Settlement and Landscape in the Late Iron Age of Hertfordshire and the Northern Chilterns

By

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Summary

The Late Iron Age settlement evidence is considered for a geographical area that contains amongst the highest known concentration of such evidence and which has formed much of the basis of understanding of the period. The thesis aims are to evaluate this evidence with respect to:

a. the reasons for the its geographical concentration,
b. whether a critical examination of it can contribute to understanding of social and economic processes in the Late Iron Age.

An assessment of the evidence concluded that deficiencies in the analysis of artifacts and environmental evidence substantially restricts the extent to which it can address the thesis aims. An assessment of geographical distortions also concluded that the potential for spatial analysis is limited by the pattern of archaeological fieldwork.

An analysis of factors, for which it is considered that the evidence can usefully be used, concluded that there appears to be a preference for site location in river valleys and close to principal overland routes. It also concluded that earlier Iron Age settlement probably did not have a significant influence upon Late Iron Age settlement.

An assessment of the evidence for defined activities concluded that few sites have such evidence, and most of it is for burial or ritual. Spatial analysis suggested that earlier prehistoric sites were influential in the location of some Late Iron Age ritual sites. Conjectured territories were also identified around some of the major settlements from patterns in the location of Late Iron Age ritual sites.

It is concluded that a combination of agricultural wealth, the bias of archaeological fieldwork, the archaeological visibility of ritual and burial evidence and the development of probably long-lived contacts with northern France, is the likely explanation for the large number of sites within the Study Area. It is also concluded that developments in ritual practices in the Late Iron Age may have been a key factor determining the nature of the archaeological evidence.

Acknowledgements

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CHAPTER 1: INTRODUCTION

1.1 The Late Iron Age of Southern England (Figure 1.1)

The period from c150 BC to AD 50 in Southern England is characterised by a number of important changes and developments in the nature of the evidence which can be used to reconstruct histories and models of the past. Most notable of these are the appearance of more archaeologically visible burial and ritual practices including some burials that were richly furnished with imports, the introduction and use of coinage, new forms of pottery, the first use of the fast potter's wheel, evidence from written sources, and the appearance of large settlement and dyke complexes (see Haselgrove 1984 and Hill 1995 for a summary of the evidence).

The Late Iron Age evidence has been the subject of a number of studies and reviews, most of which have been linked to political and historical models of developing links with Gaul and Italy as the Roman Empire expanded northwards and westwards during the later 2nd and first century BC. Most notable are those of Evans, Allen and Haselgrove on the coinage (Evans 1896; Allen 1944; Haselgrove 1987a), Birchall's review of continental affinities with the burial and pottery evidence (Birchall 1965), Thompson's and Rigby's work on the pottery (Thompson 1982; Rigby 1986; 1989) and Whimpster's assessment of the Aylesford burial evidence (Whimster 1981). As a consequence of these studies, the character of much of the artifactual evidence for the Late Iron Age is reasonably well understood, although the nature and chronology of links with Italy and Gaul is still the subject of review (Hill et al. forthcoming; Creighton forthcoming; Haselgrove 1996). Figure 1.1 shows superimposed and simplified distributions of the evidence for three of the Late Iron Age innovations, Aylesford burials, wheel-turned 'Belgic' pottery and inscribed coinage. It also shows the location of the most important settlements in southern England.

1.2 The Problem with the Settlement Evidence

The evidence for Late Iron Age settlement in southern England, in contrast to that of artifacts, has been relatively little studied, particularly with respect to the analysis of its

The Study Area, Distribution Boundaries and Location of Major Sites

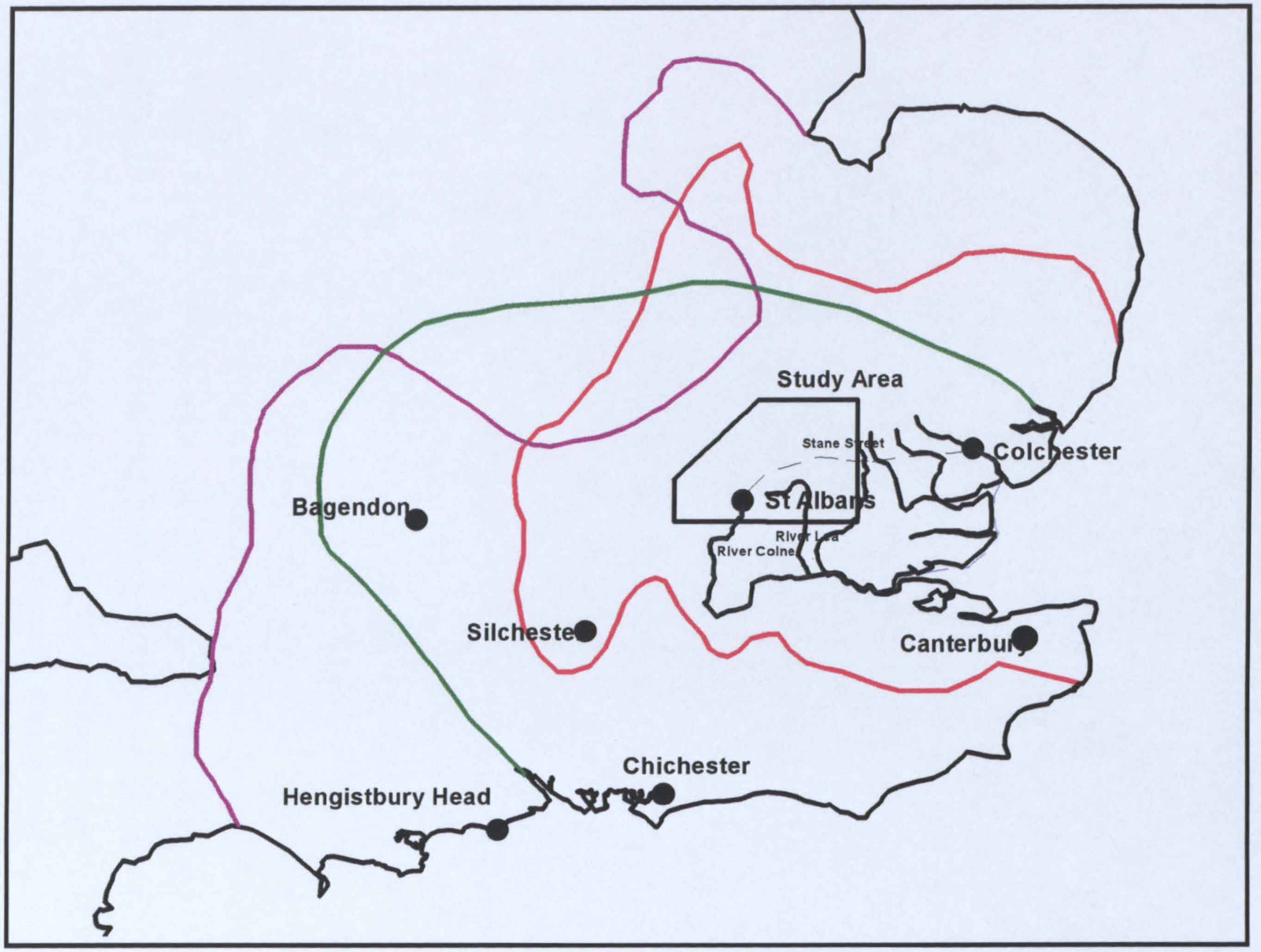


Figure 1.1

role within the contemporary social and economic system. The large settlement complexes, usually refered to as *Oppida* are well represented in the literature of the period and have been the subject of several reviews (Cunliffe 1976; Rodwell 1976; Collis 1984a) but they represent only a relatively small proportion of Late Iron Age settlement. A number of local and regional reviews and syntheses have also included the Late Iron Age e.g. Simco (1973) for Bedfordshire, Knight (1984) for the Nene and Ouse valleys, Sealey (1996) for Essex, Bryant and Nibblet (1997) for Hertfordshire, Champion and Champion (1981) for Hampshire and Bedwin (1984) for Sussex.

However, there are few detailed regional or local studies of Late Iron Age settlement evidence which have considered all of the settlement and burial evidence for a defined geographical area. Those which have been carried out are either peripheral to southern England such as Knight's corpus for the Nene and Ouse valleys (Knight 1984) or have been largely confined to the notional area of *'Oppida'* such as Hunn's analysis of the St. Albans area (Hunn 1994).

Detailed local, site-based landscape studies of Late Iron Age settlement evidence which include analysis of environment and reconstruction of contemporary Late Iron Age landscapes are also lacking. The assessment of the cultural landscape at the Iron Age site at Maxey, Cambridgeshire (Taylor 1997) and the assessment of the landscape and environment around the Wendens Ambo site within the Study Area (Halstead 1982) both demonstrate the potential of this type of analysis for understanding the spatial and temporal context for settlement, but there are few such studies in comparison with the many examples from early prehistory (e.g. Barrett et al. 1991 for Cranborne Chase)

The reason for the imbalance between the settlement and artifactual evidence in terms of analysis and understanding is probably due, in the main, to the large quantity and complex nature of Late Iron Age settlement evidence for southern England which make it particularly difficult to synthesise adequately. There is, for example, over two times the number of identified Late Iron Age sites in the Study Area than is the case for Late Bronze Age and earlier Iron Age sites even though the former represent less than a quarter of the recorded time and few of the Late Iron Age settlements are easily characterised (see below, Table 5.13). In addition, the richness of the artifact evidence for the Late Iron Age may have perversely resulted in less active investigation of the

settlement evidence than might otherwise have been the case. The fact that many of the artifacts are closely datable and some are exotic imports providing evidence of historically attested links with Gaul and Italy has inevitably meant that most analysis of the period has been concentrated on artifacts which, it can be argued, are relatively more straightforward to deal with than is the case with local and regional analysis of the settlement evidence. Many of the techniques of artefact studies such as pottery fabric analysis and typological classification of brooches are also relatively well-tried and accepted (e.g. for 'Belgic' pottery see Thompson 1982; for Gallo-Belgic imported wares see Rigby 1989, and see Drury 1978 for a detailed study of a local Mid/Late Iron Age pottery assemblage). A similar situation exists with respect to coins, for which techniques of metallurgical analysis (e.g. van Arsdell 1989) and the analysis of deposition and circulation patterns are becoming increasingly sophisticated (e.g. Haselgrove 1987a; 1993).

In contrast, few tools have existed from which it has been possible to put the wide range of disparate and complex Late Iron Age settlement data within a structured framework that could facilitate analysis at the intra-site or regional level. Spatial analysis, particularly central place theory, has been used in the past to analyse the Iron Age data from selected types of settlement such as hillforts (Hogg 1971; Cunliffe 1971) and *Oppida* (Cunliffe 1991), but this has been criticised on methodological grounds and had only very limited potential to explain the origins and development of settlement systems. (Haselgrove 1986; Collis 1986). Two studies have used spatial analysis successfully to examine English regions in the Iron Age: Ferrel has shown that spatial analysis and Central Place Theory can be used to address questions of social organisation in North East England (Ferrel 1997), and Hingley has also identified a relationship between settlement location and form in the Upper Thames Valley which may be related to social structure (Hingley 1984). However, they have both been undertaken in areas where either the settlement system has survived largely intact (North East England and the Cotswolds), or are in areas which have been extensivly studied and are reasonably well understood (the Upper Thames gravels). The application of spatial analysis is much more difficult in landscapes – such as the Study Area – in which settlement data is more geographically distorted in terms of monument survival and archaeological fieldwork

patterns and where the character of Late Iron Age settlements – in terms of their size and date – is less well understood.

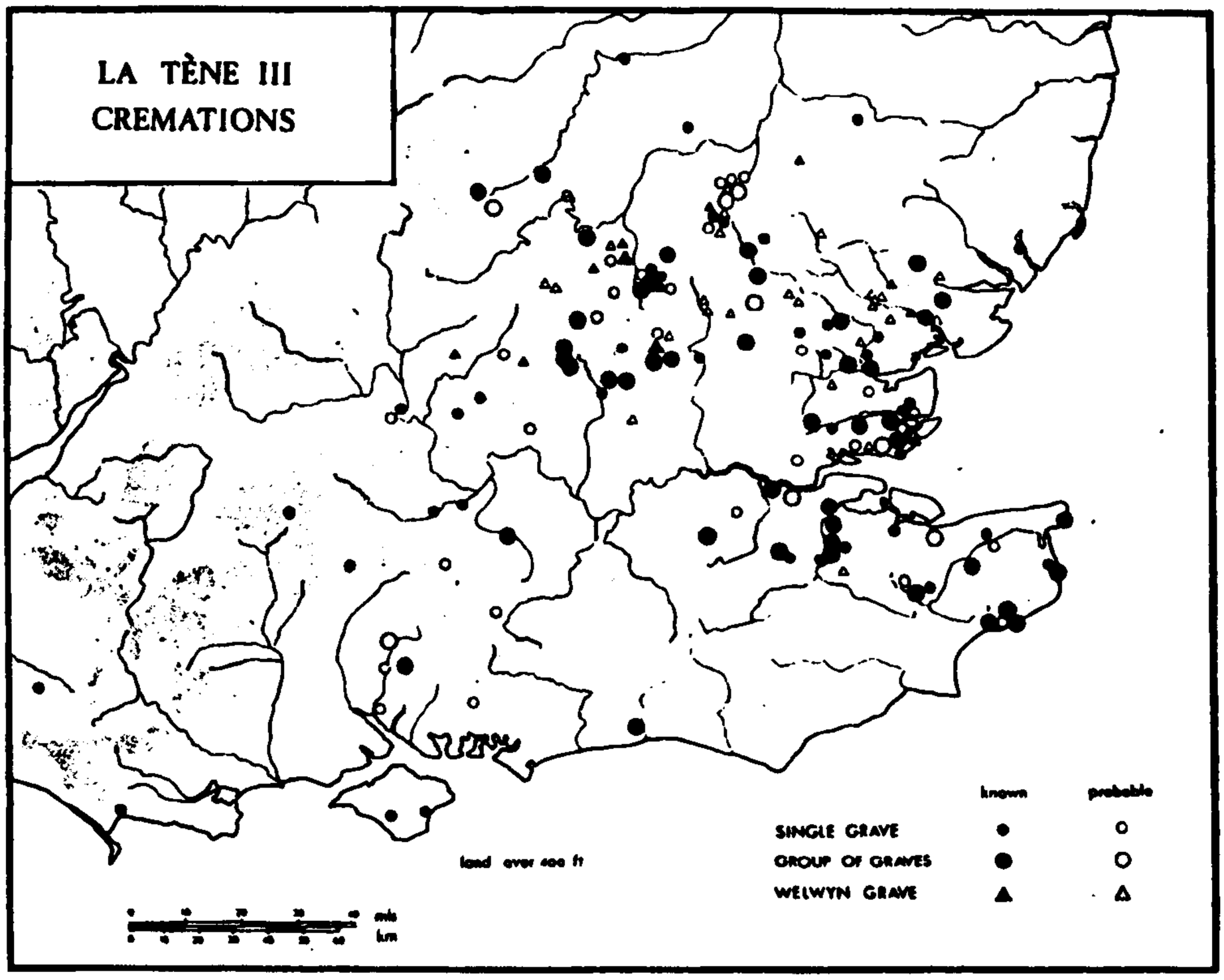
1.3 South East England and the Study Area (Figure 1.2)

The distribution of the changes and innovations which are apparent in the Late Iron Age of Southern England exhibit considerable geographical variations in density and chronology with most of the evidence (coins, settlement complexes, Belgic pottery and cremation burials) being concentrated in southeast England, especially in the modern counties of Kent, Hertfordshire, Essex and West Sussex. This is in sharp contrast to areas such as East Sussex and most of Northern East Anglia, where few changes are discernible in artifacts and burials from the earlier Iron Age through to Roman period (Bryant 1997; Morris 1994; Green 1980).

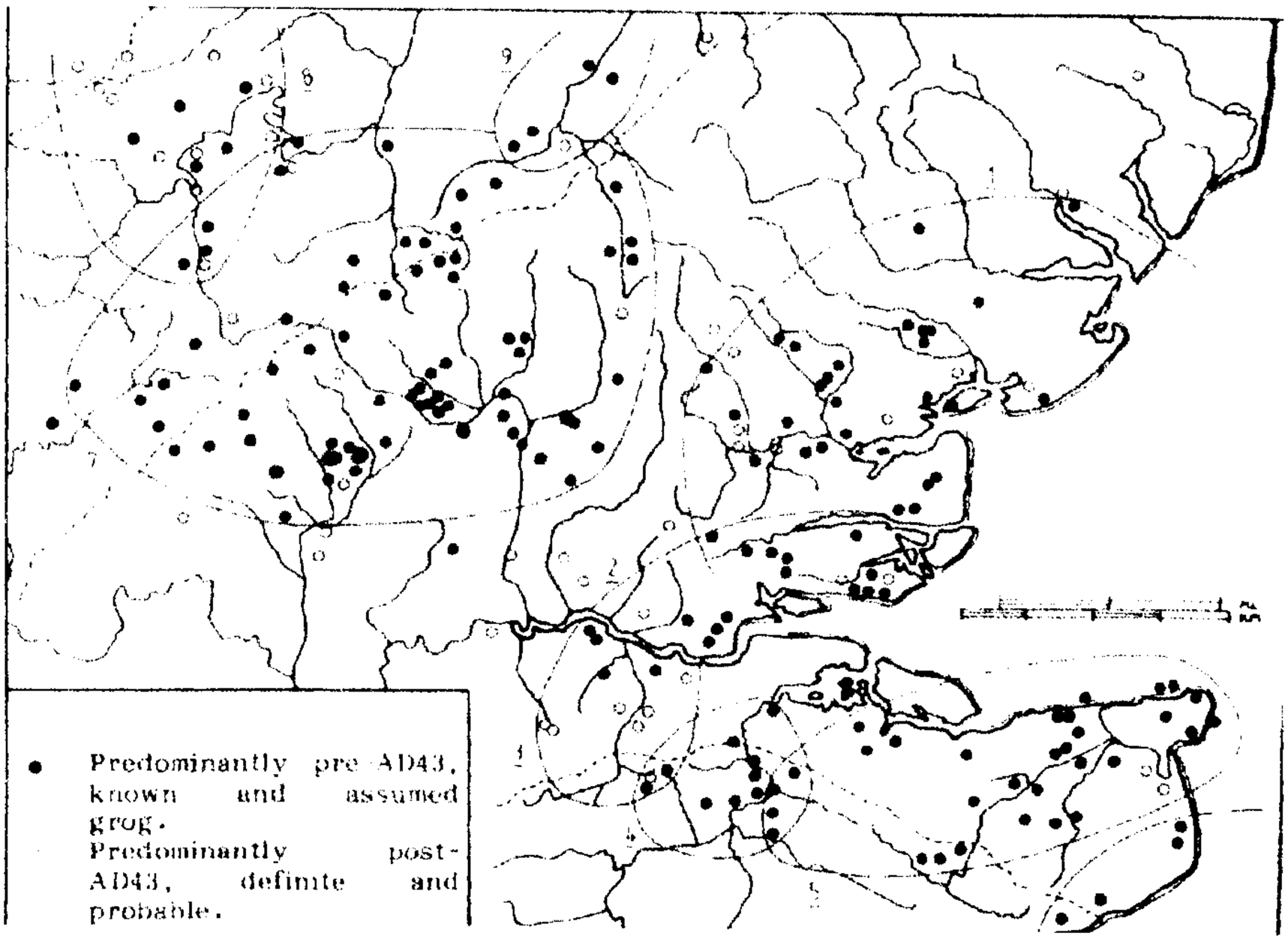
However, even within this core area for Belgic pottery, coins and burials, there are large variations in the density of evidence, with the lower Thames Valley being largely devoid of sites and Hertfordshire and East Essex containing dense concentrations of sites and finds (see Figure 1.2). Several notable campaigns of archaeological investigation have also taken place within the area of dense concentration of evidence in the Hertfordshire and East Essex areas; at Colchester (Hawkes & Hull 1947; Hawkes and Crummy 1985) St. Albans (Wheeler & Wheeler 1936 & Frere 1972; 1983; 1984; Stead & Rigby 1989), Baldock (Stead & Rigby 1986; Burleigh 1995a) and Braughing (Partridge 1977;1979;1981). The results of these excavations have formed much of the basis of current understanding of the period in southern England and tend to dominate the interpretations of the period syntheses e.g. Rodwell (1976), Frere (1978), Haselgrove (1984) and Cunliffe (1991) and also the more general prehistoric reviews (e.g. Champion et al. 1984; Darvill 1996). More recent reviews of the Iron Age by Hill (1995) and the Late Iron Age by Haselgrove (1995b) have attempted to question the wider significance of the evidence from these sites and areas, but their dominance of the published excavation sources and the particular nature of the evidence such as from the King Harry Lane cemetery, means that they still figure large in these interpretations.

The Study Area for the thesis encompasses the major concentration of evidence and published excavations in Hertfordshire, West Essex and the northern end of the Chiltern

Distribtion of Aylesford Burials and 'Belgic' Pottery



(After Whimster 1981:Fig. 52)



(After Thompson 1982: Map 1)

Figure 1.2

Hills. By carrying out a systematic examination of the Late Iron Age evidence for this area, the thesis will assess the reasons for its high density. The thesis will also attempt to understand the character of the evidence in terms of its origins and development, and its relation to social and economic developments in the Late Iron Age.

1.4 Key Questions of the Thesis

The following questions will form the framework of the thesis:

1. **What are the reasons for the relatively high concentration of Late Iron Age evidence to the north of the Thames in the Hertfordshire area**

in particular:

- the extent to which the evidence is a consequence of biases caused from archaeological fieldwork, development and other non-archaeological local factors,

- the significance of the landscape and environment of the area on settlement location,

- the influence of earlier settlement on Late Iron Age settlement location,

the significance of social factors, especially boundaries and religion, on settlement location and development.

2. **To what extent can a critical examination the settlement and burial evidence be used to gain further understanding of social and economic processes in the Late Iron Age**

specifically:

- the characterisation of the settlement evidence, including ritual and burial sites and settlement complexes,

- the identification of polities and social groups.

1.5 Methodology

1.5.1 Summary

The thesis is a retrospective study in which the evidence considered represents the results of over 150 years of data collection, most of which has been un-systematic. The evidence is therefore almost entirely represented by geographically discrete collections of data refered to as 'sites' which vary considerably in terms of quality. Attempts will be made to represent elements of the natural and cultural landscapes within which the sites were located, but the available data for such interpretation is very limited (see Chapters 3 and 7) and the thesis will of necessity be a largely 'site based' study.

In view of the variability of the evidence, a key aim of the thesis will therefore be to identify – and take account of – the biases and inconsistencies which are a consequence of the way in which it has been collected. In order to achieve this, three types of analysis will be undertaken:

1. an assessment of the quality of the evidence,
2. a characterisation of the evidence in terms of the activities and functions which it represents,
3. the analysis of spatial patterns in the evidence including comparison with environmental and cultural data, and an assessment of geographical distortions.

1.5.2 The Use of GIS

A geographical information system (GIS) has been used for the spatial analysis of the site data. GIS has provided the means by which the key questions of the thesis can be addressed by rapidly assessing the large body of spatial data that the Late Iron Age evidence represents against other data sets including environmental and other archaeological data.

The use of GIS as a method of analysis of archaeological data has however been the subject of critical debate (see Wheatley 1993; Archaeological Datea Service 1998; Gaffney & van Leuson 1995). Gaffney and Wheatley have argued strongly that some GIS studies of spatial archaeological data have marked a return to environmentally determinist models and other archaeologically discredited 'positivist' theories (Wheatley 1993; Gaffney and van Leuson 1995). In a recent debate on the subject, Gaffney outlines several particular methodological and theoretical problems with such analysis (Gaffney & van Leuson 1995):

1. the tendency (also argued by Wheatley 1993) that the practitioners use environmental determinants in a simplistic fashion and pay insufficient attention to cultural factors in archaeological explanation.

2. most applications using GIS focus upon locational explanations for archaeological sites without including any adequate qualitative description of what a 'site' is and no assessment of the quality of the data used.

In a reply to Gaffney, van Leuson points out that analysis of spatial archaeological data has in the past been limited by the functionality of the GIS programmes and the nature of the available comparable data sets, which are mainly geographical (soils, height, OS maps). The analysis has therefore been by necessity, environmentally determined. He also argues that at small geographical scales (large areas) environmental factors are relatively more significant than cultural factors in determining settlement location. In conclusion, van Leuson agrees with Gaffney that there have been shortcomings in the theoretical application of the results of GIS analysis but argues that the methodologies which GIS enables are beneficial to archaeology, especially geographical pattern detection (Gaffney & van Leuson 1995:379).

Part of the thesis will be concerned with assessing spatial archaeological 'site' data against a series of environmental factors using only the basic functionality of GIS. It will however aim to address some of the criticisms that Gaffney and others have made of past GIS analysis regarding the definition of an archaeological site/settlement and the quality of the data used. The scale of analysis (at 2300 square kilometres) is also

relatively small (large area) which as van Leuson has pointed out, makes the use of environmental factors relatively more valid provided that deterministic conclusions are not made without reference to cultural factors.

CHAPTER 2: THE GAZETTEER OF LATE IRON AGE EVIDENCE

2.1 The Methodology Used for the Gazetteer

2.1.1 Introduction

This section of the thesis provides an introduction to the gazetteer of the evidence for Late Iron Age settlement and burial within the Study Area. The substance of the gazetteer is presented in tabular form within the content of chapters 3-6 of the thesis, and a summary of this is presented in Table 2.3 below.

The model which has been used for the format of the gazetteer is Palmer's aerial photographic survey of the Danebury environs in Hampshire, particularly the section on excavated features (Palmer 1984:11-18). In this Palmer presents the excavated evidence in the form of a list of sites which included brief details of its type, the period of occupation and the scale of work involved: the stated aim being to provide a quick means of appreciating the number, type and scale of excavations in the area.

