards zero. Thus the same portion of each frequency distribution can be studied irrespective of the absolute quantities or skewness of the distribution.

Table 7.4 shows simplified frequency distributions by weight for the seven periods used in this study shown in figures 7.9-7.12. If pottery deposition were even through time then the quartile boundaries would fall at similar points. As table 7.5 shows this is clearly not the case as values broadly increased through to the mid Roman period and then fell away. Even when the likely difference in the time span of each period is taken into account this does not greatly alter the picture as, if anything, it reinforces the perceived trend. The use of quartile values therefore allows comparison of the intensity of ceramic deposition across periods. It does not help to define the nature of archaeological activity at specific locations other than suggesting the relative quantities deposited at a locale.

The next step, then, needs to involve a discussion of the nature of activity at each locale on the basis of other supporting information (section 7.6). Meanwhile the calibrated data can be used at an empirical level to study the relative growth and decline of ceramic deposition at different locales that might suggest changes in settlement and other activity locale patterning. This method works best when pottery is common, for during periods when pottery is scarce the larger number of locales where pottery is absent makes any presence appear more significant (Millett 1991). In the current survey this is a particular problem for the Iron Age and Saxon periods as all but the highest quartile of scatters are represented by absences. In effect any pottery present in these phases is highly significant even when only a single sherd.

Table 7.4 The Frequency of scatters by weight through time. For simplicity the frequencies are grouped into 50 gramme categories.

Wt. Range	Period						
	IA	Early	E/M	Mid	M/L	Late	Sax
0-49	229	158	176	68	105	216	225
50-99	2	33	35	32	35	14	4
100-149	0	18	7	30	20	2	1
150-199	1	6	5	24	16	0	1
200-249	0	8	4	20	11	0	0
250-299	0	4	0	11	14	0	0
300-349	0	0	4	9	8	0	1
350-399	0	1	0	8	1	0	0
400-449	0	1	1	6	3	0	0
450-499	0	0	0	5	5	0	0
500-549	0	0	0	6	1	0	0
550-599	0	0	0	1	3	0	0
600-649	0	0	0	2	3	0	0
650-699	0	0	0	1	3	0	0
700-749	0	1	0	0	0	0	0
750-799	0	0	0	1	1	0	0
800-849	0	1	0	2	0	0	0
850-899	0	0	0	0	1	0	0
900-949	0	0	0	0	0	0	0
950-999	0	0	0	1	1	0	0
1000+	0	1	0	5	1	0	0

Table 7.5 Quartile Values for Each Period by weight and values after correction for the approximate length of each phase.

Period	Quartile Values in grammes			Period Length	Quartile Values Corrected for Period Length (g/100 years)		
	Lower	Median	Upper		Lower	Median	Upper
IA	0	0	0	300	0	0	0
Early	0	22	57	100	0	22	57
E/M	0	13	40	100	0	13	40
Middle	37	115	220	130	28	88	169
M/L	0	50	162	180	0	28	90
Late	0	0	5	120	0	0	4
Sax	0	0	0	350	0	0	0

7.4.2 Pottery and Space

The analysis above offered one solution to the problem of comparing like with like through time, but no guidance on problems caused by differential supply across space. Considering the number of excavation-based studies that have highlighted the highly variable patterns of Roman pottery (eg. Marsh 1981; Going 1987; 1992; Marney 1989), it is surprising that so little has been done to assess the affects of this when dealing with the wide areas often covered by surveys. In the case study it was evident from an early stage that spatial patterns in supply would need to be addressed if locales were to be compared across such a large region. Study of the excavated pottery had indicated marked trends in the range and quantity of pottery of particular fabrics deposited in different parts of the county (cf. tables 7.2 & 7.3). A method thus had to be established that would help separate such large scale patterns, usually associated with the overall exchange area for pottery from a particular source, from localised variation that could be linked to differences in the status or function of individual locales. Trend

surface analysis offered just such a possibility.

There is insufficient space here for a detailed discussion of the merits and background to trend surface analysis and many good summaries are in any case available in print (eg. Unwin 1975; Hodder & Orton 1976). The basic model attempts to split each observed data point across a given space into two components; one associated with regional trends, the other with purely local effects. This is achieved by fitting a mathematical best-fit surface using regression analysis. Most of the assumptions and biases are the same as for regression analysis and were well summarised by Unwin (1975) and Davis (1973). The trend surface values are then taken to be part of regional trends whilst localised variations (or residuals) in observed data from the surface are considered to be due to local effects. In this way trend surface analysis can provide two sources of information. First, the surfaces can be viewed as crude models of overall pottery supply patterns through time across the region. This approach was adopted by Hodder and Orton (1976) in order to study the gross distribution of Oxfordshire wares across southern England using data supplied by a limited number of excavations. They were able to demonstrate the skewed nature of the distribution in favour of eastward and westward transport particularly along the Thames Valley. Second, the surfaces can be used to remove regional biases to allow better comparison of what constituted high or low levels of ceramic deposition at any specific location. If the trend surface value at any point is taken as the normally expected level of pottery then the significance of the observed quantity is measured by its deviation from the trend (its residual). Such an approach provides a method of spatial calibration that compensates for regional variation in pottery supply.

In the case study the 232 scatters quantified by weight were grouped by period to produce seven summaries for each location (cf. appendix 5). Preliminary analysis indicated that the quantities of Iron Age and Saxon pottery were too small to be used for trend surface analysis and therefore have been considered only in their uncalibrated form throughout the rest of this chapter. The five remaining periods were analysed by fitting quadratic polynomial surfaces to the data as all provided a significantly better fit than simple surfaces. The results for each period are summarised in figures 7.13-7.17 where the image represents the trend surface in plan over an outline of the study region

Figure 7.13 shows the trend surface for the Early period. It suggests a considerable

divide ran across the region along the northern side of the Nene valley between its upper reaches around the parish of Flore (fig. 7.13, Grid Ref. 640 620) to close to its junction with the East Anglian Fen near Peterborough (GR 1160 1000). To the south and east of this divide the trend rose to levels of around 120-140 grammes per scatter. Along the valley itself and towards the region's south western and north eastern margins levels were far lower at around 20-60 grammes. In the Soke of Peterborough (the area north east of GR 1050 990) the surface dropped close to zero suggesting any presence in the scatters from this area is significant. The broad expanses of boulder clays and sands that cover much of the county north of the Nene are represented by a slight recovery in the trend surface to around 40-75 grammes, with localised 'ridges' centred on the Corby-Weekley area (GR 890 990) and around Braybrooke (GR 800 830) and Benefield (GR 970 920). These trends have to be considered in the light of the generally low levels of ceramics recovered per period in the survey and the obvious problems of accuracy in the trend close to the edges of the survey (Hodder & Orton 1976, 163-4).

The degree of confidence that should be placed in specific parts of the trend surface could be further investigated by plotting the 95 percent confidence surfaces in a manner similar to the confidence limits common in ordinary regression analysis. Such an analysis goes beyond the scope of this preliminary investigation, but full details of the method are readily available in published form (eg. Krumbein 1963). As a general rule, however, the surfaces are most reliable nearest the centre of the plot and become less so near the edges. In the survey, the lack of data from the south eastern and north western quarters of the plots means that any assumptions about the trend surface outside the county are unreliable. Despite this, the Early surface provides a useful guide to regional levels of identified late iron age-conquest period pottery from the survey. A detailed consideration of the reasons for such trends is not the main focus of this chapter but some points present themselves as possible explanations. In section 7.3.2 a systematic bias was noted between the recorded proportions of grog and shell tempered Early pottery from the survey and excavated assemblages. If, as the excavated assemblages suggest, shell tempered fabrics were very common and grogged fabrics rare in the lower Welland and Nene valleys, then the low level of the trend surface may be explained by a failure to identify shell fabrics as Early or by their lack of survival in the ploughsoil (cf. sections 2.3.1 & 7.3.1). To some extent, therefore, the trend surface is one for the distribution of grogged wares,

itself an interesting area for further research (see chapter 8). Despite these issues the trend appears to be a strong one that contrasts with the later ones.

Figure 7.14 is the trend surface fitted to all pottery of Early/Mid date (c. AD 60-160) from the survey and suggests a marked re-orientation in the production and supply of pottery in the two generations succeeding the conquest of the area. The peak in regional levels is represented by a ridge covering the upper Nene and its surrounding uplands to the north and west. The trend drops away significantly towards the eastern edge of the county with levels around 10-40 grammes along the watershed between the Nene and Ouse valleys. The low level of the surface suggests that these variations were slight and the main trough in the trend lies over an area of low confidence outside the county to the south east. This distribution accords well with the known locations for pottery production during the period with early greywares from kilns around Northampton (GR 740 620) and other quartz tempered or cream coloured sandy wares between Towcester and Milton Keynes to the south west. Grogged wares produced in the Kettering area (GR 880 800) account for part of the ridge that runs north east up the county but it is also possible that the valley provided an axis for the wider distribution of upper Nene valley greywares downstream. The lower Nene and Welland valleys were still relatively under-represented in this period before the inception of greyware and colour coat production around *Durobrivae*.

During the Middle period (c. AD 120-260) the trend surface (fig. 7.15) shows a similar pattern of higher supply in the upper Nene to the north and west of Northampton, a gradual fall-off to the north east and a more dramatic decline on crossing the Nene valley to the south east. The onset of lower Nene valley greyware production had a limited effect on the lesser quantities of pottery found in the north east of the region, but was outweighed by the effect of the greater quantities of upper Nene valley wares found all over the north and west of the county. The apparent decline to the south east of the Nene on the boulder clays around the county boundary with Bedfordshire may be genuine but may could be caused by the difficulty of assigning some of the calcareous fabrics produced at kilns such as Harrold in Bedfordshire (Brown 1972) to any particular phase. The high incidence of calcareous fabrics from excavated settlements in the south eastern quarter of the county at Piddington (22%), Earls Barton (31%) and Ringstead (17%) seem to support this possibility (cf. table 7.3, compared to Brixworth,

Towcester & Great Weldon). A further factor affecting the trend surface may be the chronological overlap between groups assigned to the Middle and Mid/Late periods. Both early Lower Nene valley colour coats and Soft pink grogged wares were in production by the later second century though at low levels until the mid-third century if the excavated data are any guide (cf. table 7.3; Piddington, Brixworth, Ringstead, Earls Barton, & Towcester 93 & 94).

The Mid/Late (c. AD 190-350+) trend surface is dominated by Nene valley colour coats (fig. 7.16) and shows a considerable fall off from levels of 230-260 grammes per scatter nearest to the production centres around *Durobrivae* to 90-110 grammes in the upper Nene where supply levelled out thanks to the common occurrence of soft pink grogged wares at locales either side of Watling Street. The fall off shows a spur of higher levels along the Nene Valley that suggests a limited preference for distribution along this axis. Kiln sites for soft pink grogged ware have not been located but the supply is centred on the Milton Keynes area and Marney (1989) thinks it originated here. A very common fabric in Towcester during the third and fourth centuries, it was completely absent at Irchester only 25 kilometres away down the Nene Valley (table 7.3) The low levels of the trend in the upper Nene and west of the county may in part be caused by the chronological overlap between the Mid/Late and Late periods but not sufficiently to remove the gross differences between the high levels found in the lower Nene and the lower ones to the south west.

The Late trend (fig. 7.17) reverses the Mid/Late one in having its highest point in the south west of the county, then dropping off gradually to the 12 gramme contour (broadly equivalent to 1-2 sherds per scatter) just to the west of Northampton. The very low levels of Late material make any differences in the trend difficult to consider of genuine significance but are important in one respect. Though the mirror effect may be due to the contemporaneity of fourth century Nene Valley (in the Mid/Late trend) and Oxfordshire (in the Late trend) colour coats, the values of the latter are far too low to seriously effect the marked fall off along the Nene Valley shown in figure 7.16. Thus the trend still reflects genuine differences in the levels of later Roman ceramics in circulation between the north eastern half of the county about as far as Irchester and Kettering, and the south western half.