For the purposes of the present study, which requires a more wide-ranging assessment of the evidence than was undertaken by Palmer, the number of criteria used in the gazetteer has been expanded to eleven which have been divided into three broad areas:

Table 2.1: the structure of the gazetteer

Event Data
1. Site name
2. National Grid reference
3. Source of evidence
4. Date of event
Interpretation
5. Period

6. The type of evidence
Quality Data
7. The degree of survival of the evidence
8. The standard of excavation
9. The scale of the investigation
10. The standard of the publication of pottery
11. The standard of the publication of environmental data

2.1.2 The Sources Used

The primary source of evidence used in compiling the gazetteer of sites has been the County Sites and Monuments Records of the counties within the study area (Hertfordshire, Essex, Buckinghamshire and Bedfordshire). This was supplemented by records held in the St. Albans Urban Archaeological Database (UAD) and by the North Hertfordshire District Museum Service. Published and unpublished reports and typescripts have also been looked at where these have been available, but archive material from the excavations and surveys has generally not been directly consulted. Attempts have been made to ensure that the information recorded in the gazetteer is accurate. However, it is acknowledged that there are likely to be some errors, for which I accept full responsibility.

2.1.3 The Definition of a Late Iron Age Site

Defining a Site

A Late Iron Age 'site' is taken to be a site/event (see below 2.1.4 for a definition) which has produced material or features which may imply human activity (cf. Hodder and Orton 1976:8; Knight 1984:2). This includes evidence of habitation, either permanent or seasonal, human remains, evidence of ritual practices and other evidence of human occupation (including agriculture, industrial processing and extra-mural activity such as midden deposits) which can be ascribed to the Late Iron Age. Finds of individual artefacts, such as pottery and coins without a context or for which these classes of activity can not reasonably be inferred, have not been

included. This includes single and multiple finds of gold coins which, although, Haselgrove has convincingly argued that most were probably ritually deposited, do not by themselves provide unequivocal evidence for ritual activity (Haselgrove 1987a). An example of the way in which this relatively fine distinction has been made in the gazetteer can be provided by the cases of two multiple finds of gold coins (staters) within the Study Area, at Essenden (Herts. SMR:6821) and Broadway Farm, Berkhamsted (Herts. SMR:7320). The finds at Essenden were found in association with Late Iron Age refuse, including pottery and animal bone and a large deposit of La Tène III metalwork, and have been included in the gazetteer. The archaeological context of the coin deposits at Broadway Farm is unclear, even though several investigations have been undertaken of the site (Hunn 1999). Therefore, even though it is probable that Broadway Farm was a Late Iron Age ritual site, it has not been included in the gazetteer.

Linear monuments which are securely dated – or which probably date – to the Late Iron Age have also been excluded from the gazetteer as individual monuments in their own right. These include the substantial linear dykes at Wheathampsted and St. Albans (Wheeler and Wheeler 1936; Saunders 1982) and the large number of multiple ditches at Baldock (Burleigh 1995a). Although these monuments were undoubtedly important features within the Late Iron Age landscape of the Study Area, they do not in themselves represent evidence of occupation (as defined above), and in most cases their function and relationship to the contemporary settlements and ritual sites is unclear. However, where occupation evidence is associated with such monuments, this has been included in the gazetteer. The significance of these monuments will also be considered as part of the assessment of the Late Iron Age landscape of the Study Area in Chapter 7.

A number of entries in the gazetteer relate to scatters of pottery situated in the same area as undated cropmarks features including enclosures (see Hunn 1996:8 for a list of such sites). Whilst it is highly probable that the pottery is derived from settlements of which the cropmark features form part, in most instances this has not

been demonstrated archaeologically. In such circumstances the entry in the gazetteer relates to the pottery scatter rather than the cropmark features.

Sites, which, on morphological or other grounds alone are thought likely to date to the Late Iron Age have not been included in the gazetteer unless there is evidence that they are directly associated with a dated site. This includes settlement enclosures and field systems which are known only from aerial photographic evidence; a large number of which are present within the study area (evidence from SMRs). Whilst it is likely, based in the instances where these have been excavated, that a large number of the cropmark enclosures do indeed date to the Late Iron Age, (see Hunn 1996 for a list of sites) there is a wide variation in the degree of confidence for dating such sites on morphological grounds alone. This makes the establishment of criteria for their inclusion within a gazetteer of Late Iron Age sites problematic

Defining the 'Late Iron Age'

The term 'Late Iron Age' as used in the gazetteer is defined by the presence of wheel-thrown, grog-tempered 'Belgic' pottery. The definition of the term 'Belgic' is the same as that in Thompson (1982:3), namely:

"grog-tempered pottery in south-east England, which is mostly (but not always) wheel-thrown".

This generalised definition has been used for the pragmatic reason that the majority of sites which have been identified as 'Late Iron Age' within the Study Area have been done so by the finder or excavator solely on the basis of the presence of such 'Belgic' pottery. A definition which was based on closely dated deposits or pottery assemblages would therefore have excluded the majority of entries in the gazetteer including some well-known 'Late Iron Age' sites and virtually all sites nominally dating to before c20 BC. In some instances, a single documentary reference to 'Belgic' pottery has been deemed sufficient evidence to justify being included in the gazetteer, on the basis that such pottery is particularly characteristic and easy to identify.

The Dating of Wheel-Thrown, Grog-Tempered Pottery

Given the above definition of the Late Iron Age, a particular problem for the thesis is caused by the uncertainties over the dating of the period of use of 'Belgic' wheel-thrown, grog-tempered pottery. The date for the introduction of such pottery has been the subject of discussion since the later 19th century when Evans first suggested a *terminus post quem* of 150 BC for the pottery in the cemetery at Aylesford (Evans 1890). The pottery from Aylesford and the nearby cemetery at Swarling was subsequently re-dated by Birchall (Birchall 1965) to the later 1st century BC, on the basis of the dates of associated imported bronze vessels and brooches. A debate has subsequently ensued over the comparative dating of coins, Belgic pottery and imported pottery and metalwork, with reference to 'the Problem of the Belgae' (see Allen 1961; Hodson 1964).

The date for the introduction of the potters' wheel (which can be probably regarded as synonymous with the start of 'Belgic' pottery) into southern England is uncertain but a long chronology is now more favoured. Thompson considered that it probably occurred in the second half of the 1st century BC (Thompson 1982) and Sealey has recently suggested that the use of wheel-thrown grog-tempered pottery did not spread to most settlement sites in Essex until c50 BC (Sealey 1996:55). However, Haselgrove & Millet (1997) and Hill (forthcoming b) now argue for a significantly earlier introduction of the potter's wheel, possibly from as early as c125 BC, which ironically marks a return to the original 19th century dating by Evans.

The ending of the manufacture and use of 'Belgic' pottery also provides problems in terms of inclusion of sites in the gazetteer. Some of the grog-tempered jars appeared to have continued in use until the end of the 1st century AD (Thompson 1982:88,218). It is possible that by this time much of such pottery had fallen out of use and was therefore residual. Nonetheless, the high proportion of grog-tempered pottery in some deposits would suggest that some of the forms did continue to be used up until as late as cAD 100. It is possible therefore that some site entries in the gazetteer which have been identified as Late Iron Age on the basis of the presence of Belgic pottery may not have started during the later 1st century AD. However,

in instances where the earliest dating of a pottery assemblage that includes Belgic pottery is provided by Flavian Roman pottery (post cAD 70), the site has not been included in the gazetteer. It is therefore possible that some sites in the gazetteer could date up to AD 100, or even later, but where dating evidence is available, cAD 70 is taken to be the *termimus ante quem*.

'Late Iron Age' as used in the gazetteer is therefore primarily a cultural or artifact derived term and, in so much as it refers to a chronological period, this can be taken to date from c125 BC to cAD 70.

Wendens Ambo and the Williamson Survey

In using this definition of Late Iron Age, the status of one site (Wendens Ambo) has proved to be problematic. Although the site appears to have been occupied throughout the Iron Age and Early Roman periods – including the Late Iron Age – no wheel-thrown 'Belgic' pottery was recovered from the extensive excavations (Hodder 1982:24-9). However, a Late Iron Age coin of Tasciovanus (c30-10 BC) was found from the excavations of an adjacent part of the site in 1853 (Brinston 1963:199) and 'Belgic' pottery was also found in 1946 (ibid.). The evidence from 1946, although the least well attested archaeologically, provides the best evidence for a Late Iron Age presence (using the above definition) and has therefore been included as the basis of the gazetteer entry.

The cultural/artifact definition of Late Iron Age which as been used for the gazetteer has also meant that the Iron Age sites discovered by Tom Williamson in the north east corner of the Study Area (in the vicinity of Wendens Ambo) have not been included. Twenty eight probable Iron Age settlement sites were discovered by Williamson (Williamson 1984:129). However, the pottery in all cases is undifferentiated 'Iron Age' type, with sand, flint and vegetable temper, and no wheel-thrown or grog-tempered wares were specifically identified. It is possible that, when considered together with the evidence for Wendens Ambo, Late Iron Age sites in this part of the Study Area did not use, or had only a minimal use for, wheel-thrown wares. However, even though such sites may have been occupied

during the 1st century BC and the first century AD, they do not fall within the definition of Late Iron Age used for the gazetteer.

Geographical Precision

Sites which can not be located geographically to within one kilometre, or for which the evidence is in other ways ambiguous, have not been included in the gazetteer.

2.1.4 The Criteria used for Inclusion in the Gazetteer: the Site/Event

Introduction

The basis for the inclusion of each entry in the gazetteer is the archaeological 'site/event' the definition of which is derived from the event/monument/archive data model (Bourne 1999; CIDOC 1995).

Archaeological Events

The most recent and succinct definition of an archaeological event is by Catney (1999):

"*An event is a single episode of primary data collection over a discrete area of land. This single recording event can only consist of one investigative technique and is therefore a unique entity in time and space*".

Archaeological events can include: archaeological surveys, excavations, watching briefs and observations (including antiquarian observations). However, this definition of an archaeological event excludes all desk-based research on the grounds that such research records previous archaeological events rather than creating new ones. An archaeological event is therefore something that can be defined in space and time, although this information sometimes may not be readily available, such as for antiquarian observations.

Archaeological Monuments

In the event/monument/archive data model, an archaeological *monument* represents an interpretation of the data produced by an archaeological event or events, in which the data is characterised in terms of its archaeological context. Such characterisation can encompass all aspects of archaeological interpretation including date, function and relationship to other archaeological monuments. Archaeological *monuments* therefore essentially represent the components of contemporary models of the past.

Archaeological Archives

Archives are the sources of information which are used as the basis of the events and monuments. Archives encompass the full range of data including aerial photographs, excavation archives and survey data.

Archaeological Site/Events

Archaeological site/events (refered to hereafter as 'sites') are the basis of the gazetteer entries. Sites are records of archaeological events which also contain some information about the data produced from the event which provides it with an archaeological context. This additional information is provided in two fields: the *type* field provides an interpretation of event data in terms of its function; the *date* field provides a broad indication of its date-range. However, the purpose of this information is to provide only a very basic interpretation of the data produced from the single event and the basis for each gazetteer entry is that which relates to the event itself (where, when and how it happened).

The Quality of the Evidence

In addition to the information about the archaeological event itself, information is provided in the gazetteer about the quality of the event. This information is broken down into five criteria which relate to the standard of the archaeological event, the quality of the archaeological evidence encountered, the scale of the work and the standard of any subsequent analysis of the evidence. The first three of these criteria (survival, standard and scale) have been applied only to the sites were the source of evidence has come from archaeological excavation. For the sites which have been

found from survey, as a casual find or from metal detecting it has been assumed that the criteria are either unknown or low.

The purpose of the criteria is to evaluate the reliability and usefulness of the data to address the key questions of the thesis. For each criterion, a simple three-fold classification system has been used (high, medium, low). Definition of the three grades for each criteria are given Chapter 4.

In summary, the event is the recording action, the monument is the interpretation of the data produced from an event or events, and the archive is the source or repository of the data. The site/event gazetteer entries record information about the event, the data produced by the event and some interpretation of the data. The basis of the gazetteer is however the archaeological event.

A Worked Example

In order to explain the way in which the event/monument/archive data model has been used as the basis of the gazetteer, the attributes of a hypothetical Late Iron Age settlement will be categorised. The example is a settlement which is known from:;

1. antiquarian coin finds are made in 1850, in the general area of the settlement: the specific location is not recorded;
2. pottery is recovered from fieldwalking in 1960;
3. excavation takes place in 1985 within the fieldwalked area: the site is interpreted as a farmstead,
4. further excavation is undertaken in 1990, also within the fieldwalked area, and adjacent to the excavated area: this site is interpreted as part of a ritual complex.

In this example there are therefore four archaeological events which have resulted in archaeological data being produced. The coin finds would not be recorded in the gazetteer unless it could be shown that they were directly associated with the settlement. The other three events would be recorded separately as gazetteer as

site/event entries. Each entry comprises the site location, the event type, the date and circumstances of the recovery of the evidence, the scale of the work involved and the body or individual responsible for the archaeological event.

The interpretation of the excavated evidence of events 3 and 4 as a farmstead and ritual complex would be classified and recorded separately in 'the type of evidence' field as 'A'(agriculture) for the former, and 'RC' (Ritual/Ceremonial) for the latter. However, it is the event data which would be the basis of the gazetteer entry, and in the cases of events 3 and 4, the interpretations are based upon the evidence from that particular event only, and are at variance with each other.

The creation of *monument* data would therefore be based the interpretation of the evidence from all four events. The evidence from other geographically separate archaeological events might also taken into account.

The Reason for Using the Model

The advantage of the event/monument/archive data model for this thesis is that it allows the information which is related to the discovery of the Late Iron Age evidence (the place, time and nature of the observation) to be conceptually separated from the interpretation of the evidence (the nature, type and function of the archaeological site). This is especially useful where the data concerning the key attributes of a settlement, such as its physical extent, its period of occupation and its function are either unclear or vary between geographically adjacent archaeological events.

The separation of monument and event is particularly useful for areas within which a number of archaeological events have been undertaken within a restricted geographical area and over a long time-span. In such situations, the *events* can overlap geographically and the *monument* interpretations can change and evolve over time. The separation of the event and monument allows the various levels of interpretation to be considered separately from the evidence and the way it was

collected. Recording this data as sites also avoids the necessity (and potential pitfalls) of attempting to characterise the data before a full assessment of its context has been undertaken.

Conclusion

The aim of the gazetteer is to provide a reasonably consistent means of examining the evidence for the Late Iron Age across the Study Area. This has been done by using the archaeological site as the basis for inclusion and by restricting the definition of the Late Iron Age evidence. Some types of Late Iron Age evidence and a number of probable Late Iron Age sites have therefore been excluded from the gazetteer on the grounds that their inclusion would reduce the consistency of the evidence. However, some of the classes of Late Iron Age evidence (or probable Late Iron Age evidence) which fall outside of the scope of the gazetteer, will be considered as appropriate in the thesis, as separate themes or layers. By dealing with the evidence in this manner, it is hoped that the basis for interpretation of the evidence will be made more explicit than would be the case if all classes of (certain/probable/possible) Late Iron Age evidence were to be considered together.

2.2 The Gazetteer

2.2.1 Event Data

Events: Criteria for Inclusion and Exclusion

Antiquarian and Minor Observations

Antiquarian observation or excavations occurring before 1900 have not been included in the gazetteer where the results have subsequently led to events in the same geographical location, unless they have produced unique data. Likewise, archaeological observations producing small amounts data either within or adjacent to major archaeological events have also been omitted from the gazetteer, unless the data provides significant additional information. This decision has been made

largely for the practical reasons of limiting the size of the gazetteer, as well as the perceived low added value to the thesis of the additional research required to produce the entries. It is however acknowledged that some important data may have been have been overlooked because of this decision.

Multi-Phased Excavations

A problem with identifying events also occurs with excavations which take place over a number of years in the same general location, such at Verulamium (Frere 1972; 1983), Gorhambury (Neal et al. 1990) and Park Street (Saunders 1961). The reports of such excavations in some instances are not clear as to the date or excavation season in which particular remains were excavated. In these situations where the Late Iron Age data occurs in a more than one discrete geographical location, a separate site entry is provided for each location, and the likely date-range of the excavation given in italics; where the evidence is geographically continuous from one season to the next (as at Gorhambury) a single site entry has been given for the whole programme of excavations.

Event Date

The dating of the archaeological events in the gazetteer is based on the information which is readily available from SMRs or publication reports. For the majority of events this can be determined to a precision level of within one year. However, for some events the date is either unclear or can only be determined to within a much broader date-range. In these instances, the date is qualified by being in italics.

Geographical Location

Where an eight figure grid reference is included in the NGR field, it signifies that the geographical location is known to a precision of within 10 metres. Where this has been possible, the grid reference has been used to mark the centre-point of the site. Where a six figure reference has been used, it signifies that the location is only known to within a precision of 100 metres.

The Source of the Evidence

The four terms used (excavation, survey, casual find and metal detector) do not require any detailed definition. Excavation is taken refer to all deliberate archaeological recording actions, including salvage recording and 'watching briefs'. The scale and quality of such work will be assessed separately in the quality criteria below. 'Casual find' refers to most antiquarian observations as well as accidental discoveries.

2.2.2 Site Interpretation

The Type of Evidence

The classification system is designed to indicate broad categories of types of settlement evidence. Each of the categories are defined in Chapter 6.

Chronology

The date of each site is represented by abbreviations which have been simplified to indicate the approximate beginning and end date. This is intended to provide an approximate indication of the date-range of occupation for each site. Issues of dating are considered in Chapter 5.

The format used comprises three elements: an abbreviation indicating the earliest likely date, a central 'dot' and an abbreviation to indicate the approximate end of occupation. Where the beginning and end date are not chronologically continuous (e.g. EIA.RB), the assumption has been made that occupation was continuous between the two periods.

Defining the nature of occupation

For the purposes of this assessment, the nature of the evidence required to justify occupation has not been closely defined other than from the presence of datable discarded or deposited artifacts which indicate habitation or other significant activity. The assumed date-ranges of the sites could therefore include brief periods

or phases of abandonment, or periods in which the focus of occupation had moved away from the site. In some instances its also likely that the occupation was sporadic, seasonal or represents extra-mural discarding of material away from the main habitation focus. However, in most instances it has not been possible to interpret the nature of occupation from the available evidence.

Table 2.2, gazetteer terminology

Date	
LIA =	the site can' be dated more precisely than to somewhere between the early 1st century BC and the later 1st century AD.
EIA = ***EIA*=**	occupation began before the early 1st century BC evidence from artifacts only
AD =	occupation began during the first half of the 1st century AD
RB =	occupation continued during the second half of the 1st century AD
Type	
O =	evidence of non-specific occupation
B =	evidence of burials
RC =	ritual or ceremonial site
A =	evidence of agricultural production
I =	evidence of industrial manufacturing
Source	
E =	excavation
C =	casual find
S =	survey
MD =	metal detector
Standard & Scale	
H =	high
M =	medium
L =	low
UP =	unpublished
Blank	unknown or not relevant

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
1	**Ravensburgh Castle**	TL 0995 2958	1964	EIA.LIA	O	E		M	L	UP	L	Dyer 1976
2	**Cadwell Lane, Hitchin**	TL 1918 3060	*1937*	LIA	O	C				UP		Herts. SMR:1428
3	**Purwell, Hitchin**	TL 200 300	1930s	LIA	B	C				UP		Herts. SMR 6085
4	**Sundon**	TL 060 260	1988-91	LIA	O	S				UP		Hudspith 1995:134
5	**Sundon Park**	TL 060 260	1988-91	LIA	O	S				UP		Hudspith 1995:134
6	**Nazingbury**	TL 386 066	1975-6	RB	O	E	L	L	L	L	L	Huggins 1978
7	**Norton Rd, Stotfold**	TL 220 360	1994	EIA.RB	H B A	E	M	H	UP	UP	H	Steadman 1995; Beds.SMR:74
8	**Pegston Common**	TL 120 300	1879	LIA	B	C				UP	L	Beds. SMR:413
9	**Arlsey**	TL 1970 3290	1939	LIA	O	C				UP	L	Beds. SMR:420
11	**Galley Hill, Luton**	TL 092 270	1951-61	LIA	B	C				UP		Beds. SMR:116
12	**Engine PublicHouse, Baldock**	TL 2455 3413	1992	LIA.RB	O	E		H		UP	L	Richmond 1992
13	**Dunstable**	TL 005 223	*1950s*	LIA	O	C				UP		Beds. SMR:1388
14	**Harlow Holbooks**	TL 468 122	1970s	LIA.RB	O	E		L		UP		Conlon 1973; Fitzpatrick 1985
15	**Dane field, Pirton**	TL 1360 3190	1990	LIA.RB	O	E	H	H	L	UP	L	Went & Burleigh 1990
16	**Park Street 1,**	TL 1469 0305	1943-5	*EIA*.RB	H	E.	M	M	L	L	M	O'Neil 1945
17	**Park Street 2**	TL 1469 0305	1954-7	AD.RB	O	E	M	M	L	L	L	Saunders 1963
18	**Buntingford**	TL 361 285	1986	LIA.RB	O	E	L	M	L	UP	L	Cave-Penny & Daniells 1988
19	**Bramfield**	TL 2978 1660	1968	LIA	O	E			L	UP	L	Herts SMR:1782
20	**Thickney Wood, Codicote**	TL 2260 1910	*1973*	LIA	O	C				UP		Rook 1973
21	**Buryfields, Ware**	TL 3543 1445	1977	LIA.RB	O	E	M	M	L	L	L	Day 1980a
22	**St. Andrews St., Hertford**	TL 3220 1260	1991	LIA.RB	O	E	M	M	L	UP	L	Cooper-Reade 1990a; Herts. SMR:9841
23	**Little Wymonley**	TL 2120 2640	1975	LIA.RB	O	E	M	H	L	UP	L	Went 1992; Herts. SMR:2606
24	**Hadham Hall, Little Hadham**	TL 4519 2281	1992	EIA.RB	A	E	M	M	UP	UP	M	Walker 1994; Herts. SMR:2838
25	**Walls Field, Baldock**	TL 250 337	1932	LIA.RB	O	E	L	L	L	L		Applebaum 1932
26	**Old Copse, Aldbury**	SP 9737 1201	1952 1972	LIA	B	E		L	L	UP	L	Herts. SMR:1051
27	**Black Boy, St. Stephen's**	TL 1203 0257	1976	AD.RB	O	E		L	L	UP	L	Herts. SMR 4541

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
28	**Foxholes, Hertford**	TL 3300 1250	1976	BC.RB	A	E	M	M	L	M	H	Partridge 1989
29	**Childwickbury**	TL 1300 1000	1980s	LIA.RB	O	S				UP		Hunn 1994
30	**Bladder Wood, Wheathampstead**	TL 2070 1446	1990	LIA.RB	O	S				UP		Hunn 1994
31	**Beaumont Hill Farm, Redbourn**	TL 1110 1080	1980s	LIA.RB	O	S						Hunn 1994
32	**Rothampsted**	TL 1198 1373	1936-7	LIA.RB	O	E	L	M	L	L	L	Lowther 1937
33	**Harlow**	TL 4860 1230	1962-71	EIA.RB	RC	E	M	M	L	M	H	France & Gobel 1985; Bartlett 1987
34	**Wendens Ambo**	TL 507 360	1973-4	EIA.RB	A	E	M	H	H	H	H	Brinston 1963:199; Hodder 1982
35	**Saffron Walden**	TL 5388 3822	1970s	BC.RB	O	E	L	M	L	M	M	Bassett 1982
36	**Wallbury Hillfort**	TL 4930 1780	1959-60	EIA.LIA	O	E			L		L	Essex SMR:16
37	**Puddlehill, Dunstable**	TL 0089 2350	1960s	EIA.RB	A B	E	M	M	M	M	H	Matthews 1976
38	**Maulden Firs, Dustable**	SP 0950 2750	1962	LIA	O	E			L	UP	L	Beds. SMR:798; Dyer 1964
39	**Sundon**	TL 050 270	1977-8	LIA	O	S						Beds. SMR:9310
40	**Rosslyn Crescent, Luton**	TL 089 241	1960s	AD.RB	B	C				UP	L	Thompson 1982:776-8
41	**Bygrave**	TL 2690 3890	1994	LIA.RB	O	S						Ashworth & Burleigh 1994; Herts. SMR:1654
42	**Haughton Regis**	TL 022 241	1972	LIA	O	E			L	UP	L	Beds. SMR:1918
43	**Waulds Bank, Luton**	TL 061 246	1953	LIA	O	C				UP		Beds. SMR:820
44	**Hertford Heath**	TL 3520 1130	1956	BC.RB	B	E	M	M	L	M	H	Hussen 1983
45	**Grove Mill, Hitchin**	TL 1900 1890	1899	BC	B	C		L		L		Herts. SMR:107; Birchall 1965:fig.13.
46	**Harpenden**	TL 1449 1496	1867	LIA	B	C						Bagshaw 1928; Freeman & Watson 1949; Herts. SMR:123
47	**Stevenage**	TL 233 244	1950s	LIA	O	C						Herts. SMR:426
48	**Ware Rural**	TL 4067 1770	1995	LIA.RB	O	MD				UP		Herts. SMR:1517
49	**Exnalls Farm**	TL 4460 1980	1993	LIA.RB	O	E	L	L	L	UP	L	Cooper-Reade 1991
50	**Chapmore End**	TL 2369 1660	1969-70	LIA	O	C						Herts. SMR:499
51	**Baldock St., Ware**	TL 3554 1446	1982	LIA	O	E	M	M	L	UP	L	Herts. SMR:9130; Zeepvat 1997
52	**Millbridge, Hertford**	TL 3246 1261	1988	AD.RB	B	E	M	M	L	UP	L	Herts. SMR:9881; Murray 1996
53	**Balsoms, Standon**	TL 4070 2160	1952	LIA	I	C						Herts SMR:150

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
54	**Glaxos, Ware**	TL 3528 1456	1970s	LIA.RB	O	E	M	M	L	UP	M	Herts. SMR:9145; Zeepvat 1995a
55	**Panshanger Burial, Welwyn Garden City**	TL 2526 1316	1965	BC	B	E	M	M	L	M		Stead 1967
56	**Bakers End**	TL 3936 1662	1996	LIA.RB	O	MD	M					Herts. SMR:1086
57	**Thorley, Herts.**	TL 4729 1987	1994	LIA.RB	B	E	M	H	UP	UP	H	McDonald 1995b; Herts. SMR:9275
58	**Caldicote**	TL 2351 3864	1970s	LIA	O	E	L	H		UP	L	Herts. SMR:2467
59	**Thremfall Avenue, Stansted**	TL 5516 2210	1980s	LIA	A	E	M	H	UP	UP	H	Brooks & Bedwin 1989
60	**Airport Catering Site, Stansted**	TL 5508 2320	1980s	BC.AD	A	E	H	H	UP	UP	H	Brooks & Bedwin 1989
61	**Long Border A, Stansted**	TL 5470 2488	1980s	EIA.RB	B	E	M	H	UP	UP	H	Brooks & Bedwin 1989
62	**Duckend Car Park, Stansted**	TL 5232 2256	1988	LIA.RB	B	E	M	H	UP	UP	H	Brooks & Bedwin 1989
63	**Duckend Farm, Stansted**	TL 5215 2208	1987-8	AD.RB	B	E	M	M	UP	UP	H	Brooks & Bedwin 1989
64	**Ward's Coombe, Ivinghoe**	SP 9705 1574	1971	AD.RB	B	E	M	H	L	M	L	Dunnett 1973
65	**Bury Lodge, Stansted**	TL 5422 2204	1987	LIA.RB	A	E		H	H	UP	H	Brooks & Bedwin 1989
66	**Hatfield Aerodrome**	TL 210 090	*1938*	LIA	O	E		L	L	UP	L	Herts. SMR:125
67	**New Hall, Ware**	TL 390 165	1968	LIA	O	E		L	L	UP	L	Herts. SMR:1778
68	**Essenden**	TL 2834 0718	1992-3	EIA.RB	RC	E	M	H	UP	UP	H	Herts. SMR:6821
69	**Tea Green, Offley**	TL 1410 3440	1990	LIA	B	E	M	H	UP	UP	L	Herts. SMR:7359
70	**Kingswoodbury, Clothall**	TL 2860 3135	1993	LIA.RB	O	E	M	M	UP	UP	L	Went 1993; Herts. SMR:7360
71	**Orchard Site, Cow Roast,**	SP 9557 1014	1975	BC.RB	I B	E	L	L	UP	UP	L	Morris & Wainwright 1995; Zeepvat 1995b:21-2
72	**Dellfield, Berkhamsted**	SP 9849 0899	1970-1	BC	B I	E	M	L	L	L	L	Thompson & Holland 1982; Stead 1976.
73	**Tring**	SP 9159 1063	1974	LIA	I	E	M	L	L	UP	L	Herts. SMR:6069
74	**Aldbury**	SP 9667 1270	1943	LIA	B	E		L	L	UP	L	Herts. SMR:4242
75	**Ashridge Site 8**	TL 9790 1390	1980s	EIA.RB	O	S						Morris & Wainwright 1995:71; Hunn 1996
76	**Ashridge, Rails Copse**	SP 9760 1140	1980s	LIA	O	C						Herts. SMR:2534
77	**New Inn, Hinxworth**	TL 2276 3835	1911	LIA	B	C						Herts. SMR:2078
78	**Social Club, Stansted**	TL 5228 2241	1987		A	E		H	UP	UP	H	Brooks & Bedwin 1989

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
79	**Gorhambury, St. Albans**	TL 1175 0795	1971-82	AD.RB	M	E	H	H	M	M	H	Neal et al. 1990
80	**Maiden Bower, Dunstable**	SP 996 225	1970s	EIA.LIA	O	E		L	L	L	L	Matthews 1976:165
81	**Chrishall**	TL 4500 3750	c1920s	LIA	O	E		L	L	L	L	Thompson 1982:686
82	**Berkhamsted Golf Course**	TL 0037 0980	1950s	LIA.RB	O	E	H	L	UP	UP	L	Herts. SMR:1337
83	**Amesbury Banks**	TL 4380 0030	1950s	EIA.LIA	O	E	H	L	L	L	L	Alexander et al. 1978
84	**Hamberlins Wood, Northchurch**	SP 9600 0880	1992	EIA	O	E	M	M	UP	UP	M	McDonald 1994:68-70; 1995a:122
85	**Stocks, Aldbury**	SP 9618 1356	1992	LIA	O	E		L	UP	UP	L	Herts. SMR:9922
86	**Stanborough School 1,**	TL 2280 1170	1953	AD.RB	O	E	L	L	L	L	L	Arnold 1954; Hunn 1998
87	**Stanborough School 2**	TL 2280 1170	1988	AD.RB	O	E	M	H	UP	UP	L	Hunn 1999
88	**Panshanger School (Grub's Barn) Welwyn Garden City**	TL 2540 1307	1968	*EIA*.BC.RB	I	E	L	L	L	L	L	Rook 1970a
89	**Crookhams, Welwyn Garden City**	TL 2530 1410	*1967*	*EIA*.RB	I B	E	L	L	L	L	L	Rook 1968a
90	**Salisbury Gardens, Welwyn Garden City**	TL 248 123	1930s	LIA	O	C			L	UP		Rook 1968a:52
91	**Shortlands Green, Welwyn Grden City**	TL 250 123	1930s	LIA	O	C			L	UP		Arnold 1954:137
92	**Free Church Hall, Welwyn Garden City**	TL 1280 2364	1928	LIA.RB	O	E	L	L	L	UP	L	Hughes 1938:144
93	**Brickwall Hill, Welwyn Garden City**	TL 2232 1274	*1968*	*EIA*.RB	O	E	L	L	L	L	L	Rook 1970b
94	**Widdington**	TL 5380 3150	?	LIA	O	E			L	L	L	Thompson 1982:864
95	**Pentley Close, Welwyn Garden City**	TL 2361 1417	1971	LIA	O	E	M	L	L	UP	L	Herts. SMR:2802
96	**Bessemer Road, Welwyn Garden City**	TL 2439 1330	1937	LIA	O	C			L	UP		Hughes 1938:145
97	**Hatfield Hyde, Welwyn Garden City**	TL 245 114	1939	LIA	O	E	L	L	L	UP	L	Arnold 1954
98	**Prospect Place, Welwyn**	TL 2325 1598	1906	BC.RB	B	C			L	L		Andrews 1911; Hughes 1938:142
99	**New fields, Welwyn Garden City**	TL 223 121	1936	LIA	O	E	L	L	L	UP	L	Arnold 1954:136

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
100	**Woodhall Lane, Welwyn Garden City**	TL 244 177	1930s	LIA	O	E	L	L	L	UP	L	Arnold 1954:137
101	**Digswell Water, Welwyn Garden City**	TL 249 147	1936	LIA.RB	O	C			L	UP		Arnold 1954:136
102	**Reynard Road, Welwyn**	TL 227 172	1930s	BC.RB	O	C			L	UP		Herts. SMR:156
103	**Lockleys, Welwyn**	TL 2377 1621	1937	AD.RB	H	E	L	M	L	L	M	Ward-Perkins 1937
104	**Panshanger Golf Course, Welwyn Garden City**	TL 256 138	*1967*	AD.RB	O	E	L	L	L	L	L	Rook 1968b; Thompson 1982:789
105	**Welches Farm, Datchworth**	TL 2620 1720	1968-70	*EIA*.AD .RB	O	E	L	L	L	UP	L	Rook 1974
106	**Hollards Farm, Codicote**	TL 2160 1720	1990	AD	A	E	M	M	UP	UP	L	Burleigh et al. 1990
107	**Raffin Green**	TL 2801 1964	1979	AD.RB	? RC B	E	L	M	UP	UP	L	Herts. SMR:6309; Rook et al. 1982
108	**Ayot Farm, Ayot St. Peter**	TL 216O 1430	1991	LIA	O	C			UP	UP		Herts. SMR:261
109	**Griggs Bridge Bathouse, Braughing**	TL 3915 2434	1969-70	BC-AD	H	E	L	M	M	L	L	Partridge 1978
110	**Ralph Sadlier School, Puckeridge**	TL 3910 2330	1973	BC	H	E	L	L	L	L	L	Partridge 1978
111	**Wickham Hill Nursery, Braughing**	TL 3892 2381	1970s	LIA	? H	E	L	L	L	UP	L	Partridge 1978
112	**Wickham Hill 1969, Braughing**	TL 3879 2390	1969	LIA.RB	O	E		L	L	UP	L	Stead 1970
113	**Station Road, Puckeridge**	TL 3915 2310	1975	AD	? RC B	E	L	L	M	L	L	Partridge 1980a
114	**Gatesbury Track 1979, Braughing**	TL 3903 2393	1979	BC.AD	I,H	E	L	M	L	L	L	Partridge 1980a
115	**Skeleton Green, Braughing**	TL 3865 2384	1971	BC.AD	H	E	H	H	M	M	L	Partridge 1981
116	**Ermine Street 1971-2, Braughing**	TL 3869 2380	1971	BC.RB	O	E	L	H	M	L	L	Potter & Trow 1988
117	**Wickham Kennels 1989, Braughing**	TL 3905 2433	1989	BC.AD	H	E	M	M	L	UP	L	Going 1990
118	**Braughing Station 1970**	TL 3890 2420	1970	LIA.RB	O	E	L	M	L	UP	L	Partridge 1978
119	**11 Buntingford Road, Puckeridge**	TL 3801 2347	1982	AD.RB	O	E	M	M	L	L	L	Borrill 1983
120	**Braughing Station 1949**	TL 3898 2416	1949	LIA	H	E		L	L	L	L	Holmes 1952-3
121	**Wickham Kennels 1982, Braughing**	TL 3905 2432	1982	AD	I	E	M	M	M	M	L	Partridge 1982
122	**Gatesbury Field, Braughing**	TL 3935 2403	1936	BC.AD	O	E		L	L	L		Partridge 1981
123	**Wilbury Hill, Letchworth**	TL 1963 3272	1933	EIA.RB	O	E	M	L	L	L	L	Applebaum 1949
124	**Hawthorn Hill, Letchworth**	TL 2150 3350	1930 & 1955	LIA.RB	O	E		L	L	UP	L	Westell 1936; Herts. SMR:1286

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
125	**Two Chimneys, Letchworth**	TL 5100 3207	1956	EIA.RB ?	O	E		L	L	UP	L	Moss-Eccardt 1988
126	**Archers Way, Letchworth**	TL 2094 3284	1935	AD	B	C			L	UP		Herts. SMR:134
127	**Blackhorse Road, Letchworth**	TL 2329 3380	1959-60	EIA.RB	O	E	L	M	M	L	H	Moss-Eccardt 1965; 1988
128	**Icknield Way E, Baldock**	TL 2472 3425	1988	BC.RB	B	E	L	H	UP	UP	H	Burleigh 1995a
129	**Royston Road, Baldock**	TL 2502 3424	1986	BC.RB	B	E	L	H	UP	UP	H	Burleigh 1995a
130	**1980-1 Site, Baldock**	TL 2492 3413	1980-1	BC.RB	B	E	L	H	UP	UP	H	Burleigh 1982; 1995a
131	**Lincs Farm, Welwyn**	TL 2195 1624	*1989*	LIA	O	E		L	L	UP	L	Herts. SMR:7301
132	**Hartsfield School 1987, Baldock**	TL 2490 3406	1987	LIA.RB	H	E	L	H	UP	UP	H	Burleigh 1995b
133	**Stead Areas A & B, Baldock**	TL 2502 3398	1968-72	BC.RB	B ? RC ? I	E	L	H	L	M	M	Stead & Rigby 1986
134	**Blackhorse Farm, Baldock**	TL 2415 3450	1994	LIA.RB	O	E	H	H	UP	UP	M	Fenton 1994
135	**Suttons Farm, Hatfield**	TL 1926 0993	1997	LIA.RB	O	E		M	UP	UP		Guttmann 1998; Herts. SMR:9927
136	**Wallington Rd, Baldock**	TL 2547 3390	1982	BC.RB	B	E	L	M	UP	UP	H	Burleigh 1995a
137	**Brewery Site, Baldock**	TL 2458 3390	1953	BC.RB	O	E	L	L	L	UP		M. Stevenson Pers. Comm.
139	**The Tene, Baldock**	TL 2418 3366	1968	BC.RB	B	E	L	M	L	M	L	Stead & Rigby 1986
140	**Folly Lane, St. Albans**	TL 14241 08067	1991-2	AD.RB	RC B	E	H	H	H	H	H	Niblett 1992; 1999
141	**King Harry Lane, St. Albans**	TL 1310 0670	1966-8	AD.RB	B	E	M	H	M	L	H	Stead & Rigby 1989
142	**Mayne Avenue, St. Albans**	TL 1324 0658	1970-2	*EIA*.LIA	O	E		L	UP	UP	L	St. Albans UAD:308
143	**Verulamium Insula XVII**	TL 1364 0757	1956	AD.RB	H I	E	L	H	L	L	L	Frere 1983:103-5
144	**Great Chesterford**	TL 5029 4267	1989	LIA.RB		E	L	M	L	L	L	Crossan et al. 1990
145	**St Albans Abbey**	TL 1434 0678	1968-75	AD	I	E	H	M	L	M	L	Saunders & Havercroft 1982:34,note 3; Herts. SMR:7354
146	**Prae Wood 1933, St. Albans**	TL 1249 0690	1931	AD	I	E	H	L	L	L	M	Wheeler & Wheeler 1936
147	**Prae Wood 1931, St. Albans**	TL 1240 0696	1932	AD	? I	E	H	L	L	L		Wheeler & Wheeler 1936
148	**Pond Field 1932, St Albans**	TL 1284 0682	1932	AD	O	E	H	L	L	L	M	Wheeler and Wheeler 1936
149	**Pond Field 1960, St Albans**	TL 1289 0681	1960	AD	I	E.	H	L	L	L	L	St. Albans UAD:26
150	**White Swan Yard, Ware**	TL 3576 1438	1979	LIA	O	E	M	M	L	L	L	Partridge & Day 1980

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
151	**Wheathampstead Bypass**	TL 1852 1435	1977	AD	O	E	L	L	L	L	L	Saunders & Havercroft 1982:11-31
152	**Wheathampstead**	TL 184 134	1933	BC	O	E	H	L	L	L	L	Wheeler & Wheeler 1936
153	**Brocket Park, Welwyn**	TL 2174 1375	1998	LIA	H	E		M	UP	UP	L	Beds. Co. 1998a; Herts. SMR:9852
154	**Lobbs Hole, Stevenage**	TL 2630 2633	1997	EIA.RB	A H	E	M	H	UP	UP	H	Hunn 1997
155	**Old Parkbury, Radlett**	TL 1590 0220	1989	BC	H	E	M	H	UP	UP	L	Niblett 1990
156	**West Street, Ware**	TL 3578 1437	1979	BC.LIA	O	E		M	UP	UP	L	Gibson et al. 1982; Partridge & Day 1980
157	**Queen Victoria Hospital, Welwyn**	TL 2255 1585	1993	LIA	O	E	M	H	UP	UP	L	Murray 1993; Herts. SMR:9267
158	**Salisbury Ave., St Albans**	TL 1688 0748	1940	AD	O	C			UP	UP		Herts. SMR:148
159	**Verulam Hill Fields, St Albans**	TL 1398 0669	1963	AD.RB	B	E	H	L	L	L	M	Anthony 1968
160	**Bedmond Lane 1960, St. Albans**	TL 1263 0618	1960	LIA	O	E.		L	UP	UP	L	St. Albans UAD 200
161	**Bedmond Lane 1967, St. Albans**	TL 1259 0620	1967	LIA	O	E		L	UP	UP	L	St. Albans UAD 201
162	**Aston**	TL 2797 2198	1995	AD.RB	B ? RC	E	M	M	UP	UP	L	Herts. SMR:7971
163	**Pond Field 1933, St Albans**	TL 1289 0681	1933	AD	I	E	H	L	L	L	M	Wheeler & Wheeler 1936:15-21
164	**Area 2, Baldock**	TL 2525 3391	1981-2	LIA.RB	RC B	E	M	H	UP	UP	M	Burleigh 1995a:106
165	**Windridge Farm, St. Albans**	TL 1245 0614	1976	LIA	O	S						Herts. SMR:4540
166	**Stead Area D, Baldock**	TL 2490 3377	1968	AD.RB	O	E	M	M	M	M	L	Stead & Rigby 1986
167	**Enclosure, St Michaels**	TL 1130 0820	1980s	LIA.RB	O	S						Hunn 1996:8; Herts. SMR:1446
168	**Letchworth**	TL 2090 3260	1913	LIA	B	C						Smith 1914; Herts. SMR:139
169	**Weston Hills, Baldock**	TL 2519 3210	1994	LIA.RB	O	E	L	H	M	M	M	Hutchings & Richmond 1994
170	**Bishops Stortford**	TL 4895 2207	1978	LIA.RB	O	E	M	M	L	L	L	Garfi 1979
171	**Holwell Quarry**		1998	LIA.RB	A	E	M	H	UP	UP	H	Beds. Co. 1998b
172	**Leavesden Aerodrome**	TL 0974 0041	1998	EIA.RB	H A	E	M	H	UP	UP	H	Brossler 1999; Herts. SMR:10048
173	**Turners Hall Farm, Wheathampstead**	TL 1613 1632	1998	LIA.RB	A	E	M	H	UP	UP	M	Herts. SMR:9913
174	**Sundon 2**	TL O56 264	1989-91	LIA.RB	O	S						Hudspith 1995:134
175	**Caddington**	TL 040 190	1989-91	LIA.RB	O	S						Hudspith 1995:134
176	**Gatehouse Field**	TL 0350 1910	1989-91	LIA.RB	O	S						Huspith 1995:134

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
177	**Braughing: W of Ford Street**	TL 3907 2465	1992	LIA	O	E	L	L			L	Herts.SMR:10300
179	**Malting Road, Baldock**	TL 2506 3430	1998	LIA	O	E		M	UP	UP		Vaughan 1998
180	**Broomhill Farm**	TL 2779 2007	*1980*	AD.RB	O	E	L		L	UP		Rook et al. 1982:21 no 4
181	**Wick Avenue, Wheathampsted**	TL 1763 1373	1998	AD	B	E	H	H	UP	UP	L	Herts. SMR: 9795
182	**Oaklands, College Colney Heath**	TL 1898 0782	1997	LIA	O	E	M	H	UP	UP	L	Herts. SMR:2666
183	**Marford, Wheathampstead**	TL 1868 1383	1974	LIA	O	E	L	L	L	L	L	Saunders & Havercroft 1982:11-12
184	**Mardleybury**	TL 2500 1998	1994	BC	B	C						Stead 1967:60; Rook 1968c
185	**Redbourn**	TL 0975 1000	1990	AD	O	E	M	H	UP	UP	L	Herts. SMR: 9625
186	**Rickneys**	TL 3198 1617	1996	LIA	A	E	M	H	UP	UP	L	Percival & Richmond 1997; Herts SMR:9601
187	**Sundon**	TL 060 280	1977-8	LIA	O	S						Beds. SMR:9343; Hall 1991
188	**Clavering**	TL 4850 3080	1953	LIA	O	E			UP	UP	L	Thompson 1982:647
189	**U Walls Common, Baldock 2 Site 12**		1980	BC.RB	O	E	L	H	UP	UP	H	Burleigh 1995a
190	**Verulamium Insula XXVII**	TL 1344 0725	1959	AD.RB	O	E	VL	H	L	L	L	Frere 1983:193-4
191	**Verulamium Insula XIX**	TL 1365 0747	1960	AD.RB	O	E	VL	H	L	L	L	Frere 1983:127
192	**Verulamium Insula XXI2**	TL 1339 0716	*1955-6*	AD.RB	O	E	VL	H	L	L	L	Frere 1983:157-8
193	**Verulamium Insula XXVIII**	TL 1347 0734	1960	AD.RB	B ?I	E	VL	H	L	L	L	Frere 1983:273
194	**Ashridge Site 7**	SP 9634 1376	1980s	LIA	O	S						Morris & Wainwright 1995
195	**Ashridge Site 10**	SP 9927 1051	1980s	LIA	I	S						Morris & Wainwright 1995; Hunn 1996
196	**Ashridge Site 11**	SP 9950 1451	1980s	LIA	I	S						Morris & Wainwright 1995
197	**Ashridge Site 9**	SP 9796 0972	1980s	LIA	I	S						Morris & Wainwright 1995
198	**Ashridge Site 6**	SP 9730 1460	1980s	LIA	O	S						Morris & Wainwright 1995
199	**Hudnall Common**	SP 0090 1330	1980s	LIA.RB	O	S						Herts. SMR:1188
200	**Old Jeromes East, St. Albans**	TL 1070 0910	1980s	LIA.RB	O	S						Hunn 1996; Herts. SMR:1437
201	**Old Jeromes West, St Albans**	TL 1010 0860	1980s	LIA.RB	O	S						Hunn 1996; Herts. SMR:6001
202	**Ashridge site PI**	TL 9780 1316	1980s	LIA	O	S						Hunn 1996
203	**Datchworth**	TL 2729 2006	1995	LIA	RC?	E	H	L	UP	UP		Herts. SMR:1898
204	**Cholesbury**	SP 930 074	1932	EIA.RB	O	E	H	L	L	L	L	Kimble 1933; Thompson 1982:672-3

Table 2.3, gazetteer summary

No.	Site Name	NGR	Event Date	Period	Type	Source	Survival	Standard	Env Pub	Pot Pub	Scale	Reference
205	**Birchanger, Bishop's Stortford**	TL 5065 2189	1992	EIA.RB	B H	E	M	H	M	M	M	Medlycott 1994
206	**Wilbury Hill, Letchworth**	TL 2033 3227	1974	EIA.RB	O	E	M	M	L	L		Moss Eccardt 1988
207	**Slip End, Ashwell**	TL 283 368	*1980s*	RB	B	E			UP	UP		Burleigh 1995a:108
208	**Stoney Lane, Northchurch**	TL 0110 0590	1992	EIA.RB	O	E	M	H	UP	UP	M	McDonald 1994
209	**Crawleys Lane, Cow Roast**	TL 9550 0980	1992	RB	O	E	M	H	UP	UP	M	McDonald 1994
210	**Park St., Luton**	TL 098 205	1998	RB	O	S						Hudspith 1999:9
211	**Knocking Knoll, Pirton**	TL 134 310	1998	RB	O	S						Hudspith 1999:2
212	**Little Hallingbury**	TL 4940 1640	1876	LIA	B	E					L	Thompson 1982:767; Essex SMR:
213	**St Stephen's, St Albans**	TL 140 059	1980s	RB	B	E	H	H	UP	UP	H	Niblett 1999:399-401
214	**Wood Lane End**	TL 0826 0786	1982-3	RB	? RC	E	L	M	L	L	H	Neal 1984
215	**North Weald**	TL 4790 0490	1970s	LIA	O	E			L	L	L	Thompson 1982:789
216	**Pirton**	TL 135 318	1998	LIA/RB	O	S						Hudspith 1999:2
218	**Heronswood School, Welwyn Garden City**	TL 2560 1190	1954	LIA	O	E	L	L	L	L	L	Arnold 1954
219	**Sacombe**	TL 337 197	1998	LIA	O	E	L	L	L	UP	L	Herts. SMR:9446
220	**Crabtree Lane, Harpenden**	TL 1479 1463	1938	LIA.RB	O	E	L	L	UP	UP	L	Herts. SMR:1168
221	**Sewell Lane, Dunstable**	SP 997 232	1982-4	LIA.RB	O	E	L	L	L	L	M	Walker 1992
222	**Luton Airport**	TL 123 218	1992-4	LIA	O	S						Hudspith 1997
223	**Cockenhoe**	TL 121 234	1992-4	LIA.RB	O	S						Hudspith 1997
224	**Whitehill Farm**	TL 105 251	1992-4	LIA.RB	O	S						Hudspith 1997
225	**Lilley**	TL 106 277	1992-4	LIA.RB	O	S						Hudspith 1997
226	**Warden Hill**	TL 100 262	1992-4	LIA.RB	O	S						Hudspith 1997

CHAPTER 3: ENVIRONMENT AND AGRICULTURE

In this chapter the physical environment of the Study Area will be examined and aspects of the Iron Age agricultural landscape reconstructed using a simple model of agricultural management regimes. The aim is to provide the environmental and agricultural background to the social and economic developments in the Late Iron Age.

3.1 The Study Area: Introduction (Figure 3.1)

The Study Area is a roughly rectangular block of land, 2300 square kilometres in size. It comprises all of the modern administrative county of Hertfordshire, a substantial part of Essex and small parts of Cambridgeshire, Buckinghamshire and Bedfordshire.

The boundaries have been chosen on the basis of both academic and pragmatic criteria. The boundary to the north and west lies approximately at scarp edge of the Chiltern Hills, which form a natural, physical boundary. The eastern boundary was selected to include two areas which have been the subject of systematic surveys, Stansted Airport (Havis and Brooks forthcoming) and North West Essex (Williamson 1984). The southern boundary was drawn with the dual objectives of including the important Late Iron Age and Roman settlement at St. Albans whilst at the same also excluding the potentially distorting effect of the Greater London conurbation.