Although brief, the analyses above indicate a series of changing patterns in the quantity of pottery deposited across the region. Not only does supply change through time but also in

space as the foci of pottery production and redistribution shifted. Issues about the nature of pottery supply were not intended to be a major part of this case study but are unavoidable if we are to use a database that is reliant upon ceramics. Some reasons for the re-orientations noted and their significance are therefore discussed in their wider context in section 8.2.1. Here, the trend surfaces are important in creating comparable scales for what constituted the local norm when attempting to characterise ploughsoil pottery scatters as locales.

7.5 POTTERY SCATTERS AS LOCALES: THE CHARACTERISATION STUDIES

Until now the discussion has focused on the various regional, depositional and post-depositional trends that have acted upon the ploughsoil pottery groups studied. The intention had always been to study the data for information that might indicate similarities or differences between settlements and other activity foci across the county. To attempt this it was important to consider the degree to which *unstratified artefacts can be considered a useful guide to the status and function of particular places through time and space*. Though an obvious point it is one that has often been overlooked as the relationship between pottery and people is bypassed in a desire to plot settlement patterns as a guide to population numbers. In chapter 6 it was apparent that the region's locales show a great deal of complexity through time and space that reveal a diversity of constructions of place and landscape. All too frequently the nature and status of pottery scatters from survey has been glossed over by constructing pre-defined classifications of what constitutes a farmstead, villa or larger settlement. Such classifications, if they are to be used, must be questioned, preferably tested and their assumptions made more explicit if we are not to endlessly repeat 'known' types. Essentially the approach was to construct simple empirical classifications that might draw out contrasts in locale structure, date, function and status across the region. The sections that follow outline some areas where the data were thought profitable to study for such contrasts. The findings are then used to interpret the case study data at the end of the chapter (section 7.6).

7.5.1 Levels of Pottery Deposition

The most basic form of analysis involved simply comparing the total quantities of pottery

recovered from each of the scatters. Their pre-defined nature has already been discussed (section 7.2) but is raised here for its inherent effects on such analysis. Essentially, the key issue surrounded the need to assume that the levels of pottery deposited could be considered without calibrating them as quantities per unit area. In Hall's survey the area of a site was determined without differentiating it chronologically. Given the likelihood that locales changed size through time the decision was taken to consider the poorly defined site areas as a separate variable from the quantities recorded. Thus the quantities deposited over a particular location were considered alone and then compared with the area estimates to see if there were any consistent link between quantity and area. An alternative would have been to consider the scatter area as *analogous to a more conventional collection unit such as a field and then* calculate the quantities as densities accordingly. Unfortunately, the collection units could not be considered as independent variables as they were themselves determined on the basis of the quantities of ceramics present. In the circumstances it seemed best to consider the quantities first and then see if the scatter area (and thus possible size of the locale) was likely to be a cause of the high or low recorded quantities.

This decision taken, it remained to be seen how relative differences in the quantities of ceramics deposited might indicate different forms of activity locale. Unfortunately, there is very little data on the quantities of ceramics at different kinds of locales. This issue is currently one aim of a series of analyses on excavated assemblages in East Yorkshire being carried out by members of the Department of Archaeology at Durham University but is not yet in an accessible format and was therefore of little help here. One possibility lies in comparing the information recorded by Hall from scatters overlying locales that were subsequently excavated. Though rare, and biased as a sample by the requirements of rescue excavation noted above (chapter 5), they give some guide to the likely relationship of particular surface groups to the locale from which they were taken. Though this still suffers from the problems of comparing surface and subsurface archaeology (cf. chapter 2), it was intended only to establish points of comparison, not to give a primacy of inference to the excavated data. In the current study these can only provide a very restricted source of information. In the case study, therefore (section 7.6), observed differences in the quantities of pottery were usually interpreted on the basis of explicitly defined assumptions combined with the small quantities of additional information

provided by other types of artefact.

As a preliminary, the scatters were characterised according to their residuals from the trend surfaces used for each period. In this way the observed quantities were calibrated to take into account both chronological and spatial variations in the overall supply of pottery. To simplify the results and aid comparisons through time, the residuals were categorised according to the residual quartile ranges into which they fell. Any residual category that represented an absence of pottery was always recorded as zero, so that periods when pottery was scarce would be apparent in the analyses. The effect of this categorisation can be seen in figure 7.18, where all 232 scatters are shown according to their quartile scale. Zero represents scatters where pottery was absent, 1 residuals where pottery was present but lay in the lowest quartile range, and so on to 4 representing the top quartile range. It is important to remember that these categories were recorded relative to the trend surface for each period (their residual) *not their absolute value*. This explains why absences (zero values) do not always fall in the lowest quartile because an absence in an area of very low expected occurrence is conceptually less significant than a small presence in an area with high expected values. The categories were not intended to convey any interpretive significance but rather to simplify the data for subsequent characterisation studies and to allow comparison between the relative levels of deposition at locales from different parts of the region.

7.5.2 Additional Sources of Evidence

Other variables that could be studied were limited but nevertheless provided further characteristics that could be used to identify similarities or differences between locales. The quantified residual analyses were calculated without respect to the areas of particular scatters for the reasons noted above. Simple studies of the distribution of scatter areas and the link between them and the quantities of pottery were also carried out to check any apparent relationships. In addition to cross checking the results above, the area data provided useful information about the nature of locales across the region in their own right. Though a composite area, the size of scatters can perhaps be taken as an index of locale sizes and/or locational drift. It is impossible to separate the two possibilities given the character of the survey data, but any results raised significant issues that may relate to locale nucleation or the processes of locational

change noted in chapter 6.

The somewhat thorny issue of how to interpret the functional characteristics of pottery was raised in chapter 2 and will not be repeated at length here. Needless to say it is difficult, and probably inappropriate, to assign specific functional labels to particular forms or fabrics given the wide range of uses to which they may have been put. In the context of the present study, the low levels and highly fragmented nature of the assemblages meant that comparisons based on diagnostic form sherds were impossible. Any crude categorisation would need to be based on fabric studies or more probably ware groups. Such a categorisation is obviously then linked to fluctuations in the source of supply and for all practical purposes the two must then be considered together, especially when one category is represented by the pottery from a single industry.

Despite the somewhat negative tone of the preceding discussion, one possibility for further characterisation was selected. At a basic level the products of certain centres did seem to specialise in particularly distinct forms that may have related to their usual range of functions. Recent and current contextual studies of the functional characteristics of pottery are beginning to provide useful information in this regard (eg. Rippengal 1995), and it seemed worthwhile attempting to see if there were any discernible patterns present in the proportions of fabrics produced in what might be characterised fineware, coarseware and storage ware forms.

Finewares were defined as those fabrics predominantly used to produce beakers, cup, platters, painted or colour coated forms and mortaria. These were frequently redistributed over long distances, were often selected for use and deposition in special contexts (eg. burial), and may have been treated as of higher 'value' than other forms of pottery, particularly if Evan's (1987) analysis of graffiti provides a reliable guide. Storage wares were defined as those fabrics used to produce jars, frequently of very large sizes, that showed little variation in form or concern for decoration, and that have rarely been found coated with sooting or fireclouding. The coarsewares category was adopted to act as a catch-all group to include the remaining fabrics but included those predominantly found as jars and bowls and sometimes found with sooting or fireclouding.

Table 7.6 shows the categories initially adopted. The Iron Age and Saxon periods were not studied as both contained too few sherds and too great a degree of variability in fabrics. In

the Early period none of the fabric groups could be considered to be associated with a clearly definable range of forms and thus also had to be excluded. Lower Nene Valley colour coats (fabric group 2) presented a further problem as they were initially used for fineware forms, but by the early fourth century were produced in a wide range of bowls and jars and became ubiquitous. The great quantities of the latter and the inability of fieldwalked data to separate early and later production meant that they had to be considered under the coarsewares category for the Mid/Late period.

It soon became apparent that storage wares were too scarce to provide meaningful data. Even for the Middle and Mid/Late periods they were predominantly represented by the products of one or two industries and thus tended to simply reflect their overall supply patterns. The finewares did not suffer to the same degree, as at least two wares were present in each period and were selected for further study. Ideally this would have been through further trend surface analyses with their attendant diagnostic strengths. Unfortunately the small size of individual assemblages and the low proportions of finewares meant that trend surface analysis was not justifiable or, frequently, possible. Instead the studies concentrated on basic distribution patterns and comparisons between the 5 sample areas chosen (section 7.6.2).

Table 7.6 The fabric groups assigned to Fine, Coarse and Storage ware categories for each period.

Period	Fabric Groups by Category		
	Finewares	Coarsewares	Storage wares
Early/Middle	8, 20, 27	9, 24	None
Middle	3, 19, 26	1, 7, 16, 25	22
Middle/Late	4, 17, 18	2, 21	6, 29
Late	10, 11	13, 14, 15	None

The collection of structural materials provided a third source of information for locale characterisation. In recording the scatters Hall had collected any presences of Roman tile,

tesserae, wall-plaster and mortar. Though none of them could be dated more accurately than to the Roman (Early/Middle-Late) period, they did provide a source for interpreting the degree of architectural Romanisation reached at specific locales across the county. Three classes were chosen that it was felt expressed levels of functional, or more appropriately perhaps, Romanised status display. Class 3 scatters were those with evidence for structural elaboration in the form of specialised (eg. box flue) tiles, tesserae and painted plaster. Class 2 locales were represented by roof tiles alone, or with mortar, that suggested Romanised buildings without necessarily any form of elaboration. Finally, class 1 locales were those with no structural evidence.

A final source of data was provided by additional evidence for iron and pottery production and the presence or absence of querns as a guide to arable production. Through recording the distribution and association of these indices it was further hoped to look at where emphasis was placed on particular activities and whether they were associated with certain locales as defined by the other sources of data. Largely undateable, they were certain to be a gross simplification of the situation, but earlier work by Hall (1982) had suggested it might be a profitable line of research.

In the following sections each analysis was initially used to study the region through time. Then, patterns were studied afresh in the light of additional information about contrasts between different parts of the county in searching for possible 'landscape regions'.

7.6 LOCALE PATTERNS IN TIME AND SPACE

The survey collection strategy produced small quantities of pottery at each locale. This limited the range of studies feasible on individual scatters. Hall's data, however, had the considerable advantage of being distributed across the region including otherwise poorly studied areas. Given this, it was only sensible that the study concentrated on highlighting trends across the region as a whole and within 5 sample blocks located to incorporate areas of contrasting geographical location, topography, altitude and soils. Each section begins with a discussion of the regional picture, followed by the contrasts apparent between the 5 sample areas. The latter were not intended as archaeological regions (cf. chapter 1) and their boundaries were designed purely to provide 5 groups that could be studied for more

quantifiable contrasts than the descriptive picture produced by the regional maps. Each could then be used to assess apparent trends in the other. The sample areas provided quantifiable evidence to back up or contradict discernible visual patterns; the maps helped identify areas where the sample boundaries cut across visual trends.

The sections above noted that the data were biased towards only some forms of activity that led to particular patterns of material culture deposition (sections 7.2 & 7.5). Given this, it is important to remember that the absence of pottery scatters cannot be taken as the absence of activity foci but only those of the kinds noted in section 7.2. Thus for the Iron Age and Saxon periods the small numbers of scatters recorded are not considered a guide to levels of activity but as a consequence of the low intensity of ceramic usage and its friability.

7.6.1 Locale Patterns by Pottery Quantities and Area

The analyses described in sections 7.2-7.5 produced a database of scatters quantified by sherd number and weight into seven periods. Within each period the scatters were classified according to their residuals from the contemporaneous trend surface into quartile groups and absences (cf. fig. 7.18). The desire was to avoid *a priori* assumptions about what constituted a 'significant' level at which to define a settlement or other locale and so a decision was taken to analyse all the residual quartiles recording an absence of activity only when no pottery was recorded. This necessarily biased the perceived trends in activity towards periods or areas where pottery supply was highest and this needs to be taken into consideration when viewing the trends below.