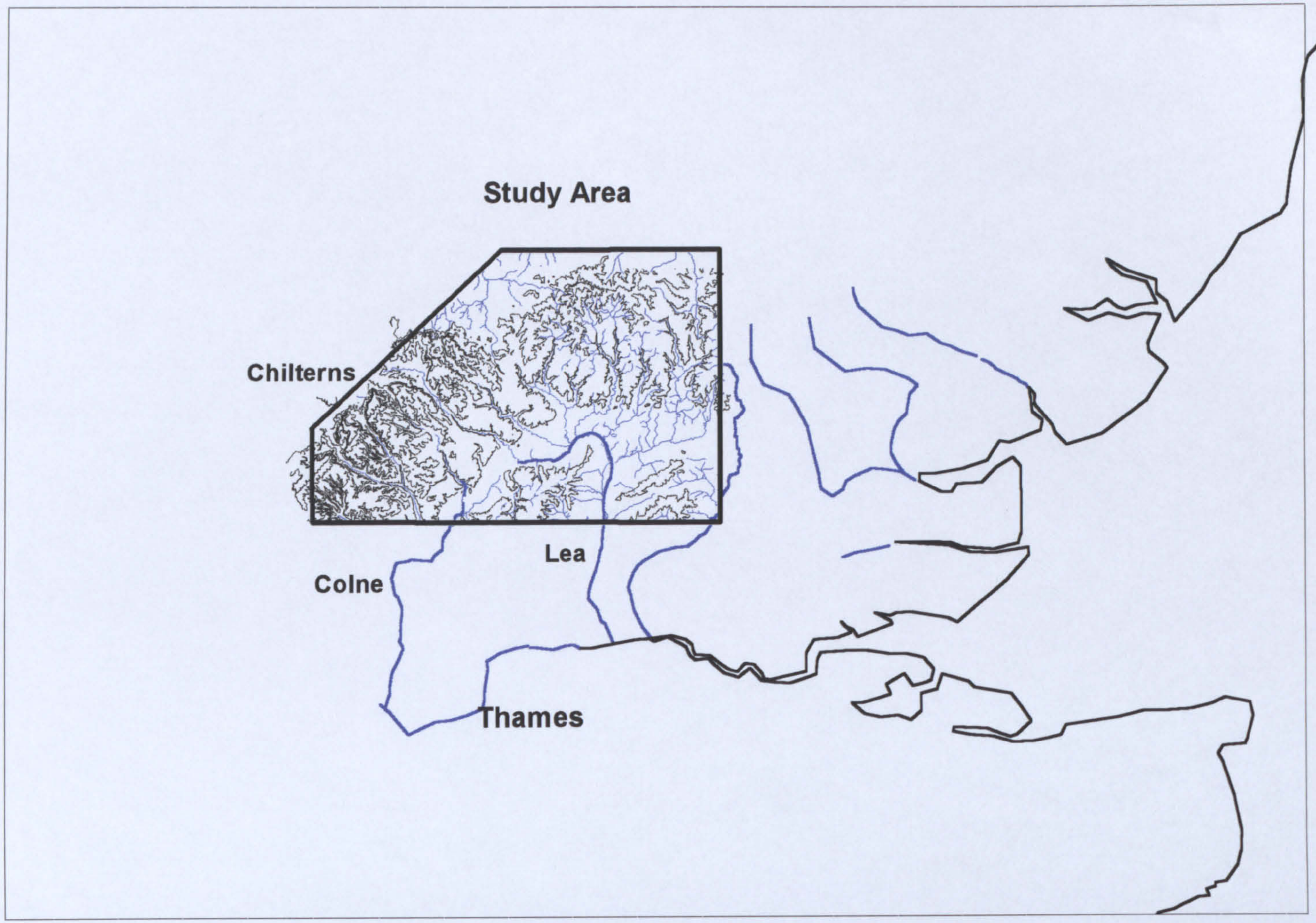
3.2 The Landscape and Geology of the Study Area: A Summary (Figure 3.2)

The Study Area is situated in the northern half of the Thames Basin, a large chalk syncline which is filled with later Tertiary and Quaternary deposits (Bridgland 1994). The area contains the valley systems of two of the major Thames tributaries, the Colne and the Lea.

The river Colne valley system rises in the Chiltern Plateau, an extensive upland area capped with clay-with-flints, which is situated to the southeast of the Chiltern chalk

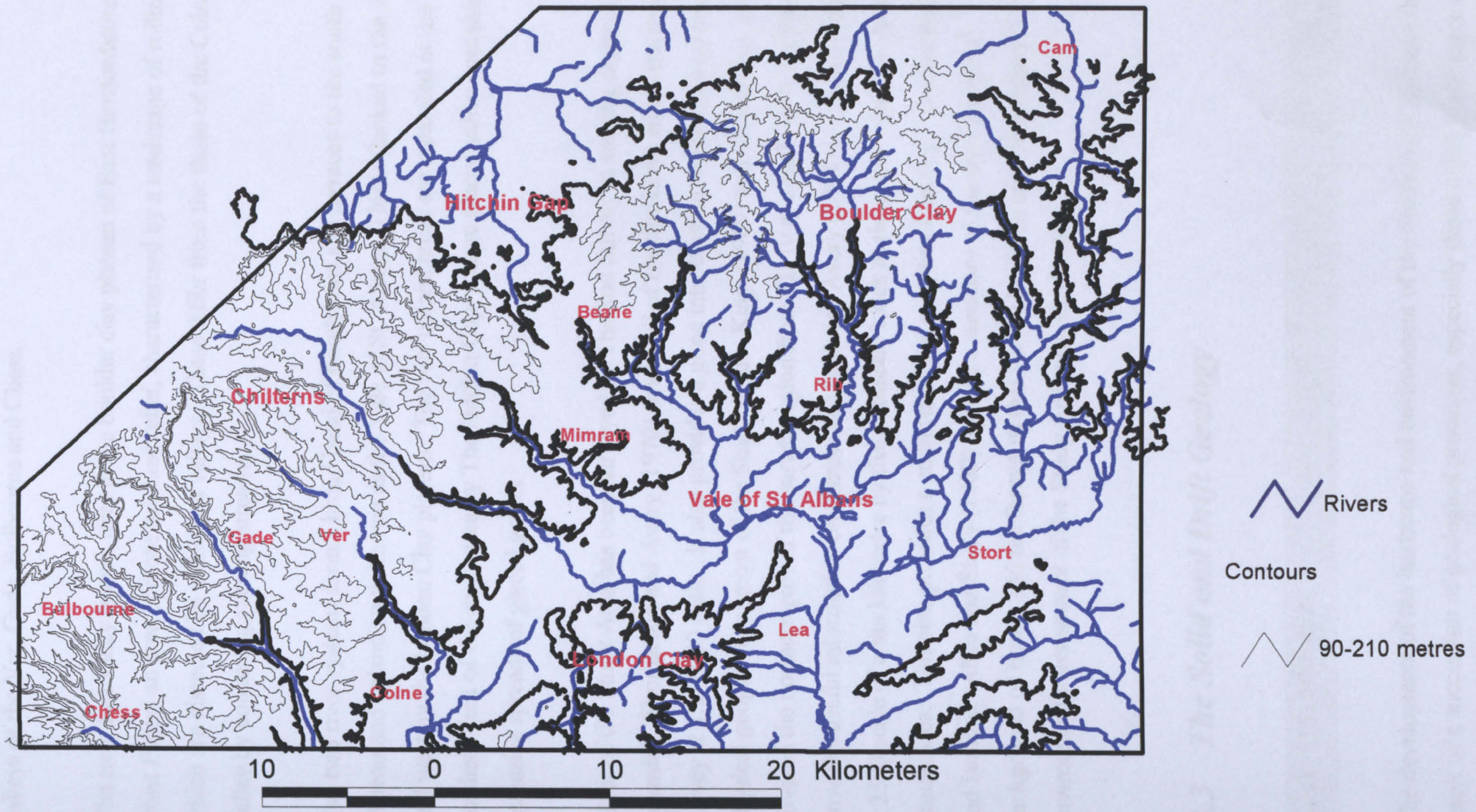
Study Area Location

Figure 3.1



Relief and Landscape

Figure 3.2



scarp. The area is characterised by numerous small, dry valleys which feed into the valleys of the Ver, Gade, Bulbourne and Chess.

The river Lea valley system rises in the boulder clay plateau of East Hertfordshire and West Essex, an area of more subdued relief, characterised by a landscape of rolling hills which are dissected by numerous valleys. These differ from the those of the Colne valley by containing running streams.

The two river systems form a broad band of floodplains and terraces to the south of the plateau and upland areas known as the Vale of St. Albans. This is flanked to the south and west by the London Clay plateau. The two upland areas are separated at the northern limit of the study area by The Hitchin Gap, a large glacial valley containing extensive spreads of glacial gravel.

Most of the Study Area has been surveyed by The Soil Survey at varying degrees of intensity. Thomasson and Avery (1970) covers all of Hertfordshire and is the most basic survey at 1:250000 scale. It also provides a good introduction to the geology and physical geography of most of the Study Area. King (1969) and Thomasson (1969) covered the northern part of the survey region from TL 10 at a scale of 1: 50000 and provides useful information on climate and landuse. Avery (1964) is a detailed survey at 1:2500 scale of a ten kilometre by five kilometre block at the south west corner of the Study Area. This also provides a comprehensive analysis of geology, geomorphology and landuse. Allen and Study (1980) provide a summary of the environmental background of Essex, and the format of that survey has been used as a model for the environmental assessment of the Study Area presented below.

3.3 The Solid and Drift Geology

3.3.1 Introduction

The development of the landscape and environment of the Study Area has been the result of a succession of geological processes, especially those which took place during

the Pleistocene period or Ice Age. An understanding of the area therefore requires some appreciation of its geological history during this period.

3.3.2 Pre-Glacial Deposits

Outcrops of pre-glacial geological formations are limited chiefly to the north and south of the Study Area. A band of chalk ranging between five kilometres and fifteen kilometres wide runs along the Chiltern scarp from Aylesbury at the south west limit of the region to Saffron Walden in Essex. Gault Clays of the Tertiary period directly overlie the chalk to the north of the Chilterns, and there is an extensive outcrop of Tertiary London Clays in the area to the south east of a line between Radlett in Hertfordshire and Epping in Essex. The London Clays are flanked to the north by a thin band of the underlying Reading Beds, and a narrow outcrop of chalk.

3.3.3 Glacial deposits

Most of the surface geology of the Study Area was deposited during the last 0.5-0.4 million years of the Pleistocene Period. Deposits from two glaciations have been identified. The earliest of these, the Anglian, was probably responsible for depositing the mass of chalky boulder clay which occurs over a large area of the north and east of the Study Area (see below 3.4.4). Further deposits of undifferentiated head and fluvioglacial sand and gravel were also laid down beyond the ice-front to the south of the boulder clay. In the sub-arctic, periglacial climate which prevailed beyond the ice-front, mixed solifluction deposits were formed in the valleys and lower slopes by mass movement of soils. These survive as undifferentiated head deposits in some of the Chilterns valleys, and pebbly clays and gravels overlying parts of the London Clay lowlands in the south of the Study Area (Thomasson and Avery 1970).

During the final Devension glaciation, the ice sheet did not reach the Study Area. However, all of the region experienced periglacial conditions, and head deposits accumulated in most of the major river valleys. Heavy loads of coarse gravely debris carried by the rivers were also deposited as gravel terraces along the lower valleys of the Lea and Colne. It is also likely that fine, wind-blown deposits of loess were deposited

on the higher ground beyond the margins of the ice sheet, providing a cover of fertile and easily worked soil over the clay plateau areas. However, most of the loess soils appear to have been eroded by the end of the Bronze Age, probably as a consequence of continued exploitation for arable agriculture. A few remnants of these loess soils survive as brickearth deposits and a proportion of loess appears to have been incorporated into some of the clay-with-flints soils (Catt 1978 and below 3.4.5).

3.3.4 Post-Glacial Deposits

The post-glacial or (Flandrian) period is characterised by a general rise in sea levels and the spread of forested environments over southeast England. Deposits of alluvium were laid down in all of the larger rivers in the Study Area, with the most extensive deposits occurring in the lower reaches of the Stort and Lea rivers.

3.4 Environmental Zones (Figure 3.3)

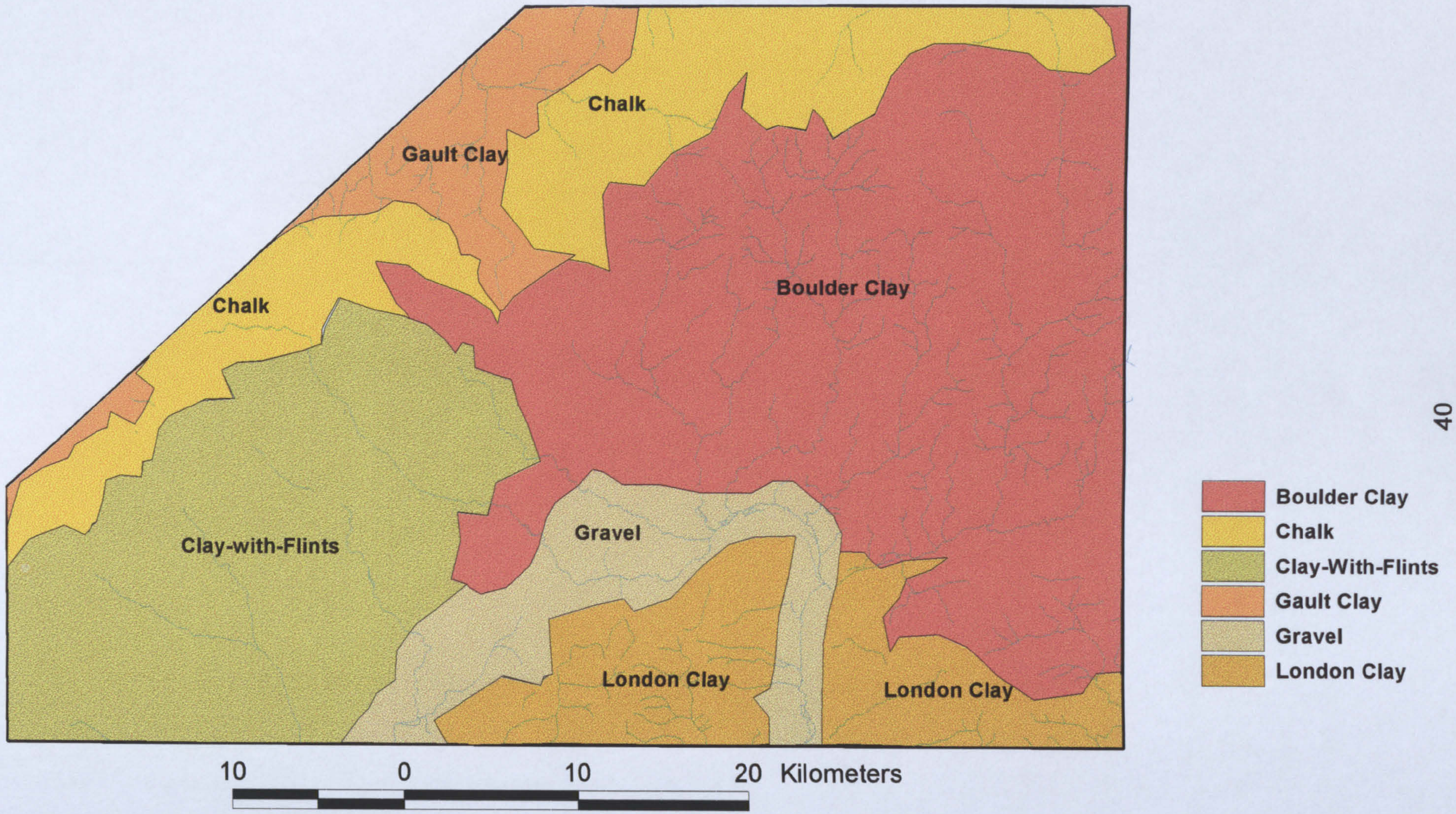
3.4.1 Introduction

The Study Area has been divided into six *Environmental Zones* which range in size from 180 to 950 square kilometres. The aim of the division is to provide a means by which the influence of the physical environment on Late Iron Age settlement location and development can be readily assessed at a relatively small geographical scale. The *Environmental Zones* will form a framework for the discussion below concerning agriculture and the assessment of geographical bias in Chapter 4.

The *Environmental Zones* have been created by taking into account the geographical patterns in a range of available environmental data including solid geology, soils and soil properties, the current agricultural potential, vegetation, and the general landscape and topography of the area. However, the basic underlying or 'first order' determinant of the zones has been the solid and drift geology and the zone boundaries broadly follow the major boundaries between solid and drift geology formations. Each of the zones

Environmental Zones

Figure 3.3



also has a distinctive physical landscape and soil type which have been largely determined by the underlying geology. These 'second order' characteristics have in turn determined, together with the climate, the 'third order' characteristics of surface vegetation and the agricultural potential of the land.

The six *Environmental Zones* are broadly comparable with the six Hertfordshire regions identified in the assessment of Domesday Book (Darby & Campbell 1962) and the six recently designated Hertfordshire Landscape Areas (Volhard 1997).

The following descriptions provide a summary of the general characteristics of each of the six *Environmental Zones*. A more detailed assessment of soils, vegetation and agricultural potential is provided in Section 3.6 below.

3.4.2 Gravel

This zone forms a band, 182 square kilometres in size, to the south of the Study Area, between Watford in the west and Enfield in the east. Its landscape consists of two broad low-lying areas between Watford and Welwyn in the west and the Lea Valley in the east, with a an area of steeper, narrower river valleys sandwiched between. The latter area between, Welwyn and Ware, was formed by the confluence of the tributaries of the river Lea.

The broad low-lying areas of the zone were originally formed by the river Thames as it was diverted northwards, 30 miles from its current course, by the Anglian Ice Sheets some 400,000 years ago (Bridgland 1994). The current river systems of the Lea and Colne are major tributaries of the Thames, but form only a small part of the zone.

The extensive deposits of glacial gravel, which make up a large proportion of the zone, have until the 20th century been dominated by acidic lowland heaths. The river valleys, in contrast, contain good arable land and population has historically been concentrated in these areas.

3.4.3 The London Clay

The London Clay zone comprises two areas, totaling 253 square kilometres in size, which are located at the southern boundary of the study area. The two areas are separated by the river Lea Valley, which is within the Glacial Gravel zone.

The zone can be divided into two reasonably distinct areas, on the basis of topography:

1. A low plateau area between the valleys of the Lea and Colne rivers, 80 to 100 metres above sea level, and approximately 85 square kilometres in area. The geology of the area comprises heavy London Clay which is overlain in parts of the area by pebbly gravel. An area of similar landscape, 105 square kilometres in size, also lies to the east of the Lea Valley.

2. A band approximately six kilometres wide to the east and west of the Lea Valley. This is one of the most distinctive landscapes in the region, which comprises a series of steep, narrow valleys which run at right-angles to the river Lea. Each of the valleys is formed by a stream which has deeply incised into the clay subsoil.

3.4.4 Boulder Clay Plateau

This zone is the largest in the Study Area, with an area of 947 square kilometres. It comprises a gently undulating plateau which is dissected by a series of river valleys, running north/south, that feed into the river Lea. The relief of the zone falls gradually from around 140 metres at its northern edge to 70 metres, at it southern limit.

The soils developed on the boulder clay can be divided into two distinct types. The chalky clay soils of the Hanslope Association are the most extensive soil type on the plateau and within the study area as a whole, and occur over much of East Hertfordshire and Northwest Essex.

The second major soil group in the zone are the clay soils of the Oak Series, which form a discrete area at the western edge of the zone extending through the central part of Hertfordshire into the Vale of St. Albans. In comparison to the Hanslope Soils, they are generally wetter, more acid, stonier and less fertile, although when drained they also make good arable land. The area contains extensive tracts of woodland and pasture, although not as much as the London Clays.

3.4.5 Clay-With-Flints Plateau

The zone forms the dip-slope – or more gentle downward slope – of the Chiltern Hills, which falls in height from north west to the south east. It is 510 square kilometres in size and its landscape consists of reasonably level plateau areas which are dissected at intervals of four to eight kilometres by relatively steep river valleys which drain into the Colne and Lea rivers. In contrast to the rivers of the Boulder Clay zone, these are not fed by networks of streams and tributaries.

The dominant soils of the plateau are clay-with-flints which were probably formed from the weathered remnants of Tertiary clays, glacial clays and loess deposits. The soils form heavy, stony brownearths which are difficult to cultivate. Constraints upon arable agriculture include excessive wear on implements, damage to the hooves of cattle and the difficulty of harvesting crops, especially root crops (Avery 1964:177)

3.4.5 Chalk Upland

This zone includes the summit and scarp slope of the Chiltern Hills, locally referred to as the 'Icknield Belt' which forms a band running from the south west to the north east of the study area, which is between three and ten kilometres wide. The zone also includes the watershed area between the Thames and Ouse river basins, two of the major river systems of southern England. Consequently, the zone does not contain any major river valleys. The soils of the zone are dominated by the shallow, calcareous, light and free-draining Icknield Series (Thommason 1969).

The zone is divided topographically and geologically into two areas which are separated by the five kilometre wide glacial valley known as 'The Hitchin Gap'. The effects of the Angian Glaciation have also led to significant differences between the landscape of the two areas: The area to the north and east was subject to the direct affects of the glacier, and has an open, gently-sloping landscape which varies between 50 metres and 120 metres. In contrast, the areas to the south and west, which appears to have between unaffected by the glacier, has a more varied and, in places, dramatic landscape, with a steep scarp to the north and west and a number of steep-sided dry valleys. The height of this area also has greater variation: between 60 metres and 200 metres.

3.4.7 Gault Clay Vale

This zone comprises two small areas to the north and west of the Chalk Upland zone. The landscape of the zone is a uniform lowland vale between 50 and 70 metres above sea level and forms a band between the Chiltern Hills and the Greensand Ridge of Bedfordshire. The soils are mainly Gault Clays of the Wicken series which produce some of the heaviest soils in England (Avery 1964:186).

3.5 The Prehistoric Agricultural Economy

3.5.1 Introduction

The Importance of Agriculture

It can reasonably be stated that agricultural production was the pre-dominant economic activity of the Late Iron Age population of the Study Area. Indeed, Jones has recently stated that:

"the Iron Age economy was entirely rooted in plant management . . ." (Jones 1997:29).

As such, the production, exchange and consumption of agricultural produce will have been an important influence upon the social and political developments which the Late

Iron Age evidence for the Study Area represents. Therefore, an assessment of the agricultural economy of the Study Area is likely to be of assistance in understanding the background to these developments.

In addition, an examination of the agricultural economy provides an opportunity to consider the important wider, landscape, context for the site specific settlement and burial data considered by the thesis. This can include information on a range of themes, including:

1. the type of management and its relative intensity, in terms of labour input,
2. the use and demarcation of physical space for fields, trackways, droveways and enclosures, etc.,
3. the spatial and temporal relationship of agricultural space to other types of designated space such as habitation areas and areas reserved for ritual and burial.

The Approach Adopted

Direct evidence about the nature of the agricultural economy of the Study Area during the Late Iron Age is sparse. Table 3.1 lists the 15 Late Iron Age sites for which there is evidence that agriculture was probably the dominant activity, and of these, only three (Wendens Ambo, Puddlehill and Gorhambury), has the evidence been fully published. Therefore, in order to gain a meaningful level of understanding of this aspect of the Late Iron Age it is necessary to draw upon evidence from earlier periods as well as general studies. The evidence from relict fields and field systems, together with their associated boundaries, will also be considered where appropriate.

Table 3.1, Late Iron Age sites with evidence for an agricultural function

Name	Reference
7. Norton Road, Stotfold Bypass	Steadman 1995
24. Hadham Hall	Walker 1994
28. Foxholes	Partridge 1989
34. Wendens Ambo	Hodder 1982
37. Puddlehill	Matthews 1976
59. Thremfall Avenue, Stansted	Brooks & Bedwin 1989
60. Airport Catering Site, Stansted	Brooks & Bedwin 1989
65. Bury Lodge, Stansted	Brooks & Bedwin 1989
78. Social Club, Stansted	Brooks & Bedwin 1989
79. Gorhambury	Neal et al. 1990
106. Hollards Farm	Burleigh et al. 1990

154. Lobbs Hole, Stevenage	Hunn 1997
171. Holwell Quarry	Beds. Co. 1998b
172. Leavesden Aerodrome	Brossler 1999
186. Rickneys	Percival and Richmond 1997

As a consequence of the limitations of the data, some of the conclusions made about the nature of the agricultural economy and landscape in the Late Iron Age are generalised and speculative. Nonetheless, it is considered that the relatively high importance of agriculture, together with the potential merits of considering an aspect of the wider landscape, makes the exercise worthwhile.

Three studies of the prehistoric agricultural economy – one from within the Study Area – have been identified as being especially relevant to assessing the nature of the Late Iron Age agricultural economy.

1. Legg, A. J. 1981. The Agricultural Economy. In. Mercer, R.J. *Grimes Graves, Norfolk: Excavations 1971-72:* Volume:80-101. Department of the Environment Archaeological Reports No 11.

2. van der Veen, M & O'Connor, T 1998. The expansion of agricultural production in the Late Iron Age and Roman Britain. In Bailey, J. (ed.) *Science in Archaeology: an agenda for the future*:127-44. English Heritage.

3. Halstead, P. 1982. The Economy. In Hodder, I.A. *Wendens Ambo: The Excavation of an Iron Age and Romano-British Settlement*: 61-3. The Archaeology of the M11, vol. 2.

In addition, evidence from unpublished reports on the environmental data from the Stansted excavations (Murphy forthcoming; Wiltshire forthcoming; Havis and Brooks forthcoming) will also be used.

3.5.2 Legge (1981)

A.J. Legge wrote a chapter on the agricultural economy in the report of the excavations of the Bronze Age settlement at Grimes Graves, Norfolk (Mercer 1981). Although the

settlement is c1700 years earlier than the Late Iron Age and is situated within an area of much drier and more acid soils than the Study Area, two parts of the chapter (3, Animal Husbandry and 5, Soils and Land use Potential) are directly relevant to the assessment of agricultural potential undertaken below, and will be considered here in detail.

Animal Husbandry

The analysis of a midden of Middle Bronze Age cattle skulls is considered by Legge. Most of the cattle were slaughtered before they were six months old, and from this he concludes that this represents a deliberate killing pattern which, by modern and historic analogy is likely to have been cattle management for dairy husbandry. In such management regimes, the calf completes with man for the important resource of the cow's milk and is an economic burden unless it is to be used for breeding or herd replacement. A high ratio (6:1) of females to males in the adult cattle cull data from the midden also strengthens Legge's interpretation of the Grimes Graves cattle management regime as dairy husbandry.

Legge considers the relative merits of diary farming compared with other management regimes, using data from a variety of sources including MAFF, nutritional journals and several Swiss prehistoric sites. A comparison using modern data of the yields of wheat, beef cattle and dairy cattle for a common unit of land is shown in Table 3.2 (after Holmes 1970).

Table 3.2, comparisons of energy yields

	Energy Yield in Million Calories per Hectare	Protein Yield in Kilograms per Hectare
Dairy cattle	2500	115
Beef cattle	750	27
Wheat	14000	350

In this idealized comparison, the advantages of dairy husbandry are clear. Legge argues that the choices between the relative importance of beef and dairy husbandry are likely to have been related to agricultural potential. He suggests that dairying would have been preferred by prehistoric farmers in situations where the animal husbandry potential

was restricted either by the size or the quality of the available pasture. A system based on husbandry for beef would therefore tend to occur in areas which were more fertile and/or had access to more extensive pastures (Legge 1981:89).

As evidence for the relationship between the type of cattle husbandry and agricultural potential, Legge also cities an assessment of the transition from the Neolithic to the Bronze Age in Switzerland (Higham 1968) which provides evidence of how the types of pasture may be related to the husbandry choice between dairying and beef rearing. Using the evidence from pollen, Higham draws a distinction between Neolithic and Bronze Age sites. In the Neolithic sites, plants representative of open pasture land are rarely represented in the pollen spectra. In these sites, it is suggested that the agricultural regime consisted of small fields for the cultivation of cereals, and animal pasture from tree foliage and mast in forested areas. In contrast, at the Bronze Age site at Arbon Bleich, the occupation phase is marked by an increase in the non-arboreal pollen and a decrease in arboreal pollen. This, it is suggested, means that the forests were being cleared for the creation of open pasture.