As a rule of thumb, scatters that fell into the third or fourth quartiles were considered higher order locales where observed levels were almost always above the trend surface. These concentrations of ceramics could reasonably be considered the primary foci for pottery deposition often associated with the settlements and other regular centres of activity noted in chapter 6. Scatters in the second and first quartiles were considered lower order locales as they had less pottery than the trend surfaces. Their status was open to question given the possibility that in periods or areas of high ceramic usage low quantities of pottery may have been deposited in areas away from activity foci. Zeros were always considered as absences (termed abandonments below) even though in some cases it was possible that near aceramic activity

continued at these locations.

Figures 7.19-7.23 are distribution maps of the scatters by period according to their residual classification. For periods when pottery was scarce, only the higher quartiles were recorded as lower ones were invariably represented by absences. No map is shown for the Iron Age as the data were so scarce as to make trend surface analysis impossible. For the Early period the residuals are well distributed across the region with third and fourth quartile scatters recovered from all areas (fig. 7.19). Some differentiation may be seen in the distribution of absences which tend to appear in higher proportions in the eastern central part of the county (between GR 800 600 & 1000 800) and in the Soke of Peterborough (GR 1100 1050).

During the Early/Middle period the distribution of absences is similar to the Early period. There was, however, a clearer differentiation between higher (3rd & 4th quartile) and lower (1st & 2nd quartile) residuals emerging in some parts of the county (fig. 7.20). Whilst the distribution of residuals is relatively even over much of the eastern half of the county, the south west was largely characterised by first and fourth quartile residuals suggesting a clearer two-fold division in their form. This pattern largely continues into the Middle period (fig. 7.21), when the ubiquity of pottery created a position in which most scatters show a presence. The first quartile residuals demonstrate a degree of continuity in distribution in the north west and south west of the county but appear at a number of new locations in the Soke of Peterborough.

During the Middle/Late period (fig. 7.22) the lower levels of pottery see the reappearance of absences. Proportionally, they were most frequent in the Soke of Peterborough and the north west of the county (around GR 650 750), with an abundance of activity through most quartile scales along the Nene Valley and its tributaries. The dichotomy between high and low quartiles in the south west of the county is still apparent. By the Late period (fig. 7.23) the scarcity of pottery removes most of the lower quartile scales which become absences. In the wake of this the distribution shows some clear clusters of absences or fourth quartiles. Absences are particularly notable around 880 600 in the middle Nene and along the Welland Valley (GR 1100 1100 to 900 1000). The fourth quartile clusters show some association with contemporaneous small towns particularly around Ashton (GR 1050 900), Towcester (GR 680 80) and Irchester (GR 920 650), and possibly to the south of Medbourne (lying outside the county at GR 750 900). There is, however, still a broader distribution of fourth

quartile residuals across much of the west of the county.

Though interesting, the regional distribution maps provide an impressionistic view of the changing patterns of locales. It gives little or no evidence for the dynamics of change in locales and their occupation. To provide this, patterns of continuity and discontinuity were studied and are summarised for the whole region in figure 7.24. Figure 7.24a showed the proportions of scatters that newly appeared during each period and what residual quartile they occupied. All scatters occupied in the Iron Age period appear then, due to the absence of identifiable material from earlier periods. The high proportion of Early scatters that were new occupations is also partly caused by the general scarcity of Iron Age material but this cannot be said to be true of any of the subsequent phases. Some 18 percent of scatters first appeared in the Early/Middle period (c. AD 60-160) and 28 percent during the Middle period (c. AD 130-260). Thereafter new locales became rare at fewer than 7 percent of occupied Middle/Late and Late scatters until a new phase of establishment during the Early to Middle Anglo-Saxon period. Looking at the distribution of residuals shows some interesting contrasts between the nature of new occupations during different periods. During the Early and Early/Middle periods new occupations were spread amongst the quartile scales suggesting that new locales covered a range of depositional intensities. In the Middle period, however, hardly any new scatters were represented by the highest quartile, indicating that new locales predominantly occupied the lower end of the spectrum.

Figure 7.24b shows the contrasting picture of abandonment, where activity was not recorded in the following period. Thus the figure for the Iron Age shows the proportion of scatters occupied then that were no longer occupied in the Early period (c. 50 BC-AD 60). For the Iron Age and Early periods the proportion remained steady at around 20 percent but dropped dramatically during the Early/Middle period as nearly all occupied scatters showed some degree of continuity into the Middle period. From the Middle period onwards, however, absences increased rapidly, though whether this is a reflection of the increasingly aceramic nature of society is not easy to say. Scatters disappear from all quartile levels during and after the Middle/Late period but predominantly from lower levels during the Middle period. In this respect, the Middle Roman period has a unique pattern of new occupation and abandonment that may relate more to a saturation in the supply of pottery than to changes in the distribution of

activity foci. Many (though far from all) of the additional scatters occupied in the Middle Roman period are represented by lowest quartile residuals. Though this may relate to the appearance of a series of small scale activity foci, it is equally possible that the levels of pottery in circulation reached a point at which a background of sherds was now scattered across the landscape. Thus, locations that were not activity foci still contained small quantities of pottery. In the case study this question was impossible to evaluate though it could be studied subjectively if Hall's criteria of 6 sherds per hectare were taken as an accurate reflection of the presence or absence of an activity foci. In this case any scatter containing fewer than 6 sherds per hectare in a period could be considered to have been abandoned as an activity focus. This does not take into account the spatial variability in supply noted above but could provide a useful avenue for further research.

In figures 7.25-7.29 the degree of continuity and discontinuity between periods is shown as a series of maps. No map is shown for the Iron Age to Early transition due to the scarcity of the former noted above. All periods show high levels of continuity, but there are some marked patterns in the dynamics of occupation indicated by the abandonment and new occupation symbols. For the Early-Early/Mid periods the north west and west of the region showed marked continuity alongside the appearance of new scatters suggesting a period of expansion in the numbers of locales identified. In central eastern Northamptonshire continuity is high along the Nene valley itself but a number of locales on the claylands (GR 850 550 to 1050 750) to the south east no longer have evidence for occupation. The side valleys and uplands to the north of the Nene by contrast show continuity and new occupation again indicating expanding numbers of locales. In the lower Nene and the Soke of Peterborough (GR 1100 1050) continuity is low as both abandonment and new occupation are high, and suggest marked locational changes in occupation.

During the subsequent phases the picture altered considerably (fig. 7.26). Given the scarcity of locales without pottery the abandonment distribution is of little use. There was however, a trend towards new occupation in the Soke of Peterborough and the lower Nene Valley. The degree to which this links with the inception of pottery production in the lower Nene Valley is interesting in that many of the new scatters were in the lowest residuals quartile (see fig. 7.24a). Many, therefore, may have related to the saturation issue raised above, or have been

lesser foci that failed to be recognised in earlier periods when their levels of pottery deposition were low.

Figure 7.27 illustrates the change seen by the Mid/Late period as many scatters appear to have been abandoned. Though widespread, the south west of the county was again less affected. There is little evidence to suggest localised patterning in abandonment elsewhere, though the area around Ashton (GR 950 900 to 1050 900) appears to have been less affected than the Soke of Peterborough (GR 1100 1050). The latter, however, include the lowest residual group discussed above. By the Late Roman period (fig. 7.28), the number of occupied scatters was considerably reduced, with absences widespread except once more for the south west. The middle Nene (GR 850 600 to 1050 800) appears to have been particularly affected, with the abandonment of most scatters coinciding with the appearance of two, of only five, new occupations over the whole region. The Late-Saxon transition is complicated by the problems of dating these periods. Figure 7.29, however, suggests that discontinuity is high, with marked change apparent in the Lower Nene and Welland Valleys.

The maps commented upon above provide some visual impression of the changing supply and deposition pottery (and perhaps nature of activity) at locales across the region, but it is difficult to pull out key trends. For this the data were grouped into samples that divided the region into the 5 blocks as shown in figure 7.1. Area 1 (24 scatters) covered the limestone plateaux and tributary valleys of the upper Nene that dominate the south and west of the county. Area 2 (26 scatters) included the middle and upper Nene and its flanking hills whilst area 3 (50 scatters) incorporated the high uplands mostly over boulder clays and sands of the north west of the county. The latter covered study areas 2 and 3 from chapter 6. The lower Nene and part of the middle Nene in Northamptonshire were grouped as area 4 (82 scatters) whilst the extensive gravels and low limestone hills that dominate the lower Nene and Welland in the Soke of Peterborough became area 5 (50 scatters).

Figures 7.30-7.34 show the continuity and discontinuity of activity at scatters by sample area. The graphs for each area show the percentage deviation from the survey trends in figure 7.24. This was done by subtracting the whole survey percentage for a particular period from the percentage within a single sample block and is intended only to show the relative magnitude of differences between an area and the survey average. This enabled areas to be compared more

evenly despite variation in the number of scatters in each area. Table 7.7 makes the same comparison on the basis of observed and expected numbers of scatters. The expected number was calculated by taking the figure for the survey as a whole, then multiplying it by the number of scatters from a particular area divided by the survey total. By comparing the two sets of information it is possible to assess the absolute and relative values for particular trends. It is impossible to do more than summarise the figures here so interpretation centres on the main areas of deviation observed in the data.

Area 1 (figs. 7.30a & b) is clearly characterised by two trends in occupation and abandonment. First, many locales were established in the Early and Early/Middle periods (to c. AD 160) as the proportion of newly occupied scatters slightly outstrips the regional trend and abandonment is rarer. This may indicate a period of rapid expansion or dispersal in locales that was well established by the middle of the second century AD. Then, from the Middle period onwards, occupation remained comparatively stable with virtually no new occupation or abandonment during the later second and third centuries. Increasing abandonment is only apparent at the end of the Late period and then follows the survey trend, suggesting that occupation or at least pottery supply to locales remained relatively stable up to the end of the Roman period. The patterns for area 3 (figs. 7.32a & b) show a number of similarities to area 1. Here too, Early period expansion or dispersal of locales was followed by relative stability during the Middle to Middle/Late Roman periods. Unlike area 1, abandonment appears common by the Late Roman period, though still slightly lower than the survey average. Given the acknowledged chronological overlap between the two periods, however, it is possible that occupation continued until late in the fourth century but that pottery supplies were dominated by Mid/Late types from the lower Nene and Milton Keynes areas rather than Oxfordshire products for example.

In area 2, patterns of continuity and discontinuity were very different as the proportions of newly occupied scatters and abandonments rarely deviated more than 5 percent from the survey mean (fig. 7.31). If anything, the trend is one of greater locational instability, with higher than average levels of abandonment and new occupation throughout the Early/Middle to Middle/Late periods (c. AD 70-330) after a relatively quiet start. This compares well with the evidence from area 4 (figs. 7.33a & b). Deviation from the survey trend suggests a higher than

expected level of abandonment between the Mid/Late-Late and the Late-Saxon periods.

Table 7.7 The Continuity and Discontinuity of Occupation in Areas 1 to 5 by Observed and Expected Numbers

Numbers of New Locales Appearing in Each Period							
	IA	Early	Early/ Middle	Middle	Middle/ Late	Late	Saxon
<i>Total</i>	22	147	33	60	4	5	30
<i>Area 1.</i>							
Observed	1	18	5	1	0	2	3
Expected	N/A	15.2	3.4	6.2	0.4	0.5	3.1
Difference		2.8	1.6	-5.2	-0.4	1.5	-0.1
<i>Area 2</i>							
Observed	2	14	5	7	1	1	3
Expected	N/A	16.5	3.7	6.7	0.4	0.6	3.4
Difference		-2.5	1.3	0.3	0.6	0.4	-0.4
<i>Area 3</i>							
Observed	3	41	5	6	1	1	9
Expected	N/A	31.7	7.1	12.9	0.9	1.1	6.5
Difference		9.3	-2.1	-6.9	0.1	-0.1	2.5
<i>Area 4</i>							
Observed	9	54	10	20	1	1	6
Expected	N/A	52	11.7	21.2	1.4	1.8	10.6
Difference		2	-1.7	-1.2	-0.4	-0.8	-4.6
<i>Area 5</i>							
Observed	7	20	8	26	1	0	9
Expected	N/A	31.7	7.1	12.9	0.9	1.1	6.5
Difference		-11.7	0.9	13.1	-0.1	-1.1	2.5
Numbers of Locales Abandoned by Following Period							
	IA	Early	Early/ Middle	Middle	Middle/ Late	Late	Saxon
<i>Total</i>	5	32	5	47	105	58	50
<i>Area 1.</i>							
Observed	0	1	1	5	4	12	7
Expected	0.5	3.3	0.5	4.9	10.9	6	N/A
Difference	-0.5	-2.3	0.5	0.1	-6.9	6	
<i>Area 2</i>							
Observed	0	3	2	6	11	5	5
Expected	0.6	3.6	0.6	5.3	11.8	6.5	N/A
Difference	-0.6	-0.6	1.4	0.7	-0.8	-1.5	
<i>Area 3</i>							
Observed	0	6	0	13	20	12	16
Expected	1.1	6.9	1.1	10.1	22.6	12.5	N/A
Difference	-1.1	-0.9	-1.1	2.9	-2.6	0.5	
<i>Area 4</i>							
Observed	2	12	2	15	40	20	11
Expected	1.8	11.3	1.8	16.6	37.1	20.5	N/A
Difference	0.2	0.7	0.2	-1.6	2.9	-0.5	
<i>Area 5</i>							
Observed	3	10	0	8	30	9	11
Expected	1.1	6.9	1.1	10.1	22.6	12.5	N/A
Difference	1.9	3.1	-1.1	-2.1	7.4	-3.5	

Area 5 stands out as having a pattern of continuity and discontinuity that is distinct from the other four areas (figs. 7.34a & b). Initially, levels of abandonment were high and new occupation low, suggesting possible contraction or nucleation. Only from the Early/Middle period (c. AD 60-160) did new occupation take off and abandonment drop as the numbers of occupied scatters rose sharply until the Mid/Late period. Occupation levels then remained relatively stable until the end of the Mid/Late period when abandonment levels rose above the survey mean. Whether this is necessarily before the end of the Roman period is open to question given the late date of some lower Nene valley products and the likelihood that places so close to the main production area were able to maintain supplies of pottery until the demise of the industry. The Saxon period is marked by a dramatic shift in the location of locales that is not matched in any of the other areas and suggests that occupation was deeply restructured in the Lower Nene and Welland Valleys.

In order to assess whether the perceived trends in the quantities of pottery deposited at locales was likely to be related to their size, figures 7.35-7.39 show a series of histograms and a distribution map of the recorded areas of scatters. As well as assessing the possible depositional area of scatters they provided an opportunity to investigate variation in the size or localised mobility of locales. Figure 7.35 shows that the vast majority of scatters from the region clustered around a small size range of 0.2 to 1.1 hectares. This suggests that the vast majority of locales Hall recorded were small foci of the kinds commonly recorded in the excavation gazetteer. On viewing the regional distribution map (fig. 7.36) and histograms for each of the five sample areas (figs. 7.37-7.39) some clear patterns emerge. In the south west there was a higher proportion of large scatters and figure 7.37a suggests this is due to the absence of very small locales (0.1-0.4 ha). To the east in the middle to upper Nene (area 2) the situation is very different with all but one locale less than 1.1 hectares in area and the main cluster around the 0.3-0.4 hectare range (fig. 7.37b). This may reflect the greater longevity of many scatters in area 1 but might also indicate a more nucleated pattern of occupation on the limestone plateaux to the west.

Area 3 shows a similar distribution to the survey total (figs. 7.35 & 7.38a) but lacks any of the big scatters occasionally recorded in areas 1 and 4. Similarly to area 2, sizes cluster around the smaller (0.3-0.4 hectare) range. The Area 4 histogram, by contrast (fig. 7.38b), shows a

distinction between very large and small scatters. The distribution map indicates that this is caused by spatial rather than coextensive factors. The larger scatters cluster in the Ashton/Brigstock area (GR 1000 850), including one from the edge of Ashton itself, and points to landscapes dominated by larger foci or that underwent considerable localised locational drift. The small scatters mark the northeastern limit of the group found over much of areas 2 and 3. To the north east of area 4 the cluster of larger scatters is replaced by an homogeneous group of small to medium sized locales centred on the 0.6-0.7 hectare range in area 5 (fig. 7.39). Included amongst these was Maxey C (appendix 5), the surface correlate of the Maxey 66 late iron age and Roman farmstead (appendix 1).

7.6.2 Other Evidence for Locale Forms

Having outlined some basic aspects of the survey assemblages, other features were studied in order to better understand variety in locale forms and functions.

The Finewares as Status Indicators

Unlike the other sources of evidence discussed in this section, the fineware data could be studied chronologically. The basic assumption used was that the presence and quantity of finewares reflected corresponding differences in the status of locales. Though obviously a gross simplification, work by Booth in Warwickshire (1991) and Griffiths (1989) has shown significant differences in the quantity and diversity of finewares found at different forms of settlement. Booth's work, in particular, noted the higher proportions of finewares recovered from specific foci. The problem highlighted by Booth, of how to separate status from patterns of supply, was studied in section 7.4.2, and for the account that follows patterns were compared with the trend surface data to help eliminate biases caused by supply factors.

Figures 7.40-7.47 illustrate the distribution maps and histograms for each of the four periods that could be studied. During the Early/Middle period, the distribution map (fig. 7.40) shows a strong trend towards higher status locales along the middle and lower Nene Valley and a marked concentration on the boulder clays and limestone hills around Brigstock and Benefield (GR 950 870). Further south and west, finewares are commonly recorded in the Tove Valley (around GR 650 500) and parts of the upper Nene, but are absent from many occupied locales in

the upland areas of the northwest of the county. If the assumption above is reasonable, the high uplands of the north and west along with parts of the boulder clays of the watershed between Northamptonshire and Bedfordshire in the east (GR 970 650) were characterised by predominantly lower status locales. This is particularly apparent in the histogram for area 3 (fig. 7.41) but is masked in that for area 1 by the clustering of higher status locales in the Tove Valley.

During the course of the second and third centuries AD the picture for areas 3-5 remained the same (cf. figs. 7.42 & 7.43). Both the Nene Valley and the Brigstock-Benefield area continued to have concentrations of higher status foci, though the same was no longer the case in the Soke of Peterborough (GR 1100 1050), as remaining higher status foci clustered towards *Durobrivae*. The sample area statistics hide a shift in area 3 as higher status foci were now clustered along the edge of the Welland Valley. The neighbouring uplands of the north west continued to be dominated by lower status locales, at a time when there is some suggestion of a slight decline in the status of many foci in area 1.

From the Middle/Late period, interpretation becomes difficult as the supply of finewares was limited to fewer sources that have clear regional biases. In the Middle/Late period the problem lies in disentangling significant information from the overall pattern of products from the lower Nene Valley kilns. A comparison between figures 7.44 and 7.45, and the trend surface for the Middle/Late period (fig. 7.16), however, suggests that area 3 has proportionally more higher status scatters than would be expected. The distribution map (fig. 7.44) indicates that this is a continuation of the cluster of foci along the southern side of the upper Welland Valley noted in the Middle period. The south west of the county, at first sight, may appear to be in decline, but the likelihood that the Late period finewares (fig. 7.46) are frequently contemporaneous suggests this is probably a consequence of the phasing used. The lack of higher status foci along the middle Nene, however, is notable (area 3, Figs. 7.45 & 7.47) and cannot be accounted for by either the Middle/Late or Late fineware maps.

Structural Evidence as Romanised Architectural Display

The majority of finds providing structural evidence all related to building elements that have been implicitly or explicitly associated with processes of Romanisation. Here the intention was not to relate the presence of Romanised building materials to status *per se*. Instead they

were chosen as a crude index of the distribution of Romanised architectural display. Unfortunately, the evidence cannot be dated to any one period and so produce a palimpsest of what was undoubtedly a complex process. Figures 7.48 and 7.49 show the distribution of class 1, 2 and 3 locales according to the definitions used in section 7.5.2. Figure 7.48 shows clear concentrations of class 2 and 3 locales (those with Roman building evidence) around Ashton (GR 1050 880) and in the neighbouring Brigstock-Benefield area (GR 980 880). Class 2 foci were common throughout the north east of the region but were proportionally rarer in the lower Welland Valley (GR 1100 1070). Class 3 (highly Romanised) locales were rare away from the middle Nene clusters so far mentioned, with one example from the Soke of Peterborough (GR 1120 1050), two immediately to the north west of Kettering (GR 850 800), and two in the north west of the county (GR 600 650). Interestingly, all of these examples lie close to the known Roman towns or large settlements at Water Newton (*Durobrivae*), Kettering and Whilton Lodge (*Bannaventa*) and may reflect the common clustering around towns exhibited by villas. This aside, both class 2 and 3 locales were very rare in the uplands to the north of Northampton which shows in the histograms for areas 2 and 3 (fig. 7.49). In the west, by contrast, class 2 scatters are as common as in the north east but show little or no evidence for clustering in particular areas.

Other Functional Characteristics

Other artefactual evidence for the possible character of locales tends to be of little value or too rarely recovered to identify any meaningful pattern in the context of this regional discussion. Thus occasional evidence for pottery kilns, copper alloy brooches and Roman coins have not been considered here. Two possible sources were available in the form of evidence for iron smelting and querns. Neither are particularly dateable, but were plotted to study evidence for iron working and crop processing. The querns in particular are difficult to interpret, but it was hoped that their gross distribution might provide some hints as to areas where arable crop processing was significant (see below).

Figure 7.50 shows the distinctive distribution of scatters where iron smelting slag was present. This evidence was compared with earlier work by Hall (1982) on the distribution and nature of Roman iron working in the region. Hall's account included all find spots of iron slag that

he had recovered up to 1981, not (as here) just those associated with dated pottery scatters. Figure 7.50 indicates a marked concentration of iron working scatters on the low ferruginous limestone hills that separate the lower Nene and Welland Valleys. This is supported by Hall's earlier evidence and suggests the presence of a significant, though relatively small scale, iron working industry. There are also a small number of scatters with iron working evidence to the south east of the middle Nene on the boundary between modern Northamptonshire and Bedfordshire.

Hall's previous work showed a further major concentration of iron working sites in this area that is only partly reflected by the assemblages studied here. Though many of Hall's (1982) sites were located in Bedfordshire (outside the present survey), a significant number were not, indicating marked differences between the two areas in the association of iron working with pottery scatters. Two possible reasons for this come to mind. First is the probability noted by Hall (1982) that some of the unassociated scatters are medieval. Second, however, is the strong possibility that iron working was practiced at different kinds of places in the two areas. In the north east, iron working was associated with more permanently occupied locales, where pottery deposition took place. On the watershed between the Ouse and the Nene, it was located away from such locales, possibly in marginal areas of the landscape.