Legge develops the thesis by analysing the sex ratios of cattle bone assemblages from the Swiss sites. These show that the ratios on the Neolithic sites are consistent with dairying (a high ratio of females to males) whilst those of the Bronze Age sites are consistent with beef production (a high ratio of males to females). This suggests that the Neolithic communities used the forest for cattle pasture, and its relatively low productivity in terms of the maximum stock density allowable meant that dairy husbandry is likely to have been the dominant stock management regime for cattle. The Bronze Age colonisers, in comparison, by clearing the forest and creating open pasture, were able to achieve much higher stock densities for a given area of land. Consequently, the energy and protein yield per hectare was high enough to make the husbandry of cattle for beef viable.

Legge concludes by suggesting that the emphasis on dairying in prehistoric farming communities may generally be related to low soil fertility and other conditions which reduce the carrying capacity of the land and its potential for animal husbandry.

The theory proposed by Legge is important for the following reasons:

1. it provides a model for the agricultural exploitation and settlement of areas of low agricultural potential, including forested areas,
2. it provides a clear economic rationale for the clearance of forest for the creation of open pasture,
3. the presence of animal husbandry regimes which have an emphasis on dairying or beef can be tested for by the analysis of suitable animal bone and pollen data.

Soils and Land-use Potential

Legge carries out an analysis of the soils and their agricultural potential for the area within a radius of three kilometres from the Middle Bronze Age settlement at Grimes Graves, which lies within the Breckland area of East Anglia. The soils are divided into five classes on the basis of their current texture, drainage and agricultural potential. However, the effects of leaching and podsolisation have almost certainly reduced the agricultural potential of the better soils in the period since the Middle Bronze Age.

:

1. upland soils - acid, with excessive drainage and unsuitable for agriculture
2. slope soils - shallow, calcareous and well drained soils
3. terrace/upland gravels - stony, acid soils: generally unsuitable for agriculture
4. dry valley soils - well drained and unsuited for agriculture
5. valley floor soils - mostly under wet pasture.

The area under study has a roughly equal proportion of the dry upland and valley soils which are currently unsuitable for agriculture, and the better 'slope soils'.

The results of the analysis show that a higher proportion of the better soils (51%, compared with 41% for the poorer soils) lie within one kilometre of the settlement. In addition, the proportion of the total land area covered by the better soils falls from 51% to 43% at a distance of between two and three kilometres from the settlement.

Legge then points out that both figures are in keeping with the classic Thunian model of land use (Chisholm 1962). In broad terms, this says that agricultural husbandry such as

intensive arable, which requires a high labour input, tends to be located close to the habitation area, and husbandry which requires a lower labour input, such as less intensive arable and animal husbandry, is located further away from the settlement. In the case of Grimes Graves, the assumption can be made that arable husbandry was carried out on the better soils adjacent to the settlement, whilst animal husbandry (dairy herding) was carried out on the poorer soils at a greater distance from the settlement.

Finally, with the conclusions concerning the importance of dairy husbandry and the soil distribution in mind, Legge considers the important factor of access to water. This, in the form of the Little Ouse river, lies at 6.6 kilometers from the Middle Bronze Age settlement which, Legge points out, corresponds well with the maximum distance recommended by MAFF that lactating cows should travel to water.

The Importance of the analysis of the physical environment at Grimes Graves

The analysis undertaken by Legge is (together with Halstead (1982), mentioned below) one of the few detailed published studies of the physical environment in the vicinity of a prehistoric or Roman settlement in southern England. The settlement appears to have been a permanently settled, mixed farming community of about 50 people (Legge 1981:100). Although there are no comparable detailed studies for the Late Iron Age, it is likely that, given what is known of the agricultural changes between the Middle Bronze and the Late Iron Ages, the agricultural economic basis of a Late Iron Age settlement in a such a location would have been similar to that of the Middle Bronze Age settlement. This is especially true with respect to the economics of dairy herding, which made up a substantial proportion of the agricultural economy of Grimes Graves.

His conclusions are important in that they show that the Middle Bronze Age settlement is located at a point which is favourable for the maximum exploitation of arable soils, grazing land for cattle, and access to water. This suggests that the location was chosen with these factors in mind, and that the physical environment may therefore have been an important determinant of settlement location. However, the proximity of the abandoned Neolithic flint mines at Grimes Graves must also have been an important factor in influencing the settlement location, either as a source of flint, or because the chalk waste

from the mines had enhanced the soil fertility of the area around the settlement (Legge 1981:96).

The settlement at Grimes Graves therefore provides an example of the potential complexity of the factors which are likely to influence the location of prehistoric farming communities. In this particular case the site of the Middle Bronze Age settlement was probably chosen with care, in order that it was in a position to easily exploit the localised resources of the flint mines, but also be in a favourable location to exploit the agricultural resources of the wider area within a three kilometre radius of the settlement.

3.5.3 Van der Veen and O'Connor (1998)

Introduction

The most recent and authoritative national overview of Iron Age agriculture is by van der Veen and O'Connor (1998). In this, van der Veen and O'Connor put forward the view that increasing agricultural production was an important feature of the period from c500 BC to AD 500. The various ways in which production can be increased are discussed and the evidence for a model of two alternative management strategies (intensification and extensification) is considered.

The evidence for increasing agricultural production as presented by van der Veen & O'Connor is summarised below, and is considered with respect to the study area.

Strategies for Agricultural Expansion

Five strategies types for agricultural expansion are identified (van der Veen & O'Connor 1998:129). However, they are not presented as alternatives or mutually exclusive strategies, and some can occur together, e.g. the commercial production of cash crops (types 4 and 5).

1. A general expansion of the area under cultivation in response to population growth. This concerns the bringing into cultivation or pasture of new areas by new people, and does not necessarily involve any change in agricultural management regimes.

2. An increase in agricultural yields or other advantages which arise from innovations that do not require changes in the agricultural management regime. However, such innovations, can in practice, arise from changes in management.

3. A change in management by an intensification or extensification. These terms are defined by van der Veen & O'Connor in the following way:

a. *Intensification* - a move to a regime which has a higher input and return and a lower capita per area. Examples of 'intensive' regimes include horticulture and market gardening which require high labour input but also have a low return from capital investment

b. *Extensification* - a move to a regime which has a lower input and return per area, but which have a higher returns per capita. A modern example of an 'extensive' regime is large scale mechanized cereal farming, which has low labour requirements and a high return on capital expenditure in the form of machinery.

4. Specialisation of production to produce cash commodities to sell in a market or other exchange system

5. A change in the mode of production of staple commodities from that based on domestic consumption to the production of intentional surpluses to fulfill external demand. This would include the production of agricultural produce for tribute or tax etc., and could involve a range of strategies including intensification/extensification.

Clearance and Colonisation 1500-500 BC

Reviewing the evidence for the five ways in which production can be increased, van der Veen and O'Connor say that by c500 BC there was a need for agricultural production to increase in order to provide for the growing non-agricultural section of the population. However, the increase required could no longer be provided for by simply bringing new areas of land into production, as had been done in the past in response to increases in population (above, type 1) (van der Veen & O'Connor 1998:129-30), the reason being that by c500 BC most of the available land been cleared and brought into production.

Evidence for this comes from the pollen record a number of lowland valleys in southern England which shows large-scale clearances of woodland from the Middle Bronze Age onwards (Brown and Murphy 1997:15-8).

The van der Veen and O'Connor Model

Van der Veen and O'Connor propose a model for increasing agricultural production during the later Iron Age. The model is of a change in agricultural management strategy to either more intensive or more extensive regimes to increase production (above, type 3). As evidence for this development, they cite the adoption of spelt wheat as the most common crop species during the Iron Age, in place of emmer. This is a widely attested development during the Iron Age which also occurs in other parts of western Europe (Jones 1981; 1984) although its use in the Study Area probably began in the Late Bronze Age (Murphy 1997:18). However, van der Veen and O'Connor point out that the conversion from emmer to spelt was not consistent in space time, and on many sites emmer continued to be used into the Roman period (van der Veen & O'Connor 1998:130-1).

Jones (1981) first highlighted the potential advantages of spelt wheat over emmer on heavy clay soils, where its hardiness and tolerance of wet conditions meant that previously marginal land could be brought into cultivation. This view has been supported from the evidence of controlled experiments which have showed that spelt has higher yields than emmer in cold winters (van der Veen & Palmer 1997).

The importance of the van der Veen and O'Connor model is that it suggests that increasing dominance of spelt wheat was not due to being consciously selected by farmers over emmer in the Iron Age, but is due to a general shift in management regime to a more *extensive* arable agriculture. The scenario envisaged is that production was increased by taking more land into arable agriculture (assumed to be mainly clay land under rough pasture), but in such a way as to minimize the labour input. Thus, the labour intensive aspects of arable agriculture such as digging, manuring and weeding were reduced or even neglected altogether. In such conditions of low fertility and poor drainage, where a seed mixture which included both spelt and emmer was used, the spelt

wheat would have a selective advantage over emmer, and gradually become naturally dominant.

This view is supported by the statistical analysis of charred seed assemblages at six Iron Age sites in North East England, where the assemblages were found to fall into two distinct groups: Group A, in which emmer wheat is dominant, but spelt and barley is present, and the weed species are indicative of intensive soil working; and Group B, which are characterised by spelt wheat and barley and which have weed species suggestive of limited soil working and manuring (van der Veen 1992; van der Veen and O'Connor 1998:32). This, albeit small sample, suggests that the differences between Group A and B are likely to be related to management regime rather than the deliberate selection of wheat species. It also provides an explanation of the continued presence of seed assemblages throughout the Iron Age, in which emmer is an important component. Such assemblages are therefore likely to be the product of intensive cultivation, with manuring and digging, to which emmer is better adapted, where as the spelt-dominated assemblages are more likely to be the result of extensive regimes.

However, the presence of six-row hulled barley in both groups A and B further complicates the picture as this was invariably associated with the poorest soil conditions. Therefore in the extensive/intensive management model, barley would have been grown under more *extensive* conditions with either spelt or emmer wheat, which in the case of the Group A sites suggests that intensive and extensive regimes were being practiced on the same farm (van der Veen & O'Connor 1998:133). Other explanations for the interaction and gradual dominance of spelt wheat in the Iron Age have been offered, including the suggestion that spelt flour makes good bread but poor porridge, where as the harder, flinty flour of emmer is more suited to porridge (Dickson 1987). However, the van der Veen and O'Conner model seems to fit best the currently available evidence of the gradual but sporadic rise in the use of spelt in the Iron Age.

3.5.4 Halstead (1982)

This is a summary of the environment and economy of the Iron Age and Roman settlement at Wendons Ambo, which is situated at the north east corner of the Study

Area. It draws upon data from the excavation undertaken in 1974, particularly animal and plant remains, together with an analysis of the soils and topography of an area within approximately one kilometre radius of the settlement.

Three soils types occurred locally: meadow soils in the valley; light soils on the valley side; and heavier boulder clay on the plateau. The settlement was located on the side of the valley from where it was able the easily exploit all three soil types in the following areas and proportions: arable 170 hectares (54%); meadow 40 hectares (13%); and clayland 105 hectares (33%).

Halstead, using the excavation and soils data, suggests that the lighter soils were exploited for intensive arable, and fertility was maintained by the application of animal manure and kitchen compost. Sheep, Halstead argues, are likely to have been used to provide the animal manure by grazing the arable land after harvest and during periods of fallow. Their habit of feeding close to the ground and moving in groups meant that they are able to make better use of the pasture than the larger horse and cattle, and thereby remain on it for longer periods. Applebaum (1954) says that sheep were especially important in prehistory for converting stubble and fallow into manure. Citing Thomas (1957), Halstead also points out that the treading by sheep of the light soils may also have been beneficial in turning the soil, where as trampling by cattle is more likely to have been damaging.

The claylands adjacent to the settlement, Halstead says, are likely to have been used for cattle pasture. He suggests a scenario whereby the extensive wooded areas on the plateau were gradually cleared for open pasture during the Iron Age, with cattle feeding on the regrowth of saplings of shrubs and trees in spring, summer and autumn, and on fodder from the remaining woodlands in winter. The heavy wet soils would have been generally unsuitable for sheep and arable agriculture. The woodland on the plateau would also have been exploited for fuel, pannage and venison. However, evidence from the Stansted excavations, where woodland clearance began from the Early/Middle Bronze Age (Wiltshire forthcoming), suggests that the extent of woodland on the boulder clay plateau areas may have been already reduced by the Iron Age.

In summary, the proposed land-use for the area in the Iron Age is for the valley sides being used for arable and sheep pasture, and the clay plateau areas for cattle pasture and as a source of fuel and game.

The Significance of the Report

The significance of Halstead's summary for this thesis is the information it provides on the role of sheep in the agricultural economy of the clayland areas; both as a source of meat and wool, and probably just as importantly, a source of manure.

Other Evidence from the Study Area and East Anglia

Pollen samples from Essex indicate that new, extensive woodland clearance began c3500 BP in the lowland areas, and c3000 BP on the boulder clay at Stanstead (within the Study Area) and intensified further during the Iron Age (Wiltshire forthcoming; Murphy 1996:172). By the later Iron Age (c300 BC), the river terraces around the Thames Estuary appear to have been a largely open landscape (Murphy 1996:172). Recent evidence indicates that the area around St. Albans was largely open by the time of the Roman conquest (Wiltshire 1999).

Spelt wheat appears to be a later Bronze Age innovation which is present on most later Bronze Age sites, although, the only sites where it is the dominant wheat species are Springfield Lyons, Chelmsford, and Lofts Farm, Heybridge (Brown & Murphy 1997:18). There are, however, grounds for suspecting that spelt-growing increased in importance through the Iron Age in Essex and the Study Area (Murphy 1997:30-31). The only sites in which emmer wheat is dominant during the later Bronze Age and Iron Age are Wendons Ambo (Hodder 1982), and Ashenden Camp on the Thames Estuary.

Although the evidence from charred seed assemblages is at present sparse, it would seems to indicate that a mixture of intensive and extensive arable regimes being practiced from the later Bronze Age (c3000BP=1000BC), with the area of extensive arable increasing during the Iron Age.

3.6 The Significance of Agricultural Potential

3.6.1 Introduction

The agricultural potential of the Study Area is one of the criteria that will be evaluated with respect to the assessment of factors which influenced Late Iron Age settlement location and development. For this study, the term 'agricultural potential' is defined as the optimum yield in terms of produce (meat or grain) which can be obtained from a given piece of land from the optimum agricultural regime (arable, pastoral or combinations of the two). An assessment of agricultural potential will be used to identify optimum agricultural regimes (see below 3.6). The significance of agricultural potential in terms of settlement location is that it will have a direct bearing on the carrying capacity of the land in terms of the number of people it can support from subsistence agriculture alone. It is, however, acknowledged that agricultural potential, as defined, is only one of a number of factors which is likely to have influenced the location and development of Late Iron Age settlement.

In order to develop an understanding of this criterion for the study area, there are several key variable factors that affect the reliability of any assumptions made, and which need to be taken into account at the outset:

1. there is very little information available concerning the nature of agricultural regimes within the Study Area during the Iron Age. Therefore, in order to make even a general assumptions about these, it is necessary to use analogies with later periods and other sources of data.

2. likewise, there is very little information available concerning changes to the factors which influenced agricultural potential between the Late Iron Age and the post-medieval period. Of these, the most significant are probably changes to soil structure and fertility. Abundant information is available concerning improvements to soil fertility and drainage, etc. during the past 150 years from the control studies carried out at Rothampsted Experimental Station, which is located within the Study Area.

However, prior to the 1850s, little data is available, and any assessment of changes is reliant on general assumptions drawn from a variety of indirect sources.

3.6.2 Factors Affecting Agricultural Potential

In this section, an assessment has been made of the principal factors which are likely to have determined the agricultural potential of the study area in the late Iron Age. It is based on information from reports from the Soil Survey and the available evidence on Late Iron Age agricultural technology .

Climate

The Study Area has an annual rainfall of 50-55 centimetres and a yearly average temperature range of 13°C, which is comparable with the more continental climate of East Anglia. There is a summer soil moisture deficit (the excess of transpiration over rainfall) of 8-15 centimetres, which means that this difference has to be made up from water held in the soil in order to avoid drought to crops (Limbrey 1978:24). This is a critical factor affecting the ratio of arable land and pasture in any given location as grass is much more sensitive to drought than cereal crops (Murphy pers. comm.). The temperature range in also significantly higher than the average of 11°C for much of western England (Avery 1964:20). This is accentuated in some parts of the Study Area by the effects of a number of narrow, relatively steeply-sloping river valleys, which can act as frost-pockets. The steepest and narrowest of these valleys (the Chess and Bulbourne) have produced some of the lowest recorded temperatures in the UK (Avery 1964:22). This affect would have occurred during the Late Iron Age and will have served as a constraint upon cultivation within these river valleys of some types of arable crops which are particularly susceptible to frost damage.

Soil Fertility

Most of the soils within the Study Area are generally fertile and can support a wide range of arable crops, once adequately drained. This is reflected in the current agricultural land classification of the Study Area, which has most of the area classified as

grade three, and a large area to the east of the Study Area (broadly corresponding with the soils of the Hanslope Association) classified as grade two.

The least fertile soils are the clay-with-flints which have a high acidity and low reserves of plant nutrients and, therefore, require liming to maintain fertility (Thomasson & Avery 1970:9). The glacial gravels of the St. Albans series are also acidic in nature and require heavy manuring to maintain fertility (Avery 1964:180). It is unlikely that soil fertility of the clay soils in general has been substantially reduced since the Late Iron Age although there is some evidence for nitrogen depletion in the Middle Ages at Stansted (Murphy forthcoming). Some erosion has also undoubtedly taken place of the chalk soils, and continued ploughing has reduced their organic-matter content (Avery 1964:4) . Within the Study Area, the very acid, strongly leached, podzolised soils are restricted to limited areas of gravel (Avery 1964:7). Soil fertility in itself is, therefore, unlikely to have been a significant constraint upon settlement in the Late Iron Age.

Drainage

The principle factors limiting agricultural development is the water retention capability of the soils. The Study Area is dominated by clay soils, which make up over 80% of the land area, and most are currently farmed for arable agriculture. However, this is due to a substantial extent to agricultural improvements made to the soils in the twentieth century, particularly from artificial drainage. Without drainage, much of the extensive clay plateau and level lowland areas of the Study Area are prone to waterlogging in winter. The extent to which this factor will have limited arable agriculture in the Late Iron Age is difficult to estimate; but the fact that much of the clay-with-flints and London Clay soils have only been brought into arable agriculture since the medieval period (Thomasson & Avery 1970:9) indicates that Iron Age arable in these areas is likely to be limited. The areas with the greatest problems with soil drainage are the London Clay, the level plateau areas of the Boulder Clay and the lowland Gault Clay areas These are all subject to waterlogging, and in the case of the Gault Clays, the maintenance of adequate drainage systems is still costly (Thomasson & Avery 1970:17). Large areas of the clay soils of the Study Area remain under deciduous woodland because of their wetness. The number of days in which the level plateau soils can be worked is still limited mainly to the summer and dryer periods of spring, autumn and

winter (Curtess & Courney 1975:137). Therefore, arable agriculture on these areas is likely to have been greatly restricted during the Late Iron Age. Cattle pasture may also have been restricted during periods when the soil was waterlogged. Winter feeding of cattle on drier areas or from collected fodder may therefore have been necessary.

However, dryness can also be a factor limiting agricultural potential for some soils with excessive drainage. The relatively low rainfall soil moisture deficit of the Study Area means that the light chalk and gravel soils which occur in some parts of the Study Area, although easily cultivated, are drought sensitive in summer; crop yields are often reduced, or occasionally fail altogether (Avery 1964:180; Thomasson & Avery 1970:15). The productivity of cattle pasture in these areas is also likely to have been low due to the lack of running water for the cattle and the higher drought sensitivity of the shallower-rooted pasture grasses compared with arable grasses (Limbrey 1978).

Ease of Cultivation

The stoniness of some soils can also reduce productivity for arable crops. Soils which contain too many stones, as is the case with much of the clay-with-flints and some of the gravely soils, restrict rooting, and limit the total available water, which can reduce yields. Damage to the hooves of stock used for plough traction can also affect the viability of arable cultivation. In addition, gradient can affect suitability for arable cultivation. Some steep slopes along the valleys of Chilterns and the Boulder Clay plateau are difficult to cultivate or are easily eroded, and landslipping occurs on some of the London Clay slopes (Thomasson 1969).

3.6.3 Conclusions

Of the four identified factors, drainage, both poor and excessive, is likely to have been the most important constraint upon agricultural potential. Poorly drained soils would have been widespread within the Study Area; occurring over most of the level plateau areas, and even with the relatively dry climate of the Study Area, they will have become waterlogged during most winters. The extent to which this is likely to have reduced the yields of the soils during the Late Iron Age is less clear, although by analogy with

modern farming, it is likely to have been considerable. The excessive drainage of the glacial gravels in the south of the Study Area would have seriously restricted the potential of these areas for arable agriculture. The soil water deficit of the gravels and other light soils, especially the chalk, is also likely to have restricted the productivity of grass pasture.

Problems with the ease of cultivation, especially due to stoniness of soils, are also likely to have been widespread on the glacial gravels and on the clay-with-flints soils, although probably less of a constraint than drainage. The tendency for large-scale erosion and landslipping down slopes on the London Clay is, however, likely to have been a more serious constraint for arable cultivation in these areas.

3.7 An Assessment of Agricultural Regimes During the Late Iron Age

3.7.1 Introduction

An assessment of the influence of the four factors affecting agricultural potential (above 3.6) together with the assessment of the prehistoric agricultural economy (above 3.5) will be used to provide a broad indication the likely optimum agricultural regimes for the six Environmental Zones. The assessment of the six zones will also be brought together and simplified into a single map of agricultural regimes for the Study Area (below 3.8).

The aim of the assessment is to provide an indication of the types of agriculture practiced in the Late Iron Age, a map of the distribution of the main types and an estimation of productivity, especially for the pastoral economy. In addition, the assessment will be used to inform the settlement distribution and density model in Chapter 4. It should however be emphasised that the assessment provides only a very general model that is intended to provide a broad agricultural context for the settlement data. In particular, there are a number of important unknown variables, some of which

have been briefly refered to above, relating to the available agricultural technology in the Late Iron Age and the type of agricultural regimes practiced which greatly restrict the reliability of any assessment.

3.7.2 The Boulder Clay Zone

General Characteristics and Potential

Soils of the Hanslope Association are the most common within the zone.

They are imperfectly drained calcareous gleys which are prone to waterlogging on the level plateau areas. When drained, the Hanslope soils make good arable land and can support a wide range of crops. The fact that the soils hold moisture well is an advantage in dry summers, which, in an area of relatively low rainfall (510-560 mm), are frequent (Thommason 1969). However, the soils can only be worked over a relatively narrow range of moisture content, which means that the timing of cultivation is important (Jarvis 1984:191). The potential of the claylands of East Herfordshire and West Essex for cereal production is demonstrated by the fact that they were famed in the medieval and post-medieval periods for the quality of the malting-barley produced. This eventually formed the basis of a nationally important malting industry in the 18th and 19th centuries (Johnson 1970).

Clay soils of the Oak series form a discrete area at the western edge of the zone extending through the central part of Hertfordshire into the Vale of St. Albans. In comparison to the Hanslope Soils, they are generally wetter, more acid, stonier and less fertile, although when drained they also make good arable land. The area contains extensive tracts of woodland and pasture, although not as much as the London Clays.

At the edges of the interfluves – at the interface between the plateau and river valleys – soils of the Thunderidge Series are of a different character from the Hanslope and Oak soils of the plateau areas. They are a mixture of clay, loam and gravel deposits which are better drained than the plateau soils and are consequently better suited to arable cultivation. However, they are generally less productive in terms of modern arable yields than the Hanslope soils. The origins of these soils are not clear, but they were probably caused by solifluction (Thomasson 1969:15-17).

A Model for Agricultural Expansion on the Boulder Clay in the Late Bronze Age and Iron Age

Introduction

A model of Bronze Age and Iron Age agricultural expansion on the Boulder Clay environmental zone is proposed below, using the conclusions of Legge (1981), Halstead (1982), van der Veen & O'Connor (1998) and the results of the Stansted excavations (Murphy forthcoming; Wiltshire forthcoming; Havis and Brooks forthcoming), (see above 3.5) together with the several other unpublished excavations of sites from within the Study Area. The model is intended to provide a possible scenario for the rise in agricultural production during the Bronze and Iron Age. Aspects of the model will also be applied to the Late Iron Age agricultural regimes of the other five environmental zones.

The Model

The model is based on changing and developing agricultural regimes, and is divided into three broad phases:

Phase I

It is proposed that during the Early Bronze Age (c2000-1500 BC) the dominant agricultural regime practiced in the Boulder Clay zone was of a broadly similar type to that of the Middle Bronze Age settlement at Grimes Graves (see above 3.5 & Legge 1981). This would have been based primarily on a regime of *extensive* or 'low-input' pastoral husbandry of the woodland and 'waste' on the plateau for pigs and dairy herding of cattle, together with small amounts of *intensive* 'high-input' arable close to settlements. Sheep are also likely to have been grazed on the arable areas as a source of meat, wool and manure. It is likely that the density of settlements was low, with most located close to the better arable land within, or on the edges of, the river valleys. However, evidence for Middle or Early Bronze Age settlements has yet to be found on the Boulder Clay zone of the Study Area, or the boulder clays within the rest of East Anglia (Brown and Murphy 1997).

Phase II

During the Middle/Late Bronze Age and Early Iron Age (c1500-600 BC) it is proposed that substantial areas of the boulder clay were converted from woodland and scrub to a regime of managed open pasture. This change from a broadly *extensive*, low input, pastoral regime to one which was more *intensive* (requiring the labour input for the initial clearance and subsequent maintenance of open grassland) would have enabled much higher densities of stock to be achieved. More intensive animal husbandry, including the rearing of cattle specifically for beef, could therefore be a viable proposition. A typical settlement of this period on the boulder clay might have been based on an agricultural regime that consisted of small areas of *intensive* arable 'infield'; large area of open *intensive* pasture which could support either beef or dairy cattle husbandry; and woodland for winter fodder.