Interpreting the significance of the presence or absence of querns from the scatters is particularly difficult given the lack of attention generally accorded them. There are few significant analyses of the functional context of querns within excavation reports to work with and so here an explicit assumption is used as an initial hypothesis. Essentially, they are considered as a crude guide to the small-scale processing of grain related to subsistence orientated arable farming. If this assumption is broadly accurate, the absence of querns should suggest areas where cereal production was not a significant focus of activity or, conversely, exactly the opposite situation where grain processing was carried out on a large scale. Figure 7.51 shows the recorded distribution of querns which, if at all reliable, suggests some clear variation across the region. While commonly recorded across the northwest of the region and along parts of the lower Welland Valley, they are almost totally absent from much of the middle Nene and the south western limestone plateaux. Furthermore there is a strong cluster of find spots in the Brigstock area which cannot simply be explained by the total number of locales situated in this area.

Interpretation here is based largely on the assumption made above, but is discussed further in chapter 8. If the hypothesis is broadly accurate, the quern distribution map indicates an emphasis on smaller scale arable production across much of the north west of the county with less emphasis, or considerably more, elsewhere. The possible significance of these patterns and a number of other aspects of regional variation in the type and location of the locales discussed in chapters 6 and 7 is the main subject of section 8.3, where they are linked into some possible hypotheses about iron age and Roman landscape change.

CHAPTER 8: INTEGRATING SURVEY AND LANDSCAPE ARCHAEOLOGY

8.1 INTRODUCTION

From the outset this thesis has had two related aims; a theoretical and methodological essay in integrating landscape archaeology and survey methods (Part I); and a case study looking at how available resources can be combined to study the iron age and Roman landscapes of one region (Part II). Throughout, the intention has been to illustrate the potential that theoretically informed, methodologically integrated, approaches have for the spatial understanding of society in the iron age and Roman periods. The case study confronted a common problem faced by researchers attempting to use an available archive of work carried out in a region to assess new theoretical issues. The problem surrounds the inevitable difficulties encountered with a dataset collected for a variety of purposes and with a range of aims in mind, to assess different questions. In this situation there is always going to be a difference between what we would like to achieve and what it is feasible in the circumstances. Despite the potential dissonance between academic aims and the nature of the extant record, case studies of the kind above provide a great deal of new and challenging information about the landscapes of the period under study. Such an exercise also encourages us to better understand the nature and pressures of public or contract archaeology. In the absence of opportunities to carry out new field work, it is important for the academic aims of research to be integrated with an understanding of the constraints under which the wider archaeological community operates. In this respect the 'integrated' of the title of this thesis is as much a comment on the need for strategies that take into account the strengths and limitations of available records as it is about combining a conceptual understanding of landscapes with survey techniques and excavation.

During the preparation of this thesis, it became apparent that many of the issues and ideas critical to both theoretical and methodological aspects of survey could not be fully addressed within the context of a PhD thesis. In chapters 2-4, however, I outlined some avenues for advancing the application of four techniques as part of an agenda for work in the future. Some of the points to have arisen from the discussions are the subject of a brief overview in section 8.2. Other issues outside the scope of this thesis are currently the subject

of pilot studies, and the enthusiasm and general support for such work given by archaeologists in the region, despite financial and time constraints, have been very encouraging.

Though restricted in their aims, the studies described in chapters 6 and 7 succeeded in providing a series of insights into the landscape archaeology of the region during the iron age and Roman periods. They also flagged up particular biases in the extant record that it is hoped will focus attention in the future. In particular, it has become evident that there is a need first to attend to some of the very poorly understood areas of the county and second to better utilise environmental archaeology throughout the period to explore the subtle variety in first millennium BC landscapes in particular. Section 8.3 provides a brief sketch of some of the key insights gained and focuses on drawing out specific themes in landscape change that arose from the case study.

8.2 THEORY, METHOD AND PRACTICE: AN ARCHAEOLOGY OF DISSONANCE?

8.2.1 Ploughsoil Artefact Assemblages

Significant aspects of the formation and interpretation of ploughsoil ceramic assemblages were outlined in chapter 2, although only some of these could be adequately assessed within the case study. The analyses discussed in chapter 2 identified a series of factors affecting the breakdown and redistribution of ceramic assemblages in the ploughsoil that provide a preliminary model for future studies. The assessments of fabric composition compared to the degree of fragmentation described in section 7.3.1 illustrated the limited, but perhaps significant, biases in the composition of assemblages that can occur. Section 7.3.2 highlighted some of the problems and pitfalls in recording, quantifying and dating unstratified groups over such a large region. Most significant for the aims described in chapter 1, however, were the questions raised about the ways in which we attempt to interpret ceramic data when they have been removed from their stratigraphic context. Section 2.5 noted the lack of consideration given to this issue in the published literature at the time of the study.

Some of the findings of chapter 7 demonstrated the critical problems that the absence of a body of literature creates in the context of interpreting fieldwalked assemblages. Without

other studies to provide a context for the assemblages (see sections 8.2.2 & 8.2.3), it remains difficult to identify whether significant differences between ceramic assemblages reflect differences in the nature of particular activity locales. Section 7.4 identified the highly significant effects of regional pottery supply through time on the composition of assemblages and illustrated a way in which future studies could isolate localised variation. This is critical if we are to start to separate analyses based on the status/function of individual locales from large scale patterns of regional production and exchange (cf. Booth 1991). Unfortunately, until more thought has been given to the detailed relationship between the status and function of activity locales and the deposition of ceramics in their vicinity, we will continue to be constrained to produce over simplistic site classifications based largely on untested assumptions. This issue is particularly important if we are to move away from the arbitrary use of subjective cut-off points at which we determine what constitutes a 'site'. In chapter 1 I suggested that scatters were simply the material correlates of *some* of the past places of landscapes and that what constitutes a significant concentration of material is likely to have been culturally specific both chronologically and spatially. The few studies that have been published (eg. Fasham 1994; Hill 1995a; Willis 1993; Going 1992; Evans 1988; Griffiths 1989; Booth 1991) have shown marked differences in the nature of assemblages from different types of foci through time. Such approaches can be developed in future to provide information for the interpretation of survey data. Throughout chapter 7 I consciously avoided using terms such as settlement or site as they have a number of connotations that have yet to be demonstrated. Though many of the scatters from Northamptonshire were undoubtedly from settlements, the analyses in chapter 6 demonstrated that the landscapes of the region were constructed around many different types of place that we are only beginning to understand. Some of these were foci for significant concentrations of ceramic deposition and deserve further consideration if we are to understand the complex patterns of ceramics that are recorded in high intensity field walking surveys of the kind carried out at Maddle Farm, Berkshire (Gaffney & Tingle 1989), in Essex (Williamson 1984) and in the Raunds area of Northamptonshire (Parry forthcoming).

8.2.2 Air Photographic Survey

The essay on air photographic survey carried out in chapter 3 concentrated on the tendency in most published accounts to produce supposedly objective maps. In most instances authors have tended to produce composite maps of the archaeological record rather than tackle the difficult task of analysing and interpreting all the elements recorded. I suspect that this has arisen because of a dearth of theory about the role of architecture in the formation and articulation of landscapes. Instead, the site-orientated philosophy that has characterised much British archaeology until recently, and that has so affected the excavated record (section 8.2.3), has produced a series of site classification strategies that are inappropriate to the analysis of landscapes. This has been a particular problem where pre-defined typologies have been adopted, giving a primacy to certain morphological forms and then classifying all elements in relation to them. An objective system of classification is probably impossible, but two key suggestions were made about the directions we could take in relation to a more analytical methodology. ^{The} First, was the use of explicitly defined criteria for recording archaeological features using the basic structural elements that can be recorded, and that are broadly akin to contexts in excavation. Interpretation of archaeological structures is then founded on recognisable decisions about what constitutes a coherent group of elements rather than on pre-existing 'known' forms. The degree of association is determined by the four forms of elementary structural relationships (ESR) described in section 3.3.1. ESR can also be used as an analytical tool for suggesting the degree of continuity or contiguity of the spatial organisation of landscapes. It can provide a useful starting point from which to investigate major changes in the structure and orientation of landscape architecture, a key guide to changes in the spatial organisation of society through time (cf. chapter 1 & section 8.3). The case study did not provide a suitable context in which to attempt this kind of analysis, as the studies in chapter 6 focussed on three limited blocks that often provided few crop marks (eg. area 3 section 6.4). Furthermore, additional ground survey and purposive trial excavation are really needed to test the effectiveness of ESR and these were not feasible in the case study. This is a problem touched upon in section 8.1 and has been experienced by others such as Bewley in his investigation of the use air photography in Cumbria (1994). ESR was, however, used to provide phased cropmark plans that were integrated with excavated and geophysical data wherever

possible. Thus air photographic evidence was used in a supporting role to give contextual information about the foci studied in detail in chapter 6 (eg. Maxey 64 & Ecton 33).

The second suggestion, made in section 3.3.2, was based on the observation that the uncritical acceptance of morphology as the primary method of recording cropmarks was possibly hampering analysis of the roles of landscape architecture. The experience of much of the discussion in the case study (chapter 6) has indicated that the roles of landscape architecture are more profitably studied through aspects of their location and spatial interrelationships. This is not to suggest that we should look for normative explanations based on the relationship of features with say, soil types, but does recognise that a sophisticated understanding of topography, earlier places and neighbouring structures were key parts of their construction and use. Pit alignments, for example, seem to have been particularly closely related to subtle changes in topography and drainage and the presence of existing locales. It is imperative, therefore, to produce recording methods that are both analytical and flexible to changes through time.

Many of the suggestions made in chapter 3 and above can be brought together to construct an outline methodology for a future pilot study in the region. Figure 8.1 shows the outline structure of such a recording system. It is designed to show the relatively uncomplicated path by which survey passes from the preliminary phases of area selection and mapping (A & B), to the initial unravelling of the palimpsest of information through the use of ESR, excavation, and site classification (C), to the production of interpretive maps and recommendations for further research (D & E). The preliminary survey is carried out on a county wide basis to select the areas most likely to produce good quality information by assessing the extent of previous aerial reconnaissance, the quality of the surviving archaeological record and the intensity of existing fieldwork (eg. figs. 3.2, 3.3, 3.4, & 5.11-5.15). Using such information, areas can be selected within the overall region for further analysis. The size of the county is far too large to attempt more than a sampling exercise initially, but the data from it would supply a valuable framework with which fieldwalked material can be combined. The pre-survey analysis (Bii) is really just a more detailed version of figure 8.1A, only for the mapped areas. The selection of mapping scales is based on the need for relative accuracy in plotting the crop marks (aided by the use of the AERIAL computer program) and the need to be able to show their ESRs. This,

however, has to be tempered by the desire to preserve the landscape context of the features by being able to cover sizeable areas within a single map. The mapping records are broadly similar to Whimster's (1989) Interpretation and Mapping Units and are intended to systematically record the reconnaissance history and post-reconnaissance treatment of each 1 x 1 kilometre block mapped.

Once the initial maps have been produced, the further analysis and interpretation of features can proceed. The approach used is outlined in figure 8.2 and begins with a two-fold study of information available about the range of forms and functions of features and complexes from existing excavations and surveys, such as those carried out in chapter 6, and from the mapping exercise. The former provides an initial assessment of whether particular attributes such as shape and size have any significance for the date of construction or use of a monument. The information available from excavation and groundwork in Northamptonshire, however, is founded largely on local individual research or evaluations in advance of development and is therefore not representative of the total diversity of the archaeology present (cf. chapters 5 & 7). This bias can be tempered by studying the air photographic maps to look at the full range of features in order to structure the classification so that it is able to take account of them, particularly in the upland areas that have been subject to little ground evaluation. The interpretive records are designed to produce interim statements on the probable date and nature of crop mark sites. The sites are then, where possible, combined into period maps along with additional information on paleogeography, archaeologically dead areas and other fieldwork, for discussion of the themes outlined in chapter 1.

Both the analytical records and the interpretive maps can then be combined in providing recommendations not only into further research but also to act back on the structure of the survey itself (using the findings from chapter 6 for example). This should alter the criteria used for the recording and grouping of elements and sites as new information becomes available. Ultimately, this should lead to a methodology that is better tailored to analytical landscape studies. It does not necessarily produce a system which can be used for other areas of research, although the basic principles of flexibility, purpose of classification, and feedback behind it are more widely applicable.

The current programme of computerisation of the air photographic archive for Northamptonshire within a geographical information system should, within the next few years, provide an ideal opportunity for more sophisticated spatial analyses of the type outlined above. Some of the ideas discussed here have also been the subject of a small scale study as part of the Holme on Spalding Moor Project, East Yorkshire (Taylor forthcoming). This has offered some promising insights into the iron age and Roman archaeology of a comparatively little studied area by providing a framework of major changes in settlement organisation and landscape change in a marginal wetland.

8.2.3 Geoprospection

The four techniques discussed in chapter 4 have become an increasingly common source of information for both surveys and excavations. Sections 4.2 and 4.3 suggested the value of magnetometry and resistivity for extending the architectural context of locales subject to excavation, or in prospecting areas not susceptible to air photography and fieldwalking. Geophysical surveys are now a common part of archaeological evaluations carried out in Northamptonshire. Such surveys are clearly a result of development pressures that do not provide a systematic research base and it has thus taken time to build up significant numbers of cases where geophysical survey has substantially enhanced the understanding of iron age and Roman landscape architecture. In the case study, many of the featured areas received most attention before the routine use of geophysics in a rescue context. As a consequence they only provided occasional instances of additional architectural information away from excavated areas and not recorded on air photographs. This is exacerbated by the continuing tendency to survey only those areas that are subsequently going to be excavated and no more. Though useful in planning excavation, this practice has the unfortunate effect of making most geophysical survey data redundant soon after it has been collected. Furthermore it perpetuates the tendency noted throughout this thesis to provide little or no contextual information to link excavated evidence into its local landscape. The chronic shortage of contextual information about Roman settlements is partly a consequence of this approach. Exceptions, such as the magnetometer survey at Wollaston 107 (cf fig. 6.25), demonstrate how even a limited amount of additional information can be invaluable to a better understanding of the layout and landscape

context of particular locales. In the Wollaston example the survey indicated the ovoid form of the excavated enclosure and its alignment alongside the key axial boundary. Recently, examples of more systematic surveys have shown the considerable benefits to be gained from such an approach. Perhaps most striking amongst these have been the results from the extra-mural area at Irchester (55) and the large villa at Cotterstock (26), which both provide useful information about two settlements that were the subject of considerable antiquarian interest but that are still comparatively poorly understood.

Sections 4.4 and 4.5 highlighted the complementary uses of magnetic susceptibility and phosphate surveys. Their ability to identify patterns of activity that were not defined by discrete architectural features or the deposition of significant quantities of artefactual material could be invaluable in understanding the less visible places of past landscapes. Within the county, however, they have rarely been applied outside the narrow confines of excavation. Though such analyses have proved useful in the context of studies at Fengate 35 (Conway 1983; Craddock *et al.* 1985) and Maxey 64 (Pryor *et al.* 1985), they are of little help to the wider scale evaluations preferred here. As such there was little or no available geochemical or magnetic susceptibility data that was of use to the case study. Partly as a response to this, a small scale research programme of sampling has now been started in conjunction with the large scale excavations currently underway at Wollaston (107). Though limited, they should provide a test database on which to assess some of the suggestions made in section 4.6 about using multivariate approaches to characterise locales from the surface (Taylor in prep.).

8.3 LANDSCAPE ARCHAEOLOGY AS THE SPATIAL EXPRESSION OF SOCIAL RELATIONS: SOME THEMES FROM THE CASE STUDY

The methodologies previously discussed can only be worthwhile in the context of results obtained. Although the case studies did not provide a full context for developing all the issues I would have liked, a new view of the landscapes of the region has nevertheless emerged. The following is not intended as a comprehensive account of cultural change in Northamptonshire which, in any case would be inappropriate to the complexities of the evidence described in chapters 6 and 7. Instead, I simply wish to pursue some lines of thought

raised in chapters 1, 6 and 7 as a way of approaching some long term changes in the landscapes and spatial organisation of communities in the region. In places it is largely speculative, as the quality of available information is still very poor, but as part of the conclusion to this study it is intended as a stimulus to re-evaluating some of our approaches to period. Though the focus of the case study was always intended to be the middle iron age to Roman periods, such an account must, for reasons that I hope will soon become apparent, start at the end of the Bronze Age and in the early Iron Age.

The bounded agricultural landscapes of the study period were initially founded with the construction of pit alignments during the later bronze/early iron age along the river valleys and their flanking hillsides. Small scale paddocks or 'field systems' have been discovered from later bronze age contexts at Fengate 35 and Stanwick 85 but lie outside the scope of this thesis, and in any case appear to have been a rare feature of the landscape. Unfortunately, the lack of study of the earlier first millennium BC locally, and the chronic shortage of paleoenvironmental data outside the lower Welland Valley, hamper attempts to explain the earlier phases of development.

At present, all we can point to are some of the features of the landscapes of the river valleys and their immediate environs and attempt to explain the context for their construction and maintenance using the concepts outlined in section 1.3. The excavated, air photographic and geophysical survey evidence described in chapter 6 indicate the small scale and ephemeral nature of most settlements, and the seemingly high degree of autonomy but low levels of agricultural, textile, iron and bronze working specialisation during the latest Bronze and earliest Iron Age (c. 900-600 BC). This, Knight (1984) suggested, indicated a dispersed landscape of subsistence farmers which, if we adopt Hill's suggestion, were part of 'atomised relations of production' where individual settlements were the centre of production (1995b, 51). Hill's model for Wessex implied that social cohesion was dependent on 'households' being loosely tied into networks of economic relations based on shared locality rather than kinship. Such a model has some appealing aspects to it and does relate well to the small scale of most settlements within the region at the time. If social relations were indeed structured around the small groups that must have dwelt in the settlements noted in chapter 6, then it is through

assessing the construction and maintenance of their contemporaneous landscapes that we may gain some insights into social interaction.

Before the construction of pit alignments, movement and action seem to have been centred around settlements (the places of dwelling), some earlier ceremonial monuments (eg. Maxey 65) and many ephemeral locales marked by pits or single posts (eg. Tallington 88). During this period (c. 900-600 BC), the landscapes of the river valleys at least were still place-orientated with few if any significant linear boundaries. The lack of paleobotanical and faunal studies hinders discussion of agricultural practice, but French's work in the lower Welland valley (Simpson *et al.* 1993, 141) and Pryor's around the fen edge (1984: Pryor *et al.* 1985) suggest that here, at least, pastoral grasslands dominated, interspersed with small stands of trees and surprisingly little evidence for arable cultivation. In the specific context of the lower Welland and Nene gravels, therefore, agriculture focused on pastoralism which Lambrick (1992, 85) has suggested was a 'land-hungry but labour efficient regime' requiring extensive areas of land to be cleared to provide sufficient grazing for animals to be overwintered. Such a strategy would have required part, at least, of any community to spend significant time away from their place(s) of dwelling and involved methods of negotiation over use of the grasslands lying between individual communities.

This fluid, expansive, use of the landscape contrasts with what is known about the requirements of arable practice which, since the middle Bronze Age, shifted towards short fallow cultivation (Barrett *et al.* 1991; Barrett 1993). As Barrett noted, such schemes tie communities to specific locations in the landscape as a consequence of the continued and relatively intensive maintenance of cultivated land. If individual communities were involved in both pastoralism and short fallow cultivation, a contrast is created between tied dwelling and extensive mobile pastoralism. This dichotomy was probably not as problematic as it might appear. First, individual communities may have divided aspects of the agricultural cycle on age, gender or seasonal grounds, with part of the community remaining fixed to places of dwelling and cultivation while others organised the pastoral regime. A second possibility involves a division in practices between different communities and raises an important issue about the role of the as yet unstudied areas away from the lighter soils of the valleys or flanking limestone hills. The few

excavated sites noted in chapter 6 and Knight's (1984) survey both suggest that the former explanation better fits the available evidence for the river valleys.

Here it is important to note the division made by Ingold (1986) between territoriality and tenure as forms of spatial social expression. These concepts provide a useful tool for investigating the social basis to the changing constructions of landscapes described in the case study. Ingold made the distinction that 'territorial behaviour is basically a mode of communication, serving to convey information about the locations of individuals dispersed in space. By contrast ... tenure is a mode of appropriation, by which persons exert claims over resources dispersed in space.' (1986, 133). Territories thus act as spaces where one individual or group holds dominance in decision making over others. There is no necessary 'ownership' or denial of access across territorial boundaries, only that 'visitors accept a position subordinate to their hosts' (Ingold 1986, 134). Tenure, by contrast, requires that a place is 'bound into the biography' (1986, 137) of an individual or group. It involves ownership of the generalised potential of a place. Regarded as such, tenure can take three distinct forms: zero dimensional, one dimensional, and two dimensional. In zero and one dimensional tenure, appropriation is achieved by holding places or pathways; two dimensional tenure extends control over definite surface areas. These forms of spatial social expression need not be mutually exclusive, as Ingold himself admitted (1986, 156). Using these concepts, the cultural landscape of the early first millennium BC seems to have been constructed around the zero and one dimensional tenure of places and pathways.

If Ingold (1986) and Barrett (1993) are correct in suggesting that two dimensional tenure is a necessary corollary of short fallow cultivation, then it was not expressed through the construction of boundaries that survive in the archaeological record. Given the possibility that, in the valleys at least, arable agriculture was a relatively small scale practice in the vicinity of dispersed settlements, it is unlikely to have taken up considerable areas of the landscape. In a social milieu in which pastoralism was pre-eminent, arable cultivation may not have been an issue of conflict or negotiation. In the absence of identifiable boundaries, the limits of appropriated land may have been determined purely through continued cultivation. If a plot ceased to be cultivated, it ceased to be appropriated and returned to the wider grassland landscape.

In such a scenario the main areas of social contact between groups lay in the pastoral part of the agricultural cycle. This 'land-hungry' practice would have required the management of grasslands that lay between neighbouring communities or at seasonally significant zones in the landscape (such as floodplains or on the upland boulder clays for example). The pastoral areas were not part of the tenured landscape but were the focus of territorial communication. The grasslands were neither appropriated as part of two dimensional tenure or, to use an all too often quoted term, held in common. They were the theatre for complex daily and seasonal practices that were regulated and formalised through the construction, use and maintenance of territorial markers such as the pit groups, posts and earlier ceremonial monuments underlying or adjacent to later pit alignments. These, to use Ingold's terminology, worked more like 'sign-posts than fences' (1986, 157), helping to orchestrate communication and action between dispersed communities. In this way groups knew where their neighbours were at any time and could, for example, enact 'negative co-operation' (Godelier 1979) whereby each group ensured that they did not use the same grazing areas or occupy them simultaneously. The only parts of this landscape that were appropriated were the territorial markers themselves. Ownership (in this case zero dimensional tenure) of these places simply established guardianship of the landscape surrounding them. There was no requirement for the exclusion of visiting individuals or groups but simply that they had to defer to the wishes of their hosts. The markers, as a focus of social and agricultural reproduction between communities, would have required constant renegotiation and were at least as significant places as the archaeologically more visible settlements.

Although superficially appearing self-sufficient, individual settlement groups were dependent on the pastoral aspect of their regime for social, economic and biological reproduction. If social cohesion was linked to the degree of contact between groups, then wider communal identity (tribes or clans for want of a better terminology) formed around those groups who most commonly shared or co-operated in the use of the grasslands. Thus identity was based on shared locality and territorial contact rather than primarily on kinship.

Whether or not the above commentary is a reasonable account of the social landscapes of the regions' river valleys, it is not one that lasts through the early Iron Age (c. 600-450 BC). A discussion of the wider arguments about change in the earlier first millennium BC lies outside

the scope of this thesis, but I have drawn upon a few of them in order to comment on some of the findings of chapter 6. Once again there is very little paleobotanical evidence from the region for this period, but what there is suggests a marked shift towards the intensification of arable cultivation and the creation of an arable surplus (cf. Knight 1984; Robinson & Wilson 1987; Williams 1993).