The investment of labour required for the initial clearance and maintenance of an open pasture regime may have led to settlements becoming more permanent and fixed in the landscape. Certainly, the limited evidence from the Late Bronze Age/Early Iron Age transitional settlements at Thorley and Cole Green seems to indicate substantial occupation with enclosures and fields (McDonald 1995b & forthcoming).

Evidence

Evidence for this phase of the model within the study area is sparse at present. This is partly due to taphonomic biases, particularly the acidic nature of the clay soils, which means that the survival of animal bone is generally poor. However, the preliminary results of several recent excavations, including those of later periods, can be used as evidence.

Possible evidence for an agricultural regime of this type is forthcoming from the Iron Age settlement at Wendens Ambo (Halstead 1982). The regime proposed by Halstead comprised *intensive* 'infield' arable adjacent to the settlement, and low-input *extensive* pasture on the clay plateau. This interpretation is supported by the high proportion of emmer wheat from the settlement, which the van der Veen and O'Connor model suggests is indicative of *intensive* arable. However, Halstead may have underestimated

the potential of the claylands for *intensive* beef cattle rearing. The average age of culling of the cattle at Wendon's Ambo is young, at 36-48 months, which could indicate a predominantly beef-rearing regime on managed pasture.

The site at Cole Green on the edge of the Lea Valley near Hertford is within the Gravel zone, but its topography and geology is comparable to many of the river valleys within the Boulder Clay zone. It was excavated in 1993, and revealed a Late Bronze Age/Early Iron Age (800-600 BC) farmstead which has evidence for both *intensive* arable and cattle rearing (McDonald forthcoming). Enclosures and trackways located adjacent to the settlement have been interpreted as pens and droveways for the management of cattle (ibid.). In addition, micromorphological analysis of soils in a hollow close to the settlement has revealed evidence for the intensive use of soils, that included substantial manuring; and which eventually resulted in large-scale instability and erosion of the soil into the hollow (McPhail forthcoming). Also, recent excavation in 1994 on the boulder clay plateau at Thorley, Herts., revealed a series of very small (5m by 20m) fields arranged in a co-axial pattern, adjacent to an Early/Middle Iron Age (600-200 BC) settlement. These were probably used for *intensive* arable agriculture (McDonald 1995b). The provisional date of this phase of the settlement complex at Thorley is later than the proposed date for Phase II of the model, but it does provide an example of the type of settlement envisaged for Phase II.

The creation of the extensive landscapes of co-axial fields may also have occurred during this phase of the model, based on the analogies with the Thames valley (Yates 1999) and The Fens (Pryor 1998) (see below 3.7.8)

Phase III

Population

For the purposes of the model, it is assumed that the population of the zone grew significantly during the Late Bronze Age/Early Iron Age (c800 BC to c200 BC). The basis of the assessment by Fowler in 1978, that population grew rapidly during the 1st millennium BC, is still probably valid (Fowler 1978:5-7). The estimate of population at the end of the 2nd millennium is probably higher now than it was in 1978 due to the large number of new later Bronze Age settlements which have been discovered since

1978. However, the most recent estimate of the Romano-British population (Millett 1980; and Chapter 4 below) is comparable with the top end of the estimate made by Fowler. Fowler also concludes that the increase was greatest in the lowland zone of England and was probably at its most rapid from the third to the first centuries BC (Fowler 1978:6).

Some increase in agricultural production to accommodate this growing population was achieved by continued clearance and conversion of some of the remaining wooded and scrub areas on the clay plateau to open pasture. However, by the Iron Age, the ability to increase agricultural production in such a way was limited, and the conversion of open pasture to *extensively* managed arable could have been an alternative strategy. It is envisaged that, initially, a wheat seed mixture of emmer and spelt was grown on these areas, and during the course of the Iron Age, spelt wheat, because of its hardiness, gradually became the dominant species. The evidence for spelt wheat from settlements on the boulder clays from Late Bronze Age also supports this assumption (Murphy 1997). Barley is also likely to have been grown under such an *extensive* arable regime, probably in the wetter and less fertile areas or in combination with spelt. The importance of sowing seed mixtures as a strategy in the Iron Age has also recently been emphasised by Jones (Jones 1997).

The increase in the area of arable cultivation is also likely to have led to an increase in the population of sheep, which would have been used to graze the crop stubble and to provide manure. Support for the relationship between the area of arable cultivation and the population of sheep is clearly demonstrated in the more recent history of the zone, which saw a 50% fall in sheep numbers of between 1880 and 1930, a period which coincided with a decrease of over 50% in the areas under arable cultivation (Gardner 1936).

The choice of areas to be converted from pasture to arable will probably have been influenced by drainage and the ease of cultivation; the factors which tend to limit agricultural potential for the clay soils for arable cultivation (see above). The edges of the clay plateau, which have generally much lighter and better drained soils, are therefore likely to have been favoured for conversion. It is however possible that social

factors would also have influenced the adoption of *extensive* arable cultivation. Ferrell has shown that in North East England, those Iron Age communities which are hierarchical and socially integrated were more likely to adopt the innovation of low-input extensive cultivation (Ferrell 1997:235).

In this phase of agricultural expansion there is, therefore likely to have been several reasonably distinct types of agricultural regimes being practiced, with an increasing tendency towards specialisation of *intensive* pasture on the wetter plateau areas and *extensive* arable at the edges of the plateau. In this model, the importance of *intensive* arable (represented by assemblages dominated by emmer wheat) will have decreased during the Iron Age as the much higher energy yields, and probable surpluses, from large-scale *extensive* arable cultivation reduced the requirement to practice this labour intensive form of regime.

Evidence

The animal bone assemblage from the Stansted Airport Catering Site has been interpreted as evidence for specialised meat production in the Late Iron Age, produced from *intensive* open pasture (Havis and Brooks forthcoming). No other sites have produced published evidence which could be similarly interpreted, although only a small proportion of sites have published animal bone or seed assemblages (see above Chapter 2, Table 3). Two recently excavated sites have, however, produced evidence for cattle rearing in the form of stock compounds. At Rickneys, within the Boulder Clay zone, a Late Iron Age rectilinear enclosure with double-ditched feature leading from the entrance has been interpreted as a stock enclosure for cattle (Percival and Richmond 1997). A similar enclosure with a double-ditched feature leading from the entrance has also been excavated at Holwell with the Gault Clay zone. Here, as with Rickneys, there were no buildings or other structures within the enclosure, suggesting that it probably functioned as a cattle compound (Beds. Co. 1998b).

Although these form only a small proportion of the total number of sites, the fact that two of the half a dozen or so sites which have recently been excavated to a high standard have produced such evidence is probably significant. On this basis it could be argued that many of the large number of un-characterised Late Iron Age sites included

in the gazetteer could be associated with the management of stock. Hunn has pointed out that 36% of the probable Iron Age and Roman enclosure in Hertfordshire have evidence for parallel ditches or droveways, indicating a possible pastoral function (Hunn 1996:8).

Extensive Arable Agriculture

Possible evidence for *extensive* arable agriculture has come from Stansted Airport, where several Early Roman settlements located on the edge of the boulder clay plateau have produced charred grain assemblages, demonstrating that arable agriculture was taking place in these areas (Murphy forthcoming). A preliminary assessment of seed and animal bone assemblage at Lobs Hole, Stevenage (Rackham 1997) and Thorley (McDonald 1996:25) also indicates that spelt wheat forms a significant element. There are a few published seed assemblages (Foxholes, Hertford & Skeleton Green) but in these the wheat species could only be identified to genus (spelt or emmer) level (Monk 1989).

Significant evidence for arable agriculture on the boulder clay plateau at the north east corner of the Study Area has also come from the systematic fieldwalking survey by Williamson (Williamson 1984). Williamson observed that the heavier clay soils appeared to have received much larger quantities of farmyard manure than the lighter soils in the Cam river valley. This, he suggested, could indicate that these heavy soils were manured by cattle and the lighter soils were manured exclusively by folded sheep. In this scenario, the wetness of the heavy clay soils would favour manuring by cattle, even though their manure is less fertile than produced by sheep (Willamson 1984:79-80).

The evidence for large-scale manuring of the clay plateau from the Williamson survey would tend to argue against the model of *extensive* low-input arable. However, Williamson points out that the farmyard refuse represented by the manuring scatters probably resulted from only occasional stalling of cattle in the farmyard, and subsequent spreading of manure on the cultivated clayland. This is because some mixing of cattle manure with organic matter such as bedding straw is necessary to retain the potassium and nitrogen in the manure (Williamson 1984:80). The Williamson survey therefore

supports the model by indicating a dual arable/pasture regime in the Boulder Clay zone, with cattle pasture and *extensive* arable on the plateau and plateau-edge, and *intensive* arable and sheep pasture in the Cam valley.

Summary and Conclusions

Table 3.3 provides a summary of the model proposed for agricultural development of the Boulder Clay plateau area during the Bronze Age and Iron Age. In the model, most of the wooded areas on the plateau are cleared in the Middle Bronze Age and production was increased by converting some of these areas to *intensively* managed open pasture. Production continued to be increased during the Iron Age without the need for further large-scale clearance, by converting areas of open pasture to *extensive* arable in the areas of lighter and better drained soils on plateau edge locations. By the end of the Iron Age the large increase in arable production made possible by the conversion of pasture to extensive arable usage, reduced the need for settlements to engage in *intensive* arable production, and also enabled settlements located on the plateau to specialise in intensive pasture (e.g. Stansted).

Table 3.3, agricultural development of the boulder clay

Date	Phase	Dominant Management Regime
Early Bronze Age (c2000-1500 BC)	**I**	*Intensive* arable and pasture in river valleys & *extensive* pasture on central plateau
⇓		⇓ Clearance of woodland
Middle/Late Bronze Age (1500-800 BC)	**II**	*Intensive* pasture on central plateau & conversion *intensive* arable in river valleys
⇓		⇓
Iron Age (800-100 BC)	**III**	*Intensive* pasture on central plateau with *extensive* arable on plateau edge
⇓		⇓
Late Iron Age/Early Roman Period (100 BC-AD 100)	**III**	Specialised *intensive* pasture on central plateau & *extensive* arable on plateau edge

3.7.3 The Chalk Upland Zone

General Characteristics and Potential

The characteristics of the soils and landscape of this zone appear to have offered greater variety in terms of the potential choice of agricultural regimes than would have been the

case with the clay-dominated environmental zones. The potential of the soils are not greatly affected by any of the four main identified limiting factors (drainage, fertility, climate and ease of cultivation). The availability of water is likely to have been the main factor which limited agricultural potential. There are few rivers within the zone, and settlement of all periods tends to be concentrated around springs at the base of the chalk scarp. Sources of water on the upland areas are likely to have been provided by the few chalk streams and ponds on the clay-with-flints areas. The potential problems with the availability of water may have reduced the ability of some areas to support cattle rearing, which requires ready access to water. However, any difficulties are likely to have been only localised and, therefore probably only had a marginal affect over the zone as a whole.

Another limiting factor with regard to arable agriculture would have been the excessive drainage and practical difficulties of cultivating some of the steep slopes of scarp-edge and the many dry valleys within the zone. However, most of these locations contain Roman and medieval strip lynchets, which clearly demonstrates that cultivation was possible.

Agricultural Regimes

Until the 1950s, sheep farming for wool together with small areas of arable cultivation was the dominant agricultural regime practiced in the zone, and before the nineteenth century it had a good reputation for 'fine wool'. The traditional method of farming the downland was to graze the sheep on the upland pasture during the day and fold then onto the lowland arable, next to the farm, at night. Cattle rearing was an important but secondary activity (Oates 1994 & information from HBRC).

However, in modern terms, the yield from sheep rearing is not high, and easily cultivated chalk soils are dominated by large, open arable fields with few hedges or trees. The limitations on arable agriculture are the poor moisture retention of the soils and the many areas of steep relief, especially in the western area of the zone, although the this problem can be overcome with modern techniques and machinery. All land except for the steepest slopes is currently under arable cultivation (Avery 1964:30).

The ecology of the few remaining chalk grasslands within the zone also suggests that this traditional agricultural regime of sheep rearing may be very long-lived. The grasslands have a very high biodiversity of flora (one of the highest of any ecological types in the UK) which is likely to have taken many centuries, and probably several millennia, to be achieved (information from HBRC). Barrow cemeteries, dating to the Late Neolithic/Early Bronze Age, are also situated at regular intervals along the Icknield Belt. Although this does not provide direct dating evidence, it does suggest that these grasslands are likely to have been managed for sheep rearing almost continually since the Anglo-Saxon period, and possibly since the Bronze Age.

The archaeological evidence for the nature of the agricultural regimes practiced during the Iron Age of the zone is not plentiful, and such as there is, is generally of a low quality (see Chapter 2, Table 2.3). However, three sites (Puddlehill, Barley and Blackhorse Road, Letchworth) have produced significant assemblages of published animal bone.

Puddlehill

The Iron Age settlement at Puddlehill is situated on the chalk downland near Dunstable at a height of 140 metres. Excavations produced a large collection of animal bone, although several boxes were lost in transit (Matthews 1976:150). The remaining bone assemblage is dominated by sheep in the Early Iron Age, with a minimum number which is twice as high cattle (the other major species represented). The relative importance of sheep is consistent with the topographical situation of the settlement at Puddlehill, which is 1.5 kilometres from the nearest supply of running water. However, the ratio of the minimum number of cattle to sheep increases to 1:1 in the Late Iron Age. The extent to which this change is due to sampling or taphonomic biases is unclear, but the magnitude of the change could indicate that a change in the agricultural regimes may have taken place towards the end of the Iron Age, with an increasing emphasis on cattle rearing.

Barley

The Iron Age farmstead at Barley was excavated between 1959 and 1961 (Cra'ster 1961; 1965). The site is located on chalk downland at a height of 110 meters, three miles to the south of Royston town. Two water sources, in the form of small streams lie

one kilometre to the east and west of the farmstead. It is dated to the second century BC on the basis of the pottery (Ozanne 1961). A large assemblage of animal bones was recovered from a number of pits. Sheep were the most common species although cattle and horse were also represented. The age at death of the sheep at Barley has also been studied in detail, in a landmark study of tooth eruption sequences (Ewbank et. al. 1964). This demonstrated that the autumn peak of lamb culling, which might be expected if the occupation of the site were seasonal, was not present. Instead, the culling pattern was gradual and cumulative over the first two years of life, indicating permanent occupation (Ewbank 1964 et al). No direct evidence for grain processing was recovered from the excavations.

Blackhorse Road

Blackhorse Road is situated on low-lying ground between the towns of Letchworth and Baldock, and is close to the source of the river Ivel (Moss-Eccardt). It comprises a number of small sites dated to the second century BC (Birley 1988:80-1) scattered over approximately one square kilometre, which were excavated between 1958 and 1973. A reasonably large collection of animal bones was recovered from these sites, although none of the individual sites produced many bones. The recovery of bone was also biased by the absence of any sieving (Legge 1988). The proportion of the four main species was reasonably consistent between the sites at 40-65 % cattle, sheep 20-45 %, pig 3-9% and horse 3-20%. These figures are probably biased by the recovery in favour of the larger bones of horse and cattle. However, even allowing for this, the dominance of cattle over the other species is clear. The much greater source of meat that cattle provide in comparison to sheep also suggests that cattle were likely to have been the most important meat species within the agricultural economy of Blackhorse Road. Analysis of the age of death of the cattle and sheep indicates most were at their maximum body size and a substantial proportion lived to a relatively advanced age. This indicates an agricultural economy in which the cattle and sheep were exploited for a variety of products, including use of cattle for traction (Legge 1988:95).

Conclusions

The proportion of the two main mammal species (sheep and cow) in the animal bone assemblages of the three sites in generally in keeping with the theory proposed above

that sheep rearing is likely to be the dominant regime on downland, with cattle rearing being relatively more important in lowland locations which have ready access to water and higher quality pasture. The sample is small and is subject to significant sampling and taphonomic biases, but it does provide an indication of general trends. The marked change at Puddlehill from a sheep to a cattle dominated assemblage at the end of the Iron Age, could be indicative of significant local or regional change in animal husbandry. However, the small size of the sample, when taken together with the biases caused the recovery techniques and the post-excavation loss of part of the assemblage, makes any conclusions speculative.

The high fertility and ease of cultivation of the chalk soils would have made arable agriculture viable in most locations within the zone. Mixed farming, in which sheep and cattle rearing took place together with arable cultivation (both *intensive* and *extensive*) formed a significant element, is therefore likely to have been typical, and farms specialising arable or pastoral, or even predominately so, may have been rare.

3.7.4 The Clay-with-Flints Zone

General Characteristics and Potential

Clay-with-flints soils have a high natural acidity and low reserve of plant nutrients, and therefore requires the application of large quantities of chalk to maintain soil fertility. Probably because of the acidity and stony nature of the soils, the cultivation of significant areas of the plateau does not appear to have occurred until after the medieval period. However, by the eighteenth century, much of the plateau was common pasture and in 1939, large areas still contained their semi-natural cover of acid grassland and woodland (Avery 1964:30). These areas produced moderately productive pasture (Avery 1964:177). The plateau areas are also comparatively well drained when compared with the London Clay zone and much of the Boulder Clay zone.

Better soils occur in the numerous wet and dry valleys which cut though the clay soils and which expose extensive outcrops of the underlying chalk bedrock. Before the medieval period, settlement was mainly concentrated along the river valleys and the

plateau edge, with arable agriculture taking place on the lighter soils of the valley sides. However, there is some evidence of clearance and settlement of the plateau area to the north of the Upper Bulbourne Valley during the Late Iron Age (Morris and Wainwright 1995).

A division of the zone can be made in terms of agricultural potential between the clay plateau areas of the Chilterns dip-slope, and the six major river valleys which run north west/south east across the zone (the Lea, Ver, Gade, Bulbourne, Chess and Miswell).

Agricultural Regimes

The Plateau Areas

No archaeological data is available from excavated sites on the plateau areas of the zone from which it might be possible to formulate a hypothesis about the agricultural regimes in the Late Iron Age. However, it is possible to reach some conclusions by considering the following aspects of land-use history and likely agricultural constraints, which the soils and topography of the area would have imposed in the Late Iron Age;

1. the soils of the Chilterns dip-slope plateau are dominated by the thick, stony clays of the Batcombe Association (Avery 1964), which are likely to have been generally unsuited for arable agriculture in the Late Iron Age. Indeed Avery (1964:9) says:

   " . . their stony and intractable character, high natural acidity and low reserves of plant nutrients would have presented considerable problems to primitive cultivators"

2. the general suitability of the area for cattle rearing is demonstrated by the fact that prior to the 1940s, these areas of the zone were dominated by cattle pasture. The grassland of the extensive cattle pasture was acid in nature, but was relatively well drained and reasonably productive (Avery 1964:177).

The lack of available running water on the plateau areas may have been a constraint upon cattle rearing in the Late Iron Age. There are far fewer sources of running water on the plateau areas of the modern landscape than is the case for the boulder clay plateau to the east of the Study Area. Some areas of the plateau may have also been further than the two kilometres from running water which M.A.F.F. recommends as the maximum for lactating cows (M.A.F.F. 1971, cited by Legge 1981:86). The

combination of reasonably good drainage and lack of running water in some areas may therefore have made sheep rearing relatively more productive than cattle. However, the extent to which the current drainage pattern is an accurate reflection of that in the Late Iron Age is uncertain. Ponds, whether natural or man-made, may also have provided an alternative source of water on the clay areas. Nonetheless, the assumption can probably be made that cattle rearing was the preferred agricultural regime in these areas of the Chiltern dip-slope plateau during the Late Iron Age, with pigs also reared in the woodland and rough pasture areas.

The current relatively high proportion of woodland and scrub in the area, especially at the edges of the plateau, suggests that this land-use type could have covered as much as 50% of the total plateau area in the Late Iron Age. The fact that very few prehistoric or Roman settlements of any kind are known from these areas, although it is not reliable 'negative' evidence, does also suggest that they were not intensively farmed.

Therefore, a speculative conclusion can be made that a high proportion (up to 50%) of the plateau areas is likely to have been *extensively* managed pasture for pigs and dairy cattle possibly in the form of scrub and acid heathland rather than woodland. In addition, more *intensive* open pasture for beef rearing would have been possible on the more fertile clays and sheep rearing may also have formed a significant component in the drier areas. In the absence of evidence for settlements on the plateau (although it is highly likely that some Late Iron Age settlements did exist), it can also be assumed that most of the plateau areas were farmed from settlements on the edge of the plateau and within the river valleys.

The Plateau Edges and River Valleys

The soils of the edges of the dip-slope plateau and the river valleys are generally different in character to those of the plateau area, and form a series of bands which run parallel with the river valleys. The Batcombe Series soils of the central plateau grade into the Winchester Series soils at the edges of the plateau where the clay-with-flints thins (the outer band). These are reasonably well-drained, but because of the high acidity these soils have tended not to be used for arable cultivation, and are mostly under beech woodland or scrub (Curtess & Courtney 1975:201). The next band, within the

river valleys, are the soils of the Coomb and Charity series. These are mixed soils whose composition has been strongly influenced by mass soil movement downhill during the last glaciation. The Coomb series are well-drained soils which contain a high proportion of chalk and silt derived from loess and are amongst the most fertile soils in the Study Area. The Charity soils are also well-drained, but are decalcified, and are less fertile than the Coomb soils. Both types of soil provide good arable land, although the arable potential is strongly influenced by the stoniness of the soils. The least stony soils are suitable for vegetable and glasshouse crops, including fruit, but the stonier soils are much less valuable, and in some areas over 50% of the volume of the soil is composed of flint. These soils are liable to 'burn' in periods of drought and can cause excessive wear on farm implements (Curtess & Courtney 1975:164).

The 'dissected' topography of this part of the zone can produce relatively large variations in temperature, dependent upon relief, aspect and exposure. In particular, the steeped-sided valleys can act as frost-pockets, resulting in severe cold that can act as a constraint upon the cultivation of some frost-sensitive crops (Avery 1964:22). The principal constraints upon agriculture within the river valleys are therefore likely to have been the degree of stoniness of the soils and the microclimatic conditions in some locations.

These areas of the zone have a much higher potential for arable agriculture in the Late Iron Age than the plateau area, although, as is the case with plateau areas, there is little direct archaeological data from excavations to confirm this impression. However, two surveys of significant tracts of valley and plateau edge landscape within the zone (the Ashridge Survey and Hunns's study of the St. Albans area) do provide important supporting data. The only two pollen studies from the Study Area also come from within the zone - in the Ver Valley.

The Ashridge Survey

An earthwork and field walking survey of the western plateau edge of the head of the Bulbourne Valley has demonstrated the existence of an extensive complex of settlement enclosures, trackways and field systems of Late Iron Age and Early Roman date (Morris and Wainwright 1995). The survey area lies mainly within the clay-with-flints soils of

the Winchester Series. The morphology of the trackways and enclosures found suggest that a mixture of pasture and arable agriculture was being practiced. In particular the presence of several small rectilinear enclosures, which incorporate lynchets, provides good evidence for arable cultivation, although at what point within the general Late Iron Age/Early Roman period the cultivation of the fields took place, is not known (ibid.). The Ashridge area in general is, however, unlikely to be typical of the river valleys of the zone because of the presence of extensive evidence for iron smelting (found by the survey). As such, agriculture is likely to have been less important for the economy of Ashridge than was the norm for the valleys of the zone. Nonetheless, Ashridge does provide a rare surviving example of the spatial organisation of settlements and agricultural features of Late Iron Age/Early Roman date.

The St. Albans Survey

Hunn's survey (1994) is a largely desk-based landscape study of the Ver Valley and its environs. Environmental data from soils and topography has been used, together with the known Late Iron Age settlement pattern, to reconstruct a simple land-use map for the area. Four categories of land-use have been used: habitation sites, arable, pasture, marshland and woodland. The majority of the area of the land-use map comprises arable and pasture, with arable forming the higher proportion of the two (Hunn 1994:36-7, Fig.16).

The largest area of pasture on the land-use map is that of the extensive earthworks at Prae Wood on the western plateau-edge of the valley. Hunn suggests that the morphology of many of the earthworks is indicative of a pastoral function, possible of communal cattle kraals. The fact they are located on acid, well-drained, pebbly soils which would have retarded cultivation, also supports this interpretation (Hunn 1994). The areas designated as arable are largely on the lighter, more fertile and less stony soils to the northwest and east of the Prae Wood area. However, Hunn does point out that the arable and pasture areas on the map provide no more than a general definition of areas that are more or less favourable for these regimes, and that the amount of arable has probably been exaggerated (Hunn 1994:34). Nonetheless, the map does demonstrate clearly the potential of the valley for arable agriculture.

The distribution of the fourth category; marshland, is also significant. Hunn points out that the area of marshland has been substantially reduced since the Late Iron Age by drainage and reduction in river levels. However, in comparison with the areas of arable and pasture, its former extent can be mapped relatively accurately and in the Late Iron Age it was probably quite extensive within the Ver Valley. Hunn also points out that the natural resources of the marshland such as osiers and reeds would have been an important source of raw materials for domestic activities such as matting, basket making and binding. The river and marshland would also have provided food in the form of water fowl, eels and fish (Hunn 1994:37). Therefore, the economic value of marshland (when considered together with the constraints upon arable agriculture in valley bottom locations caused by the temperature inversion/frost pocket phenomenon) would have served to deter the draining of marshland to create arable farmland.

Pollen Data

Two samples of pollen have been analysed from the Ver Valley:

24 pollen samples were taken from a waterlogged deposit within the Roman town of Verulamium (Dimbleby 1978). The deposit was sealed beneath a timber structure, dated to the mid first century AD. All of the samples of pollen are dominated by grass pollen and agricultural weeds, with the weeds of arable farming being the most common. The amount of tree pollen was negligible. Cereal pollen is present, particularly in the upper levels. Dimbleby concludes that the pollen must have derived from the soils within the wider valley catchment, and is indicative of intensive agriculture, with arable agriculture forming a significant component. Although the deposit could not be dated, other than pre-AD 50, it was almost certainly created at some point during the first millennium BC. The increase of cereal pollen at the top of the sequence is therefore probably dated to some point during the later Iron Age c300 BC to AD50.