A social milieu that focused on the creation of arable surplus as an important material resource would have made the control of arable land an imperative that wherever possible should be expanded. Emphasis on arable production and possible expansion in cultivated land area created different conditions for social interaction between communities. First, it probably involved the appropriation of areas formerly incorporated within the context of territorial relations. In effect parts of the landscape that had previously been a negotiable resource were now bound exclusively to the biography of individuals or the group to which they belonged. Second, settlements became a more significant focus for social reproduction during the course of the early Iron Age and into the earlier middle Iron Age (c. 600-350 BC). In the middle Nene valley group 5 settlements became the arenas for social and agricultural reproduction seen through the appearance of four posterns, more substantial roundhouse architecture, and enclosing or screening palisades. Increased emphasis on arable production would, I suggest, have involved a parallel change towards two dimensional tenure that may have been expressed architecturally through the screening or enclosure of settlements and sometimes neighbouring areas. The construction of linear boundaries, whatever their precise form, now delimited two dimensional areas and created an inside and outside world. Thus settlements were physically and socially isolated from their surrounding landscapes, creating a world increasingly viewed from a central place of dwelling. The physical boundaries visually delimited the extent of the appropriated space of dwelling in a way that may also have been designed to emphasise continuity and permanence. Unlike most arable land which, being largely devoid of boundaries, may have relied on continued cultivation to maintain tenure, settlements now had spatial limits that would remain regardless of the precise size of the groups dwelling within. Such a strategy helps to address a concern of Hill's (1995b) about how the unstable social prestige of individual 'households' (settlement groups) could at least appear to be maintained through successive generations.

Beyond settlement the implications of this change in social strategy may have been most acutely felt if arable (tenured) land expanded to a point where it created pressure on territorial relationships. Such problems would be most acute where existing places in the pastoral landscape or the pathways between them were encroached upon. If a contraction in the available grasslands was socially acceptable or new grasslands could be created through clearance or expansion into other areas, then some of these problems could have been mitigated.

It might seem questionable whether arable expansion was significant before the latter part of this period or the middle iron age. A change in the pattern of land use, however, could have had a greater impact on social relations. This is because a desire for surplus arable cultivation may have placed a premium on tenure over favourable soils. Such a strategy encouraged the appropriation of certain parts of the landscape such as the higher gravel terraces and thus created localised pressures on existing territorial relationships. *Where this was not possible new social strategies were needed to avoid conflict and to enable social reorientation.*

One mediating strategy can be suggested as a reason for the construction of pit alignments along the river valleys of the case study. The semi-permeable nature but linear form of the alignments produced an ideal architectural form combining the concepts of territorial and tenurial boundaries in one. Many pit alignments in the region linked earlier territorial places into linear boundaries that enclosed or divided the spaces between them. Previously, I suggested that the spaces between grassland places were held as a form of guardianship where there was no clear division of space but simply changing spheres of subordination or domination over rights of management. The pit alignments created a clear line across which one entered different spaces, control over which was dependent upon holding tenure over the marker places incorporated within the boundaries. In this way the zero dimensional tenure of grassland places may have been extended to the two dimensional surfaces between them. Alternatively, tenure may simply have been extended along the alignments as one dimensional tenurial appropriation. Permission would then be required to cross the boundary but not be needed once in the space beyond. Their intermittent form did not create physical barriers to access and so probably allowed the space between to continue as territorial grasslands.

The construction and maintenance of alignments did, however, create clear boundaries between areas of guardianship, removing any uncertainties over rights of dominant access between neighbouring communities. The enclosing effect of the alignments and the way they linked existing tenured places also tightened the connection between territorial rights of access and the biography of specific individuals or groups. In effect, a precursor to two dimensional tenorial control was already being constructed during the earlier iron age. The pit alignments need not have been constructed for, or by, single communities. Though there is insufficient evidence from the Northamptonshire case study, different territorial places held by neighbouring communities may have been tied into the same alignment, thus combining the various rights of a number of neighbouring communities into a single inter-communal resource that largely excluded other, more distant, groups. This appears to have been the strategy used around Stanton Harcourt in the Thames Valley (Lambrick 1992, 90-91), where the alignments created a large central territory surrounded by settlements lying within neighbouring smaller territories.

Whatever the specifics of this process, it is clear that in the river valleys and on the neighbouring lighter soils of Northamptonshire, the construction of pit alignments fundamentally changed the valley landscapes during the early iron age. Once established, the boundaries must have tied communities in these areas (remembering we have little or no information regarding possible upland clayland landscapes) into more formalised spatial relationships. The more fixed, centred, world of individual communities, and the formalised structure of boundaries between them, created a social environment where contact was probably less extensive but more regular. Thus individual communities entered into regular social contact with fewer people but did so more often. This process was far from even or systematic and resulted in the patchwork of blocks of bounded communities seen in the air photographic record and noted in chapter 6. Unfortunately, we have little or no information about the nature of settlement and landscape away from these areas and so cannot consider their relations with other communities possibly occupying neighbouring upland or woodland areas.

There are a number of aspects of the account above, speculative though it is, that are appealing when considered with other trends in this period. First, it helps to place the initial establishment and construction of hillforts within the context of a series of wider changes in the cultural landscape. Second, it is paralleled by a number of changes in material culture and

depositional rites that have been the subject of a recent review by Bradley (1990). Third, it can be seen to provide a social context for the oft observed trend towards increasing intensification of land use and possible attendant population change. Fourth, it provides a meaningful context to the changes observed during the middle iron age.

A number of recent reviews have questioned the role of hillforts as just military and population centres (eg. Bowden & McOmish 1987; 1989; Sharples 1991; Hill 1995a) and in a recent article Hill (1995b, 53) has suggested that some existed as places outside, rather than above, the normal activities of settlements and agriculture. In the discussion above I suggested that access to some of the landscapes of the early iron age was increasingly formalised and restricted to those communities that directly adjoined them. One impact of this was to restrict the opportunities for wider contacts that may have imposed an unforeseen hindrance to access to key events or resources expressing wider social desires or identity. As tenure increasingly tied access to specific individuals or communities, wider freedom of movement became restricted and it may have become imperative to establish and delimit important places of communication, mediation, exchange and ceremony that helped to orchestrate wider concerns or conflicts between neighbouring areas. The known early palisaded settlements, such as Wollaston 108, and the hillforts all appear to have been located on ridges and spurs overlooking the valleys and at the fringes of the emerging blocks of bounded landscape in central and south west Northamptonshire. In this respect they seem ideally situated to have acted as places outside, or at the edge of, linked groups of river valley based communities. They were well placed for contact between neighbouring blocks of communities that we may think of as emerging polities whose shared interests, bonds of locality and regular contact gave them a closer sense of shared identity than with more distant groups. The palisaded sites and early stage hillforts can then be seen partly as foci for renegotiating rights to open parts of the landscape that still lay between these communities. Alternatively, they may have provided an arena for communicating relations between them and communities living in the unbounded landscapes, operating different social strategies that could on occasion lead to misunderstanding or conflict. Such an explanation does not exclude the significance of hillforts in warfare, as these foci of inter-communal contact were likely to be fundamental in periods of conflict, when establishing control over them would have provided legitimation for the aims of the

controlling group. Hillforts are, however, a relatively rare occurrence in Northamptonshire that tapers out to the north of the region.

If hillforts played an important part in orchestrating and unifying communities, their relative scarcity begs further questions about the spatial reproduction of society that have received comparatively little attention (though see Hill 1995b; Willis forthcoming). Willis notes that many of the landscapes of the East Midlands (predominantly Leicestershire, Lincolnshire and Nottinghamshire) did not feature hillforts or indeed many of the monumental constructions that are notable in other iron age landscapes of the south and south east. The lower Welland and Nene valleys around the Fen edge seem to fall into this sphere, with the evidence from case study 1 (section 6.2) and surrounding areas recording few monumentalised enclosures, dykes or ramparts. An exception appears to be the multiple parallel ditch systems (noted in case study 1, fig. 6.21) that have been found associated with and without pit alignments in river valleys throughout the north of the county and beyond (eg. Maxey fig. 6.3; Barnack fig. 6.15; Lynch Farm 61; Ketton and Tixover in Leicestershire, Mackie 1993). Unfortunately many are unexcavated or undated, but they seem to stem from at least the early iron age in their earliest form and go out of use by the first century AD. Where studied, they appear to have been multiphase constructions that often delimited the extent of pit alignments and/or ran perpendicular to the course of the valley, thus dividing it into sections. If, as I have suggested, hillforts fulfilled a number of roles in social cohesion and interaction then, as Willis (forthcoming) has commented, their comparative absence from the north of the county and neighbouring areas implies that other forms of action were used to work through these requirements. If so, the valley boundary systems may deserve greater attention than they have hitherto received.

Bradley's recent review of depositional practices (1990, 155-189) highlighted three trends during the early to middle iron age; a restricted distribution of metalwork, a decrease in their numbers, and the appearance of specialised deposits of human and animal remains, often associated with storage pits or around the perimeter of settlements (cf. Wait 1985). Bradley, following Barrett (1989), used this evidence to suggest that emphasis was now placed on depositional practices that 'stressed the links between the population and the fertility of its land' (1990, 164). A number of these associations were to continue in changing forms throughout the middle and into the late iron age. They link well with the parallel shift towards emphasising

places of dwelling, changing tenurial and territorial relations connected to a possible expansion in cultivated land, and the production of an arable surplus, noted above.

During the middle iron age (c. 400-100 BC), the discussion in chapter 6 centred on four main developments in the landscapes of the region. The most apparent was the marked increase in the quantity and quality of structural information. This seems to have been a consequence of a move towards far more fixed, boundary-orientated, landscapes, and the formalisation and monumentalisation of all forms of architecture. Most areas of the river valleys were increasingly incorporated within bounded 'domains' that appear to have been ringed by settlements and other focal places that were themselves often enclosed. This process reached its peak around the second to early first century BC, when a number of settlements and enclosures were provided with monumentalised boundaries, gateways and even walls. This boundary imperative was centred in the most intensively settled parts of the region, but enclosure, the formalisation of structures, and monumentalisation extended to settlements and other places away from the main bounded landscapes (eg. Stanwell Spinney 84). The main difference between the two areas was that in the bounded landscapes, settlements and other foci were increasingly structured according to clear spatial syntaxes. These emerging spatial cosmologies varied according to local constraints and traditions but may have developed as part of a change towards the extension of two dimensional tenure over most of the lowland areas of the region. Where the evidence is best (eg. Wollaston 107), this often seems to have been achieved through action by the small groups of communities that had been tied into partially shared use of the landscape through the construction of pit alignments during the early iron age. This was by no means the only strategy and, in areas that were previously unbounded, new domains appear to have been constructed by piecemeal extension of boundaries (eg. Barnack 9). Frustratingly little is known about the development of the few nucleated settlements that appear at this time, but where information is available, they seem to have formed through a piecemeal grouping of separate settlement units or by budding off to create new units. Even less is known about the landscapes of such settlements and so it is difficult at present to judge how surrounding areas were structured.

In low lying areas the impression is of landscapes that were becoming ever more restrictive to movement beyond neighbouring groups of communities. In this closed down

society, settlements and boundary places were extremely important foci for agricultural and social reproduction beyond individual domains. Within the domains, the absence of internal divisions suggests that intercommunal co-operation was great and it is possible that we may be seeing the emergence of one form of slightly larger social polity at this time. (cf fig. 6.3)

The presence of other less well investigated forms of settlement and landscape construction, particularly away from the river valleys, indicates that there were almost certainly other forms of communal interaction and local social organisation. Possibilities include the continuation of relatively isolated single settlement communities in some of the unbounded upland landscapes, with far more flexible social relations to other groups (including the lowland polities I have just described) and the beginnings of nucleated communities that appear to have maintained their 'household' structure but were now tied into single larger settlements, and who operated very different tenorial practices. This patchwork of communities, exercising a complex and subtle range of social and tenorial practices, is paralleled by the early stages of changes in agriculture, and iron and textile production as specific communities appear to have started to develop specialisations that were to characterise the late iron age (Evans & Serjeantson 1988; Jones 1985; Haselgrove 1989; Henderson 1991; Hill 1995a).