The significance of the pollen samples are therefore;

1. the low proportion of woodland pollen throughout the sequence
2. the importance of arable and pasture throughout the sequence,
3. the apparent increase in cereal and arable weed pollen at the end of the sequence

4. the likelihood that the pollen was derived from eroded soils of the river catchment upstream of the Roman town.

Pollen analysis of the collapsed turf mound of the Folly Lane burial has revealed that the landscape around St. Albans was dominated by lightly-grazed, herb-rich pasture which had been largely cleared of trees for several hundred years before cAD 50. Evidence of acid heaths was also found (Wiltshire 1999).

The Valleys and Plateau Edge Locations: Conclusions

The assessment of agricultural potential together with the evidence from the Ashridge and St. Albans landscape surveys and the two pollen samples from the River Ver valley suggests the following:

1. the river valleys and plateau edge landscapes consisted primarily of areas of arable agriculture, pasture and marshland. The proportion of these three land-use types will have varied considerably within the valleys, but the proportion of land under arable was proportionally much higher than was the case for plateau areas and some areas of arable (on Charity soils) would have been highly productive;

2. woodland cover of the valley and plateau edge was not extensive, and where it occurred is likely to have been carefully managed for timber production. In this respect, it is significant the two largest areas of woodland within the environmental zone (Ashridge and Prae Wood) contain extensive Late Iron Age earthworks which must have been created in largely open landscapes. In these circumstances, it is possible to speculate that current woodland (in both cases the woodlands are ecologically designated as ancient) regenerated from much smaller carefully managed Iron Age wooded areas.

3.7.5 The London Clay Zone

Introduction

The topography and general characteristics of the zone have been outlined in 3.4.3, above. The division of the zone into the two topographical distinct areas will be used for consideration of agricultural regimes.

The Western Plateau Area

General Consideration and Agricultural Potential

London Clays soils occur on the more gently-sloping areas and produce wet, acid soils which become waterlogged on most sites in winter and on drying in summer, crack and shrink. These properties make the soils difficult to cultivate without underground drainage systems, and the period over which they are friable enough to cultivate, is very limited. On slopes of more than 8° are also prone to landslipping. Pebbly, gravel soils overly the London Clay over large parts of the level plateau area. These are less prone to waterlogging than the clay soils, but they are also acid and difficult to cultivate. The poor drainage of the London Clay is also exacerbated by a network of small streams which originate from the overlying gravel soils (Thomasson 1969:28).

Agricultural Regimes

Before the 1950s, almost all of the area was either woodland or permanent pasture. In the 19th century, the pasture was used primarily for hay production for horses and town dairies in London. With the demise of the market for horse fodder, cattle husbandry for dairying became the main enterprise (Thomasson & Avery 1970:13); only in recent years has arable agriculture become a major industry.

Arable agriculture is therefore unlikely to have been undertaken to any significant degree in the area during the Late Iron Age. Such cultivation for arable crops as there was is likely to have been restricted to small areas of intensive 'infield' adjacent to settlements, although no settlements are currently known from area. Therefore, a mixture of *intensive* and *extensive* cattle pasture, and pannage for pigs, would probably have been the dominant agricultural regime for the area. In the absence of data, an estimation of the relative importance of intensive and extensive pasture is difficult to

estimate. However, the known factors, especially the history of land use of the area and the agricultural constraints mean that woodland and mixed areas of wood and rough grazing would probably have been the most common land-use.

The Lea Valley

General Consideration and Agricultural Potential

The landscape is comprised of series of steep, narrow valleys which run at right-angles to the river Lea, with each of the valleys formed by a stream which has deeply incised into the clay subsoil. The steep sides of the valleys and the absence of level plateau areas in between them has meant that the drainage of the area is better than the level plateau area to the west. Its current landuse comprises a mixture of woodland and cattle and horse pasture, with little land under arable. The combination of heavy soils and steep slopes makes much of the area unsuitable for cultivation and it has one of the lowest proportions of arable land in the region. It also currently has the lowest population density of the Study Area (Bryant et.al. forthcoming).

Agricultural Regime

The unusual topography and poor soils of the area have also combined to make it one of the few parts of the Study Area which is still unsuitable for arable agriculture even with adequate drainage and the application of fertilizers. Changes in land-use since the medieval period have therefore been primarily limited to some market gardening and sub-urban development during the 20th century, amounting to less than 5% of the total area. Moreover, there is also evidence that many of the field boundaries and roads which survive in the modern landscape are pre Anglo-Saxon in date and may have been deliberately planned as a pastoral landscape in prehistory (Bryant et al.. forthcoming). The fields and roadways at Wormley and Broxboune Woods form a brickwork or 'co-axial' pattern of large fields of pasture linked to the roads and trackways, which extends over at least ten square kilometres. The date of field system is unknown although a Bronze Age date is possible.

Irrespective of their date of construction, the fields at Broxbourne and Wormley provide a likely model for the land-use of the area in the Late Iron Age. Intensive pastoralism for beef cattle is therefore suggested as the dominant agricultural regime for the area

during the Late Iron Age. The high proportion of woodland currently within the area, although almost certainly greater than it was during the Late Iron Age, would also have provided some areas of more extensive pastoralism and pannage for pigs.

3.7.6 The Gault Clay Zone

General Consideration and Agricultural Potential

The soils of the Gault Clay zone are heavy calcareous clays of the Wicken Series. Like the similarly heavy Tertiary clays of the London Clay Zone, they are impervious soils which are difficult to cultivate, and are prone to waterlogging in winter and shrinking and cracking in summer. Arable cultivation requires extensive drainage, which can be expensive to maintain. The wet nature of the soils also means that the grazing season is short for pasture (Avery 1964:186). The soils are, however, generally more fertile than the London Clays, and this is reflected in the current land use which is a mixture of arable and permanent grassland with relatively little woodland.

Ridge-and-furrow occurs on some of the grassland areas, which suggests that arable cultivation was possible on these areas during the medieval period. In addition, Jones (1984) has suggested that the high proportion of bread wheat, a variety which favours heavy wet soils, found at the Iron Age site just outside the study area, at Bierton, near Aylesbury indicates that the heavy clays in the area are likely to have been extensively cultivated in the Later Prehistoric period. However, this interpretation of the evidence has been challenged by Robinson who says that the bread wheat is probably derived from an Anglo-Saxon context (Robinson pers. comm. cited in van der Veen and O'Connor 1998:130).

Agricultural Regimes

In the absence of known Late Iron Age or other later prehistoric sites, from the zone, any assessment of agricultural regimes is dependent upon information from past land-use, an evaluation of the agricultural constraints and information from settlements outside of the Study Area, such as Bierton.

These sources together suggest that the zone has the potential for arable cultivation in the Late Iron Age, but that substantial investment would have been required to cultivate and maintain an adequate level of drainage. Therefore, the zone should probably be regarded as 'marginal' in terms of arable agriculture. As was the case in the medieval period, the more suitable areas for arable agriculture may have been cultivated on a short-term basis in the Late Iron Age. In addition, areas of more permanent 'intensive' arable would also have been located close to settlements where the necessary high labour input would have been more economic.

The short grazing season for cattle is also likely to have imposed a constraint upon cattle rearing in the Late Iron Age. As a consequence, the average density of cattle that a given area of pasture could maintain, is likely to have been lower than for the corresponding clay soils of the Clay-with-Flints and Boulder Clay zones. In conclusion, low-input, *extensive* cattle rearing may have been the optimum agricultural regime for the zone, interspersed with small areas of intensive high input arable.

3.7.7 The Gravel Zone

Introduction

In comparison with the clay-dominated Environmental Zones, the Gravel Zone contains a relatively large number of excavated Late Iron Age sites. However, very few of these sites have any data from which it might be possible to theorize about the likely agricultural regimes in the Late Iron Age. In the absence of archaeological or palaeoenvironmental data, a model of the agricultural land-use during the Late Iron Age will be based on the data and models from other Environmental Zones, and a consideration of the characteristics of soils and topography.

General Characteristics and Potential

In terms of its agricultural potential, the Glacial Gravel zone can be divided between the fertile river valleys and areas of surviving brickearth, and the much less fertile areas of glacial gravel. The former soils occur where brickearth or periglacial head deposits

overlie the gravel, and these are generally well-drained and fertile. They produce friable brown-earth soils of the St. Albans and Bengeo series (King 1969).

Where they occur, the brickearth soils are retentive of moisture and are easy to work, and form the basis of the extensive market garden industry in the Lea valley (Avery 1964:180;1969). They would undoubtedly have been favoured by early farming communities for arable farming.

Where the gravel is not overlain by finer deposits, as is the case on plateau areas and steeply sloping sites, the soils very freely-drained and can suffer from drought. The land is usually too dry and acidic for arable farming and is often left as rough pasture or woodland (ibid.). These areas have historically formed extensive lowland heaths.

Agricultural Regimes

Brickearth Soils and River valleys

The relative absence of significant constraints upon agriculture within these areas would make arable agriculture theoretically a viable and productive regime. Moreover, on the soils of highest agricultural potential, such as the brickearths, it can be predicted with reasonable confidence that arable agriculture would have been the dominant regime during the Late Iron Age. However, it is more difficult to speculate further on the nature of the crops which are likely to have been cultivated, or the management regimes used (extensive or intensive, etc.).

Plateau Gravels

The dryness and much lower fertility of the soils in the areas of plateau gravels would have made arable cultivation much less viable than those of the river valleys and brickearth soils. The dryness and low productivity of the soils would also have made intensively managed pasture for beef cattle rearing unviable as a regime. Before the 20th century, most of these areas were acid, lowland heaths, and the dominant agricultural regime was woodland and rough pasture for pigs, cattle and sheep. The evidence from Domesday Book also suggests that this regime may have been in existence in these areas since the late Saxon period. The Domesday Book records a low human population, a scarcity of ploughlands and ploughteams, and large population of

pigs (Darby & Campbell 1962), all of which are indicative of rough pasture and woodland.

3.7.9 Bronze Age Field Systems & Pastoral Landscapes

An important aspect of the creation of open pasture from the clearance of woodland for *intensive* cattle farming is the requirement for fields and droveways to control the movement of stock once its population reaches a certain point (Pryor 1998:82). Recent research in East Anglia and the Thames Valley has indicated that the clearance of woodland and the creation of landscapes of fields of pasture was a feature of the Bronze Age.

A recent review of the evidence for field systems in the Middle and Upper Thames Valley has concluded that large areas were managed for intensive pasture during the Middle and Late Bronze Age (Yates 1999) and there is evidence for Bronze Age planned systems of co-axial (brickwork pattern) fields in the Lincolnshire and Cambridgeshire Fens (Pryor 1998:112).

No dated Bronze Age or Iron Age field systems are known from the Study Area. There are, however, are several examples of co-axial field systems within the Study Area and the East Anglian region which are probably pastoral in origin and which may be prehistoric in date. A Late Iron Age or Early Roman date has also been suggested for co-axial systems of large fields on boulder clay at Little Waltham and Rivenhall in Essex close to the eastern boundary of the Study Area (Drury 1978:135-6; Rodwell 1993:Fig 36). The widespread co-axial field systems at Scole/Dickleborough on the Suffolk boulder clay have been interpreted by Williamson as being Late Iron Age pastoral landscapes (Williamson 1987) although the Late Iron Age dating has been disputed (see Hilton 1997 & Williamson 1999). In addition, at Wormley in the London Clay zone within the Study Area, a large extant landscape of co-axial fields and droveways has been interpreted as a possible prehistoric pasture landscape (Bryant et al. forthcoming).

A forthcoming review of the evidence for prehistoric environment in East Anglia (Wiltshire and Murphy 1999) has concluded that woodland cover had largely been

removed by the Early Iron Age. This together with the evidence from Stansted, cited above, for woodland clearance from the Middle Bronze Age and the evidence for the Bronze Age field systems in the Thames valley, indicates that if the fields are prehistoric, they are more likely to have been created in the Bronze Age than Iron Age.

3.8 The Combined Map of Agriculture and Environmental Zones

3.8.1 Introduction (Figure 3.4)

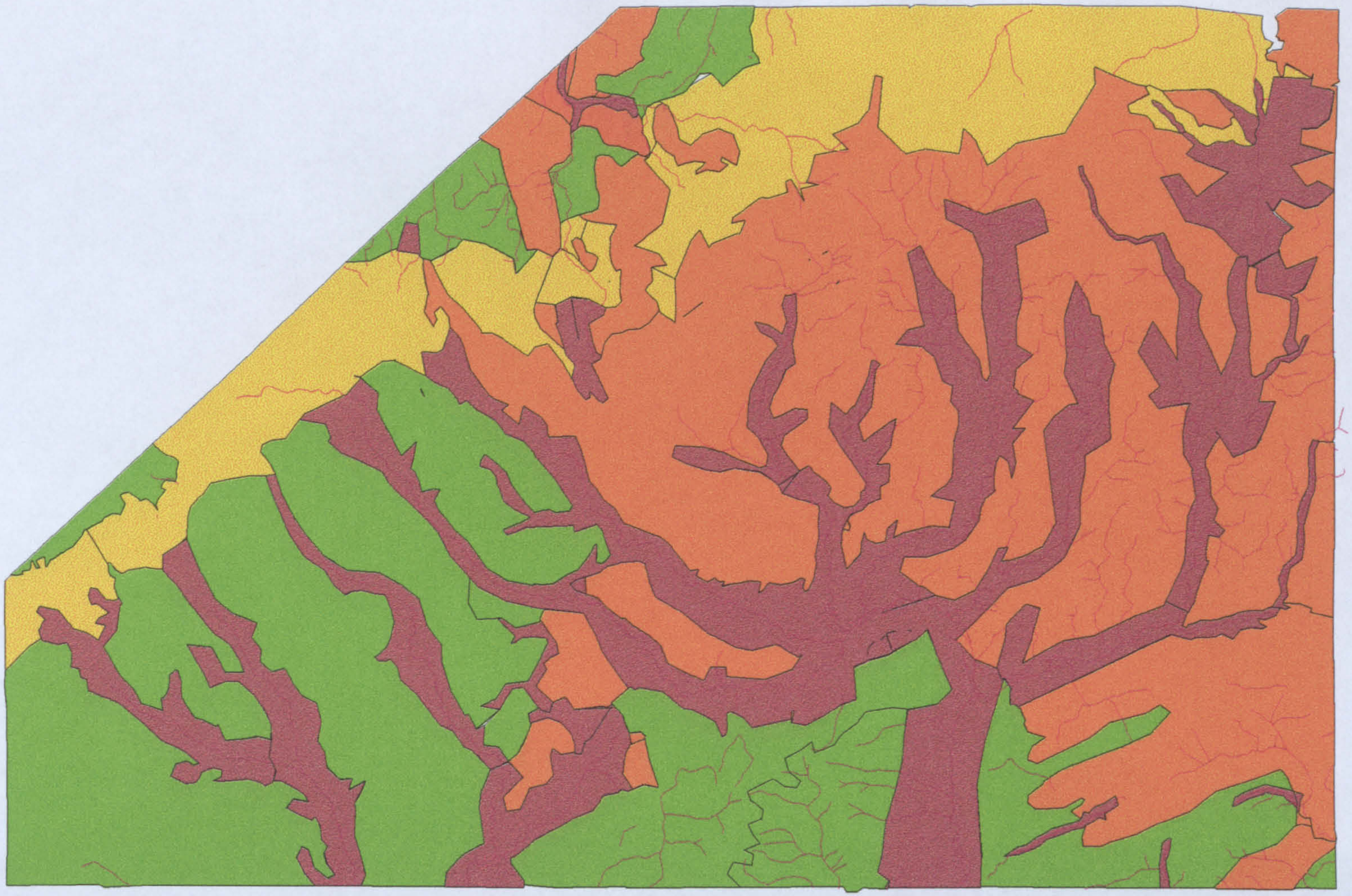
Figure 3.4 is a map of the Study Area which shows a conjectural distribution of four generic types of agricultural regime. The map is designed to provide a broad indication of land-use and agricultural potential for the Study Area in the Late Iron Age and to show how this relates to the six environmental zones. Table 3.4 provides a summary of the four types of agricultural regime.

Table 3.4, types of Late Iron Age agricultural regime.

I.	**River Valleys and Plateau-Edge**
	Predominately extensive or intensive arable and sheep rearing It is assumed that a large proportion of the area would be fallow, and/or used as sheep or cattle pasture at any one time. The numbers of sheep would be higher than cattle. The *intensive* arable is likely to be concentrated close to habitation areas and within the valleys, with *extensive* arable on the edges of the clay plateau.
II.	**Chalk Downland**
	Predominantly sheep rearing, with arable and intensive cattle rearing. Sheep would be rough grazed on downland, with arable restricted to intensive cultivation close to habitation areas. Cattle rearing would occur in river valleys.
III.	**Boulder Clay Plateau**
	Predominantly intensive pastoral cattle rearing Most of the area would be open grassland interspersed with woodland, habitation areas and small areas of *intensive* arable. Some areas of more *extensive* arable may have been present on the more favourable locations. Much of the area of grassland may have comprised planned systems of fields and droveways for cattle rearing.
IV.	**Acid Claylands and Gravels**
	Predominantly extensive pastoral cattle and sheep rearing Most of the area is likely to have comprised woodland and rough pasture. Some areas may have been suitable for more *intensive* cattle rearing and arable cultivation.

Agricultural Regimes

Figure 3.4



The types have been arrived at by applying the models of agricultural development put forward by Legge (1981) and O'Connor & van der Veen (1998) outlined above, together with the data from soils, topography and land-use history referred to in the assessment of the agricultural regimes of the Environmental Zones. The theoretical division between *extensive* and *intensive* agriculture, as defined by O'Connor and van der Veen, has therefore been used together with the basic agricultural division between arable and pasture. An indication of the animal species reared on the pasture has also been indicated, although this is mainly based on an assessment of likely constraints, principally drainage, rather than archaeological information. With this assessment, as with the arable/pasture division, the aim of the typology is to indicate only the likely dominant regime for a particular area. The four agricultural regime types are therefore not intended to represent exclusively a particular mode of agricultural production for a given area, but instead to be indicative, in a broad sense, of the predominant way in which the landscape was managed. In particular, the division which has been made between predominantly *extensive* and *intensive* pasture is designed to model land-use in a general sense by providing a qualitative distinction in terms of the potential productivity of pasture. It is however recognised that in reality there would not have been a clear distinction between the two types.

The mapping of the types on GIS has been undertaken at a small scale (1:20000), which means that the boundaries between the types has a margin of error of a minimum of 200 metres. When this is considered together with the imprecision of the sources used (soils and height data), the margin of error of is increased to $\pm$ 500 metres.

3.8.2 Agricultural Potential: Relative Energy Yields

In terms of the average energy yield per hectare, the agricultural potential of the four types, based on the figure from Holmes (1970), can be divided into two, with types I, II and III being broadly equivalent, and having a much higher potential than and IV.

However, the figures used by Holmes are based on twentieth century agriculture which assumes that the land has been improved by drainage and the use of modern fertilizers.

The energy yield calculations for arable in particular, are based on the highly intensive cultivation of wheat. The limited evidence from later prehistoric and Roman cultivation of the Study Area suggests that other grass species were also grown (principally barley) and the cultivation was much less intensive. In the Late Iron Age, the energy yields from pasture and arable will therefore have been considerably lower, but the difference in yields is likely to have been proportionally much greater in the Study Area for arable than is the case for pasture. The difference between the potential energy yields is therefore likely to have been much less marked than the modern figures suggest.

The energy yield per hectare for type III (*intensive* pasture) is likely to have been significantly higher than type IV (*extensive* pasture). In theory, the difference between the two could have been small, if dairying was concentrated in the type III areas and cattle rearing in the type IV areas. The higher energy yields obtainable from dairying on type III land could therefore have offset the lower stock densities achievable. However, this assumes that beef rearing would always be favoured in the areas of *intensive* pasture, and in practice a mixed dairying and beef regime is likely to have been common in these areas. The generally higher fertility of the type III areas is also likely to have resulted in a much higher proportion of arable land, which would have been mainly *intensive* arable concentrated close to habitation areas.

In conclusion, the agricultural potential, in terms of energy yields, of the type IV (acid clay) areas is likely to have been significantly lower than types I-III, and any variations based on the above analysis, may not have been large.

3.8.3 Area Analysis

Table 3.5 shows the total area and percentage of the Study Area covered by each of the four types of agricultural regime. It should be emphasised that the figures are not intended to give an accurate representation of the total area of arable, pasture etc., but to indicate areas in which the four types of regime are likely to have been dominant.

Table 3.5, area analysis of agricultural types

Type	Area in Sq. Kilometres	Percentage

I: River valleys: arable	591	24%
II: Chalk downland: sheep & arable	325	14 %
III: Boulder clay: intensive cattle pasture & arable	901	36%
IV: Acid clays: extensive cattle pasture	578	26%

Given this caveat, some general observations are possible:

1. Just under 1/4 of the Study Area has been identified as being predominantly arable. These areas contain what would have been the most productive land for agriculture in the Late Iron Age. They lie almost exclusively within river valleys, and the relatively large number of river valleys within the Study Area, particularly within the Boulder Clay zone, accounts for the size of the total figure.

This figure almost certainly significantly under-represents the total area of arable, as it does not include *intensive* arable around settlements on the clay plateau areas and within the type II areas. It may also under-represent the potential area of *extensive* arable on the edges of the clay plateau areas. It does, however, exclude areas of settlement, woodland and pasture (including marshland) within the river valleys. A grand total figure of arable land somewhere in the region of 1/3 of the total area might therefore be realistic.

The importance of sheep in the arable areas should also be emphasised. The traditional regime of allowing sheep to graze stubble and fallow land, and the folding sheep onto arable land at night, have been mentioned above. The better drained lighter soils of the river valleys would also have favoured sheep. Therefore, it is therefore likely that a high population of sheep existed in the predominantly arable areas.

2. The total area of the type II land (downland), which is likely to have contained the more productive grasslands, is substantially higher than type IV (acid clays), which represents the lower grade pasture. In addition, it is likely that type III (boulder clay) is under-represented, as it is possible that some of the clay-with-flints soils, which comprise the majority of the type IV areas, could have supported more intensively managed grasslands.

3. The proportion of the Study Area in which either *intensive* or *extensive* pasture was likely to have been dominant (63%), is significantly higher than arable (24%). A proportion (probably greater than 50% of the area) of the Type II should also probably be added to the area of pasture. A very rough calculation of between 2/3 and 3/4 of the Study Area could therefore potentially have been pasture, and just under 40% of the total area had the potential to be intensively farmed for beef.

4. The distribution of the lower-grade type IV extensively managed pasture is wholly within the south west half of the Study Area, (south and west of the River Lea) where it makes up 56% of the area. The analysis of the distribution of woodland and arable land in the Domesday Book returns for Hertfordshire (Darby and Campbell 1962) also provides additional corroborative evidence for this mapped distribution. The analysis is based upon the distribution of pigs (as indicators of woodland) and ploughteams (as indicators of arable). The two distributions sharply divide along the same axis as the mapped distribution and are reasonably mutually exclusive, with woodland much more extensive in the south and west and arable much more common in the north and east (Darby & Campbell 1962 :figs. 22,23,28). There is of course not necessarily any direct relationship between Domesday woodland and extensive pasture in the Late Iron Age, but the analysis of Domesday Book does confirm the above assessment of the comparatively low agricultural potential of the southwest half of the study area and the relatively sharp divide between it and the northeast half.

3.8.4 Estimating Agricultural Production

Estimating Late Iron Age agricultural 'outputs' in terms of numbers of animals and quantities of grain produced is fraught with difficulties due to the number of unknown factors concerned with Late Iron Age agricultural technology which need to be taken into account, most of which could significantly affect any calculations. This is especially true when estimating yields from arable agriculture, as little detailed information is available of areas sown of the various types of crop (wheat, barley, oats, rye) in the Late Iron Age, or the average yields achieved. Documentary evidence from medieval

agriculture also demonstrates that arable yields can vary wildly, dependent upon localised differences in soil fertility.

Arable

It is possible to estimate a very rough figure for arable production in the Late Iron Age. Legg (1981:100) has estimated a production figure of 1.25 tonnes per hectare of barley for the Grimes Graves Area of Norfolk. If a similar average figure is assumed for the Study Area, and it is also assumed that 50% of arable land was fallow at any on time, a hypothetical total production figure of 33937 metric tonnes of grain can be suggested.

Numbers of Stock

However, it can be argued that there are far fewer variables to take account of when comparing the outputs of modern and Late Iron Age stock rearing. In particular, localised variations in fertility and climate are much less likely to have had a significant effect on stock yields than would have been the case with arable yields.

An assumption can also be made that the few remaining areas of ecologically important 'old pasture' within the Study Area (those which have not been improved with fertilizers or drained) are likely to be broadly comparable to Late Iron Age pasture. The recommended stocking densities to maintain these remaining areas as ecologically important pastures are likely to be substantially closer to Late Iron Age levels than figures derived from modern 'improved' pasture. The old pastures might therefore be reasonably used as a basis for estimating Late Iron Age stock densities.

Comparisons between modern and Late Iron Age yields on old grasslands will be affected to some extent by the different characteristics of modern sheep and cattle, although modern breeds are not significantly more efficient in converting these, by modern standards, relatively impoverished grasslands into meat (HERC). Higher densities of the smaller and hardier Iron Age breeds might therefore be expected, but the overall yield in terms of kilogrammes of meat, was probably not significantly lower.

By using the mapped distribution of the type III and IV agricultural regimes together with an estimation of the average Late Iron Age stock density, it is possible to calculate

a hypothetical, approximate figure of the total number of cattle and sheep in the Study Area.

The current English Nature recommended stock density in terms of numbers per hectare for cattle and sheep on grasslands is shown in Table 6. The table has combined the figures for lowland grassland from Crofts & Jefferson (1994:table 4.5), and for lowland heathland from Michael (1996:18-19).

Table 3.6, grassland stock densities per hectare.

Calcareous Grassland		Neutral Grassland		Acid Grassland		Heath	
Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle
2.5	0.5	4	1.5	2	0.5-1	2.5	0.2-0.5

Type III Areas (Boulder Clay)

It can be assumed that most of type III areas of predominantly *intensive* pasture is likely to have been pH. neutral or slightly alkaline. The neutral grassland have substantially higher figures for cattle and sheep, but as has been mentioned above, the heavy and wet nature of much of level plateau areas which make up the type III areas would have been unsuitable for sheep rearing. An average figure of 1.5 cattle per hectare for these areas has therefore be assumed.