In part the developments witnessed between 400 and 100 BC may have been a consequence of the changes in agriculture and tenorial control noted for the early iron age. As communities or groups of communities established tenorial control over parts of the landscape best suited to arable production, other communities adopted strategies to counter imbalances in social relations. Compensation through changing labour practices, arable innovation, pastoral specialisation and seasonal iron or textile production are all possible directions that may have been taken.

By the late iron age (c. 100 BC-AD 60), the infilling of the river valleys and their boundary definition were virtually complete. The studies in chapter 6, however, suggest that during this period many of the forms of landscape created during the middle iron age were replaced by new expressions of social relations and landuse. Key amongst these is the appearance of more nucleated settlements along the river valleys, at a time when many smaller settlements were abandoned or changed location and the hillforts of the region were largely ignored. The fundamental restructuring of settlement was paralleled by changes in the landscape, as many

boundaries were infilled or allowed to silt up, and new less monumental boundaries constructed, to create droeways that opened up access across the wider landscape. Thus the inward looking, heavily bounded domains of small groups of settlements were replaced by the beginnings of a landscape of complex and often highly fragmented land division in which settlements were restructured, abandoned or moved. Settlements were increasingly linked to one another and widening networks of droeways as efforts were beginning to be made to drain and delimit areas of the floodplains. Away from the valleys it is difficult to reconstruct the landscape, but the twin processes of settlement abandonment or shift, and the demise of monumental enclosure, occur here also.

As the bounded domains were broken down, many of the boundary enclosures were also abandoned. Increasingly, parts of daily or seasonal practice seem to have returned to settlements which were internally divided into separate activity foci. In both the valleys and upland areas, these processes of reorientation may have had a less dramatic effect on the nucleated settlements than the smaller farmsteads in central and southern Northamptonshire and the Soke of Peterborough. A comprehensive account of such regional variations, however, cannot be covered here, but some general points about the possible social implications are appropriate.

By the first century AD the cultural landscapes of the river valleys seem to have become dominated by more complex landscapes, in which the connections between social cohesion and locational proximity were broken down. It is possible to argue that communal social structure was no longer focused around the shared use of bounded areas of the landscape and the regular contacts this entailed. Instead, tenurial rights were increasingly fragmented into separate holdings that need not have been contiguous. Inter communal social relations probably involved contacts well beyond neighbouring groups that may have been tied to wider or more complex political or kinship allegiances. In this respect the later iron age saw a critical change in which social and political relations were increasingly divorced from spatial/tenurial control and shared access to key agricultural resources, to a situation in which power was invested through the conspicuous consumption of material culture, kinship and access to prestige exchange. In a changed social order the wider landscape was subordinated to material culture and settlement architecture as the foci of personal prestige and power. These changes were not only seen in

the fragmentation of land and the increasingly settlement-orientated nature of the landscape, but the appearance of free standing shrines not linked to physical boundaries that became the focus of conspicuous material culture deposition. They were also apparent in the so-called 'fibula event horizon' (Hill pers comm.; Willis forthcoming), that actually extended to many forms of personal artefact which appeared in great numbers during the late iron age, and even the adoption of individual burial towards the end of this period.

In many ways the incorporation of the region under Roman administration did not initially alter the trajectories of change under way during the late iron age. Many of the changes noted above do not seem not have affected the Lower Welland Valley, for example, until after circa AD 70. The speed of change and direction of architectural expression seem to have varied greatly between different parts of the region (see below). In chapter 6, however, it was suggested that certain factors relating to the establishment and maintenance of Roman power caused additional changes to the organisation of the landscape and social relations of agricultural production. It would require another thesis to adequately address the issues involved, but here I wish to flag two key areas for future study.

The military occupation of this region was *relatively short lived and seems to have had limited impact upon its geography*. Studies that have tended to emphasise the significance of forts in establishing foci for subsequent settlement (Wacher 1966; Rodwell 1975) have missed a more significant consequence of the military strategy of conquest. The need to create a network of roads in order to maintain supply and facilitate administration of the province created the skeleton of a fundamentally different landscape geography. In cutting across existing boundaries, possibly appropriating land immediately bordering the roads and creating a new focus for the redistribution of produce, they may have had important and sometimes unintended effects on the subsequent development of the landscape. In particular they seem to have become a focus for settlement at a time when smaller farmsteads were under pressure and often abandoned.

Alongside the road network, the impact of Roman taxation, and particularly conceptions of land as a commodity, are areas that have received little attention in Romano-British studies. The nature of Roman administration and the collection of taxation have been the subject of some discussion by Millett (1990; 1995), but without yet focussing on the detailed implications of this

for agricultural production. The limited evidence of chapter 6 suggested that, though some exotica may have been more common and certain large scale processing techniques were introduced, the main impact was the demarcation of all areas of the river valleys. The few open areas on the floodplain and in the vicinity of some earlier ceremonial landscapes were now incorporated within field systems that extended tenure to all areas. As social status switched to Romanised forms of display, such as domestic architecture, it is important to consider what effects this had on patterns of production and exchange in the countryside.

As these changes became increasingly apparent during the second century AD, a later Roman landscape geography emerged. The suggestion of small settlement attrition during the third and fourth centuries made in chapter 6 was supported by the survey evidence in chapter 7. In the areas discussed in chapter 6, settlement was increasingly nucleated and oriented towards the networks of roads and their linking droveways. As part of the population of the countryside seems to have left smaller agricultural settlements, we see an expansion in the size of some villas and the appearance of larger nucleated settlements, particularly along the roads. This ran alongside a decline in the redefinition of boundaries away from settlements. The continued maintenance of droveways may suggest that this 'decline' is more apparent than real, as the failure to re-emphasise field boundaries may have been a consequence of stabilisation in the layout of land. If land was a commoditised resource, it had to be objectified and measured and would thus be more likely to be retain its spatial integrity. This would have been a direct consequence of Roman taxation since incorporation of a province was followed by periodic censuses for tax assessment. This involved not only measuring the land but estimating its tax product. How such a process may have been altered by changes in taxation during the late Roman period could be an interesting avenue for future research.

Diversity in the form of focal places, landscapes and land use was a key aspect of the region during the Roman period that is important to study if we are to understand the parochial complexity of parts of the province. As settlements and other focal places became central to cultural landscapes from the late iron age onwards, their detailed study becomes particularly important. Consequently the survey data used in chapter 7 may be a better guide to the landscapes of the period than we might at first think. The evidence available provided only a very crude guide but further emphasised variety in the forms of locales, and thus probably the

landscapes of the region. Using the simplified terminology of five blocks adopted in figure 7.1 it is possible to recognise a complex field of interlinked changes that may relate to some of the developments noted above, or to as yet unstudied local factors.

Area 1 (the south west of the county including the Tove Valley and the limestone plateaux) underwent considerable change during the late iron age but subsequently locales appear to have remained very stable until the end of the Roman period. There was a clear dichotomy between locales with very high and low levels of pottery deposition and they generally cover larger areas than the survey average. Highly Romanised locales were rare and tended to cluster around Towcester and Whilton Lodge. Structural class 2 locales (tiled buildings) were as common as elsewhere, but querns were rarer than usual. Though obviously a tentative suggestion, it is possible that away from the towns this area was characterised by relatively large nucleated places that changed little during the Roman period and which do not seem to have placed an emphasis on arable production or iron working.

In many ways area 3 (the north west of the county, dominated by the deeply dissected uplands over boulder clays) seems similar to area 1. Occupation was again stable from the first century AD, but abandonment (if not a product of pottery supply) seems to have been more common here from the third century onwards. The area also shows few signs of Romanised architectural display and locales were generally smaller than the survey average, with no large ones recorded. If anything, these uplands seem to have been the most isolated and least Romanised of all the areas in the survey, with a landscape characterised by small locales with low levels of pottery deposition and the presence of querns suggesting arable crop processing at a relatively small scale.

The upper Nene Valley and its surrounding hills and tributaries (area 2) present a contrast to areas 1 and 3. Locale occupation largely parallels the survey mean but seems to have been subjected to greater locational instability, with high levels of occupation and abandonment. Like area 3 it was dominated by smaller locales, but as with most of the Nene valley access to higher status pottery was common until the third century at least. Structurally, however, the area has relatively few Romanised locales, perhaps suggesting differences in the methods of status expression across the region. Though not the most ostentatious area in the Roman period, it may have been one that underwent considerable change.

The large number of scatters recorded from the middle and lower Nene Valley and its flanking hills (area 4) provides sufficient information for more subtle spatial differences to be noted. Though occupation and abandonment patterns were similar to the overall trend, the other analyses show some striking differences from other parts of the county. Sizes varied widely, but significant numbers of the largest locales clustered in the Brigstock-Ashton area. High status indicators were also concentrated here and along the middle Nene, with a particular concentration of class 3 locales around Ashton. It is difficult to interpret these data, but it seems that the Middle Nene and the limestone and boulder clays hills to the north west of Ashton were the focus for landscapes dominated by large, high-status places often associated with iron working and crop processing.

In chapter 6 the lower Welland and Nene Valleys seemed to be markedly different from much of the rest of the region. The survey evidence supported this impression, as the occupation and abandonment studies indicated that the area underwent a period of contraction or nucleation during the first century AD. This situation was reversed during the second and third centuries and may have been linked to developments in the drainage and occupation of the Fens to the east and the emergence of *Durobrivae*. Places were generally slightly bigger than average, but there were very few large scatters. Though evenly distributed in the first and second centuries, higher status locales later clustered around *Durobrivae*. This process appears to have been dramatically reversed at the end of the Roman period, with a marked dislocation of activity by the Anglo-Saxon period.

Though limited, the survey evidence highlighted the diverse directions taken by different parts of the region during the Roman period. The evidence in chapter 6 focussed largely on the river valleys of the region and consequently may have overemphasised the similarity of changes in the landscapes of the region. Both chapters 6 and 7 identified the notably different nature and history of the landscapes of the Soke of Peterborough. The greater spatial coverage of the data from chapter 7 also demonstrated that the overwhelming concentration of excavation and air photography along the valleys underestimates the variability of settlement and landscapes. One interesting feature of the bias seems to be that, by concentrating on the valleys, we are in serious danger of over stressing the impact of Roman hegemony on communities living in much of the region. Roman material culture and structural

traditions did not appear to have penetrated the uplands of Northamptonshire to the same degree as elsewhere and there was less dislocation in occupation. In neglecting large parts of the county, there is a danger we are missing much that was significant in the nature of Romano-British society.

On reflection, the thesis has therefore demonstrated three promising developments for the future. First, the theoretical stance taken in chapter 1 and applied to a limited case study, provided a new dimension to the landscapes of the iron age and Roman periods. By asserting the active role landscapes played in society, rather than just considering them as the neutral spatial backgrounds over which people acted, it is possible to better understand the complexities of communal and inter communal landuse and social interaction. Second, the reconsideration of survey techniques in chapters 2-4 highlighted the need for a more theoretically aware, interpretive, approach to their use that stresses their complementarity. In particular there are considerable prospective gains to be had from integrated approaches that place excavation and survey within their proper analytical and spatial contexts. This brings me to the final prospect; an archaeology of the iron age and Roman periods that stresses the social implications of both key long term changes in the way landscapes were constructed and perceived, and the spatial diversity in their forms.

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