From this figure, a very simple calculation can be made that 135,000 cattle could potentially be supported on the areas of intensive pasture. This figure would however be reduced significantly by areas of arable, habitation, woodland and other areas generally unsuitable for cattle rearing. If the assumption is made that the woodland cover was three times as extensive as at present (7%) and an equivalent area was unsuitable for other reasons, the total area available for cattle rearing would be reduced to 780 square kilometres. The hypothetical total number of cattle would therefore be reduced to 117,000.

Type IV Areas (Acid Clays)

The Type IV areas were probably a mixture of acid grassland and acid rough pasture or 'heathland'. A comparison of the two types of grassland shows that sheep are relatively

more productive than cattle on the nutrient poor heathland. Therefore, all things being equal, sheep would therefore be preferentially grazed on heathland and cattle on acid grassland. This tendency would also have been strengthened in the Study Area by the location of most of the acid grasslands on the heavier and wetter clay-with-flints soils. The relative proportions of the two types of grassland in the areas designated as Type IV are difficult to estimate, although it can be assumed that most of the heathlands were located on the London Clay and poorer glacial gravel soils (see above). In terms of area, they cover approximately 180 square kilometres. This gives a potential total figure of 3600-9000 cattle, or 45000 sheep. The remaining 400 square kilometres of the Type IV areas could therefore be classified as acid grasslands. A potential number of stock for these areas ranges from 19990 to 39800 cattle. The hypothetical total figure for the type IV areas is up to 45000 sheep and between 19900 and 48000 cattle.

Type II Areas (Chalk Downland)

Almost all of the grasslands within the Type II areas would have been calcareous. If all of the area designated as Type II was devoted to sheep rearing, the hypothetical total number of sheep, based on the current recommended stocking rates, would be 81250. However, the area would be reduced by woodland, settlement areas, arable land and cattle pasture. The proportion of the total area devoted to sheep rearing may therefore have been between 50% and 75%. This would give a figure between 44000 and 60900 sheep. Furthermore, if it assumed that 25% of the area was devoted to cattle rearing, the total number would be 4000.

Type I Areas (River Valleys)

No figures are available for the stocking densities for sheep on arable land. However, if it is assumed there were a density of 1-2 sheep per hectare, a figure of between 59000 and 110000 sheep might be achieved.

Total Figures For the Study Area

Adding the cattle figures for Types I-IV results in a range of between 141000 and 165000. For sheep the range is between 148000 and 216000.

3.8.5 Summary and Conclusions

The Agricultural Development Model for the Boulder Clay Zone

Forty one percent of the Study Area lies within the Boulder Clay environmental zone. The zone contains fertile soils and unlike the Boulder Clay areas of Essex, Norfolk and Suffolk (which are mostly level plateau areas) it has a topography which is dissected by numerous rivers and streams. These factors have combined to make it currently one of the most agriculturally productive areas in southeast England.

It is argued that the following three phases of development occurred:

Phase I

In the Early Bronze Age (c2000-1500 BC) a regime of *extensive* or 'low-input' pastoral husbandry of woodland and 'waste' by means of dairy herding of cattle was combined with small amounts of *intensive* 'high-input' arable close to settlements. Sheep are also likely to have been grazed on the arable areas as a source of meat, wool and manure.

Phase II

In the Middle and Late Bronze Age (1500-800 BC), most of the plateau areas and valleys of the zone were cleared and settled. The agricultural economy comprised mixed farming within the valleys, and predominantly pastoral cattle rearing on the plateau areas.

Phase III

During the earlier Iron Age (800/600-100 BC) agricultural productivity within the zone was increased by converting areas of pasture at the edges of the plateau to low-input *extensive* arable agriculture.

By the Late Iron Age (100 BC), a highly productive agricultural economy existed in the zone which comprised:

1. large farms and hamlets on the boulder clay plateau areas, specialising in the rearing of cattle for beef
2. large areas of arable wheat and barley crops at the edges of the plateau and in the numerous river valleys.

This agricultural model formed the basis of the successful and productive agricultural economy of the Study Area during the Roman period.

Agricultural Productivity

Variations in agricultural productivity within the Study Area are not high when compared to other regions in the north and west of Britain. Nonetheless, the productivity of the clay areas of the southwest half of the Study Area (London Clay Glacial Gravel and Clay-with-Flints Zones) was significantly lower than the northeast half (Boulder Clay and Calcareous Upland Zones).

The north-east half of the Study Area was primarily concerned with agricultural production, and probably produced substantial agricultural surpluses. Evidence for such surpluses at this time is provided from the contemporary source, Strabo, who writing of the period between Caesar's invasion and the Roman conquest, remarked that Britain was known for its exports of cattle and corn. The importance of cattle rearing is also indicated by the observation by Caesar that 'cattle were numerous' (*De Bell Gallico* V; 14). Haselgrove has recently suggested that this perception is erroneous, in view of the growing archaeological evidence for arable agriculture throughout most of Britain in the Late Iron Age (Haselgrove 1989:3). However, the reference may simply be a reflection of the large scale and high intensity of Late Iron Age agriculture, of which cattle rearing was the most visible aspect and the most extensive in terms of area.

The political significance of arable production in the Late Iron Age is, however, demonstrated by depictions of an ear of corn on coin issues by Cunobelin, in the early first century AD. Agricultural surpluses were therefore probably an important aspect of the social political development within the Study Area between 55 BC and AD 43.

In the south-west half of the Study Area, it is argued that agricultural production was combined with large-scale industrial production, particularly metalworking although at present, the only large scale evidence of metalworking is located in the Bulbourne Valley (see Chapter 6).

3.9 Chapter 3: Conclusions

The above assessment has provided evidence that the characteristics of the Study Area (especially soils, relief and climate) enabled it to have a high agricultural productivity in the Late Iron Age. It has also suggested that the this productivity was broadly-based comprising; large areas of wheat producing arable soils along the plateau edges and the numerous river valleys; sheep rearing on chalk downland and as a component of mixed farming regimes in the river valleys; cattle rearing in the extensive clay plateau areas; and pig rearing in woodland and the rough pasture areas.

A key development which forms the earlier background to the high agricultural productivity in the Late Iron Age is the evidence for the clearance of woodland on the extensive boulder clay plateau areas during the Middle and Late Bronze Age. This, it is argued, dramatically increased agricultural productivity enabling the widespread and permanent settlement of these areas for pastoral farming, a processes which is evidenced from a number of recent excavations including Stansted and Thorley and the Williamson Survey. Productivity was further increased during the Late Bronze Age and Iron Age by the conversion of some pasture along the edges of the clay plateau to *extensive* low-input arable agriculture. This is also evidenced by the early and widespread use of spelt wheat. By the Late Iron Age it is suggested that agricultural productivity of the Study Area was sufficiently high to maintain a population level, which although unknown, was probably as high as any other comparably-sized area in southern England, and which also enabled the production of substantial agricultural surpluses.

CHAPTER 4: ANALYSING THE RELIABILITY OF THE LATE IRON AGE EVIDENCE

The aim of this chapter is to evaluate the usefulness of the Late Iron Age site evidence to address the key questions of thesis. This has been undertaken by means of two separate assessments:

1. the evaluation criteria of the site evidence, summarised in Chapter 2
2. an evaluation of the affect geographical distortions have had on the distribution of the evidence.

4.1 Assessment of the Evaluation Criteria

4.1.1 Introduction

In this section, a summary assessment will be undertaken of the criteria within the gazetteer of Late Iron Age site evidence, presented in Table 2.3 which relate to the source and date of the archaeological *event* and which provide information about the quality of the *event.*

4.1.2 Event Data

The Date & Source of the Evidence

Introduction

A total of 226 Late Iron Age sites have been identified within the Study Area. The geographical distribution of the sites is shown in Figure 4.1.

Figure 4.2 also provides a break down of the source of the site evidence into four broad categories. This reveals that 162 sites (73%) are known from various types of

Distribution of late Iron Age Sites

Figure 4.1

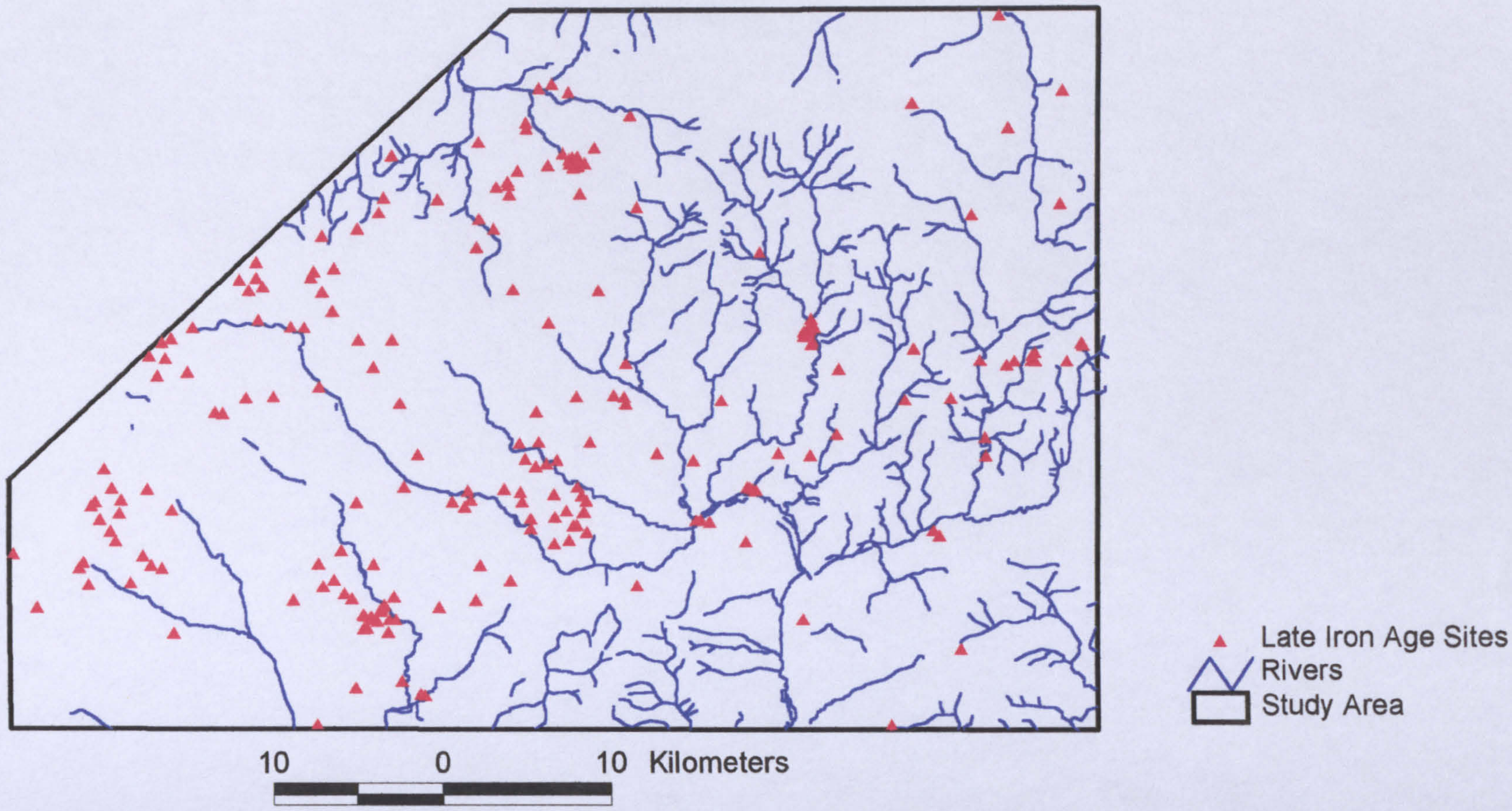
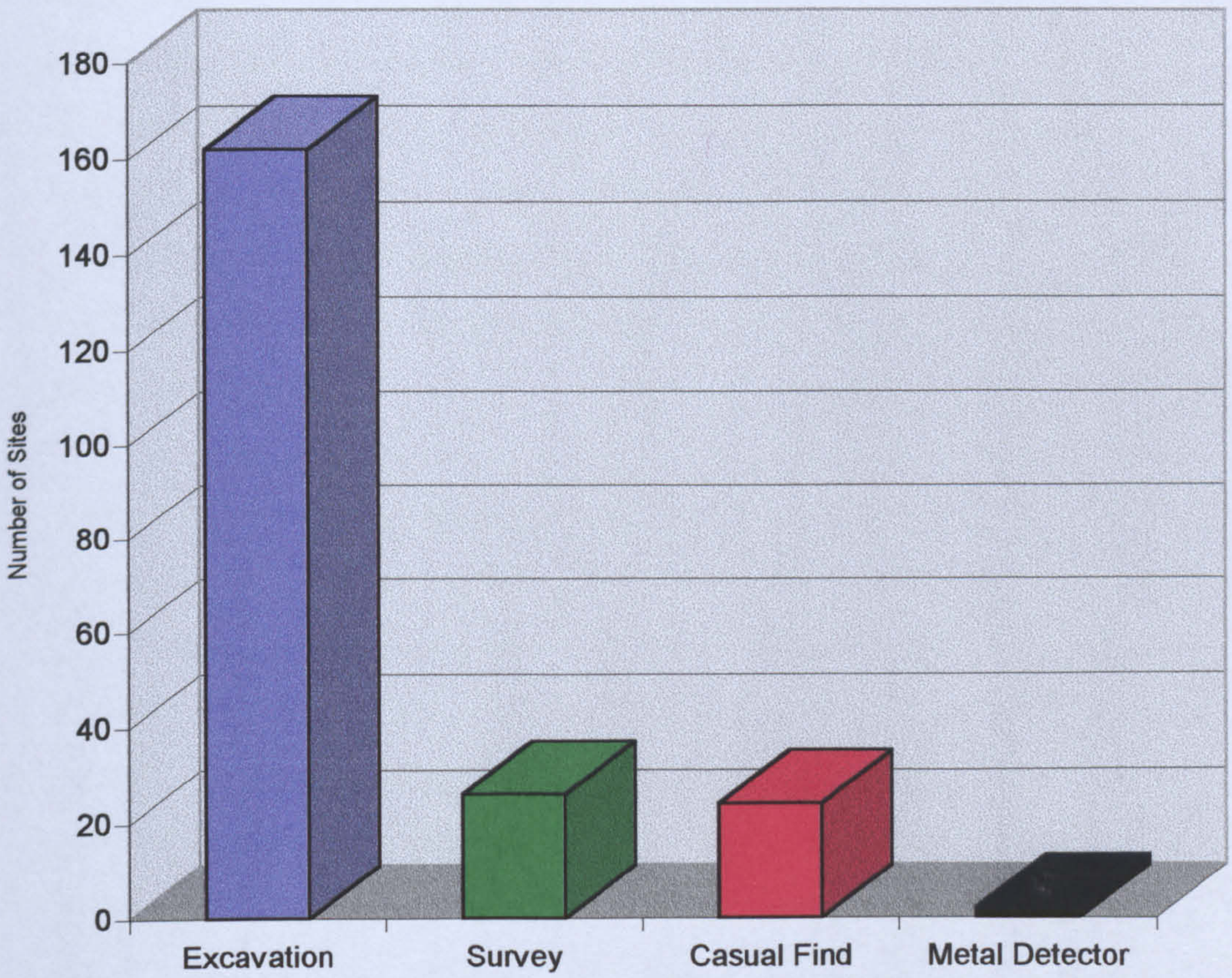


Figure 4.2: Source of Evidence



archaeological excavations, ranging in scale from salvage recording to large open-area excavations. In comparison, only 26 (11%) have been found as the result of systematic field survey. The proportion can be raised slightly if the some of the sites at Stansted, which were initially found from fieldwalking survey, are added to the figure (Brooks and Bedwin 1989); Havis and Brooks forthcoming). The proportion known from casual finds is also low at 24 (11%). These mostly represent accidental discoveries made during the 19th century or the early part of the 20th century. Where a deliberate recording action is documented or can reasonably be inferred, the source of evidence has been classified as 'excavation' rather and 'casual find'. Lastly, only two sites are known from evidence of metal detectors. A number of reported finds of Late Iron Age metalwork are known from the Study Area. However, only two of these sites have been included because the metalwork (including coins and brooches) in these instances was known to have been found in association with pottery and animal bone: Late Iron Age occupation can therefore reasonably be inferred.

Figure 4.3 provides a breakdown, by decade, of when the sites were first discovered. The general trend is for a steady but low number of discoveries until the 1950s and a rapid but steady rate of increase thereafter apart from two large 'blips' in the 1930s and the 1980s both of which can be explained by particular distorting factors. The large number of discoveries in the 1930s is due mainly to the excavation by the Wheelers and the discoveries made during the initial construction of Welwyn Garden City. Fourteen of the 25 sites result from these. The surveys by Hunn, Wainwright and Hudspith in the 1980s also account for 17 of the 50 sites discovered during that decade.

The steady rise in numbers from the 1950s can probably be paralleled for other archaeological periods within the Study Area and also probably for most other areas of Southern England. A similar pattern is revealed in Figure 4.4 which shows just the figures for the number of excavated sites discovered, by decade. The reasons, which are considered more fully below, are the result of the combination of

Figure 4.3: All Sites Discovered by Decade

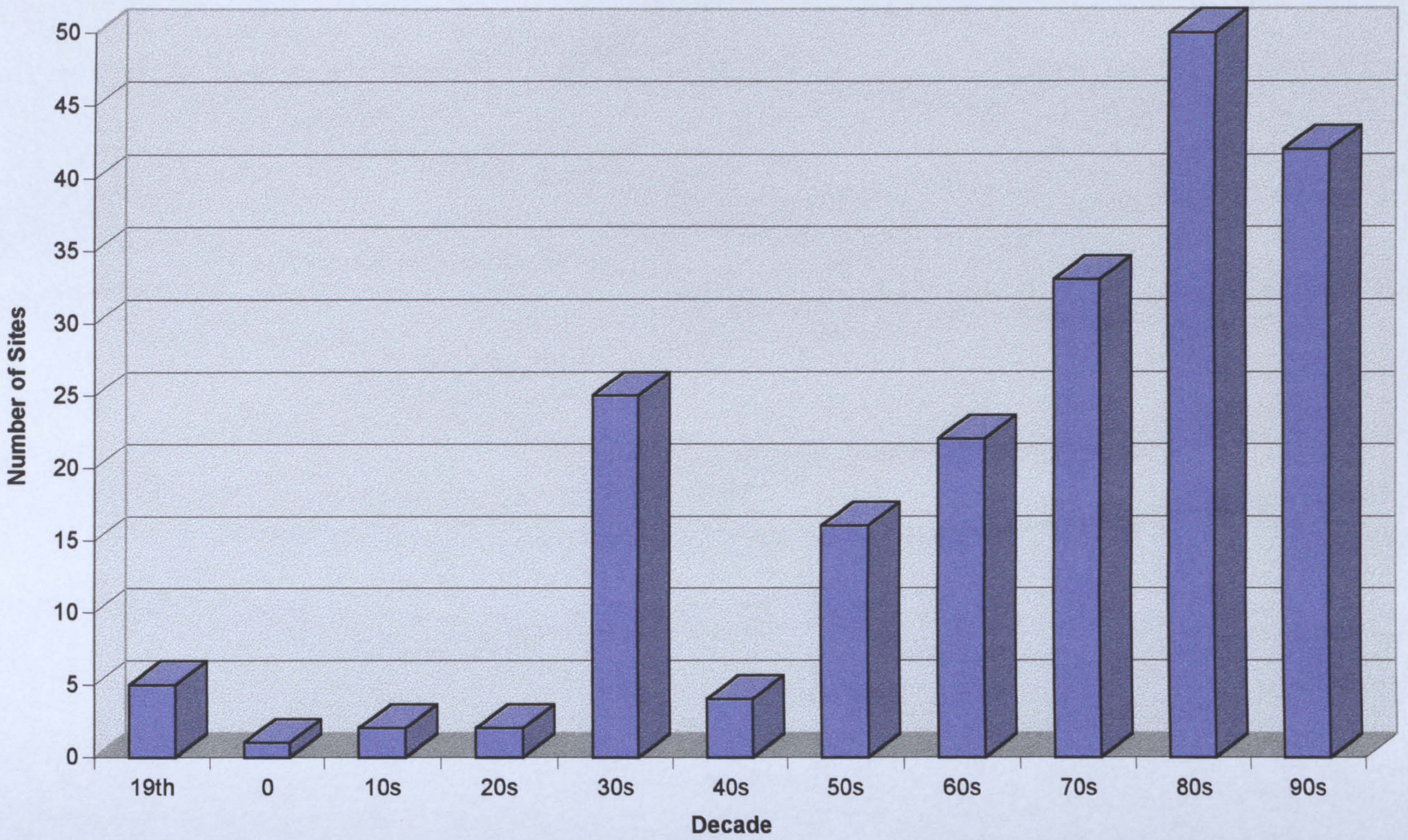
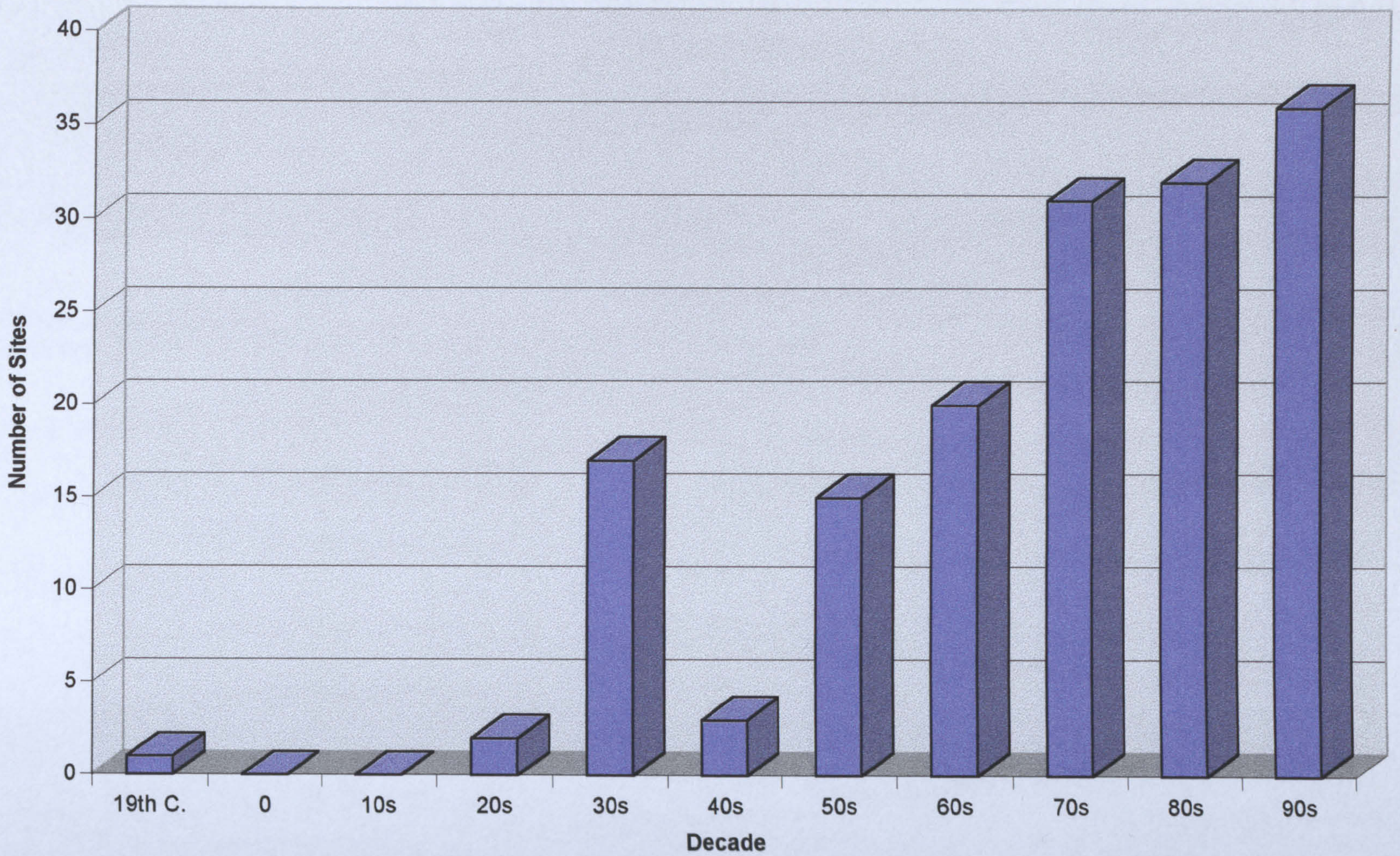


Figure 4.4: Excavated Sites by Decade



increased development and, since the 1970s, from a substantial increase in resources allocated to archaeological excavation.

In summary, the evidence for Late Iron Age sites is dominated by excavations carried out in the 1930s and since the 1950s, with 68% (151) of all sites discovered by excavation during those periods.

4.1.3 The Quality Criteria

Five criteria have been selected to assess the reliability and usefulness of the Late Iron Age evidence selected to address the key questions of the thesis. For each of the criteria, a simple three-fold classification system has been used (high, medium, low).

The assessment for most sites has been reasonably straightforward. It has however been necessary to include a degree of subjective assessment for most of the criteria. This has been greatest with the 'standard' criterion, where some assumptions have been made regarding recording methods and recovery of the evidence based upon the date, circumstances and personnel involved in the excavation. For this, and for the other criteria, where there has been doubt between two categories, the site has been allotted the higher of the two.

It should therefore be emphasised that the assessments provide only an indication of broad characteristics and tends that have a significant degree of subjectivity included within them. It is nonetheless hoped that the assessment can provide some general indication of the usefulness of the evidence.

The Survival of the Evidence **(Figure 4.5)**

Introduction

For this criterion an attempt has been made, where possible, to assess the extent to which processes occurring after the deposition of the Late Iron Age remains have affected their survival. The aim is to evaluate the potential of the archaeological

deposits to address the questions of the thesis. This has been determined largely from an estimation of the extent of erosion on the site from ploughing and the truncation or destruction of deposits by later occupation. However, in most instances, it has not been possible to make other than a broad estimate of the general level of survival. Figure 4.5 shows the number of sites for each category where the assessment has been possible.

High

The definition of a *high* degree of survival has been taken to be the absence of significant erosion of deposits and/or good preservation of deposits due to waterlogging or other beneficial conditions.

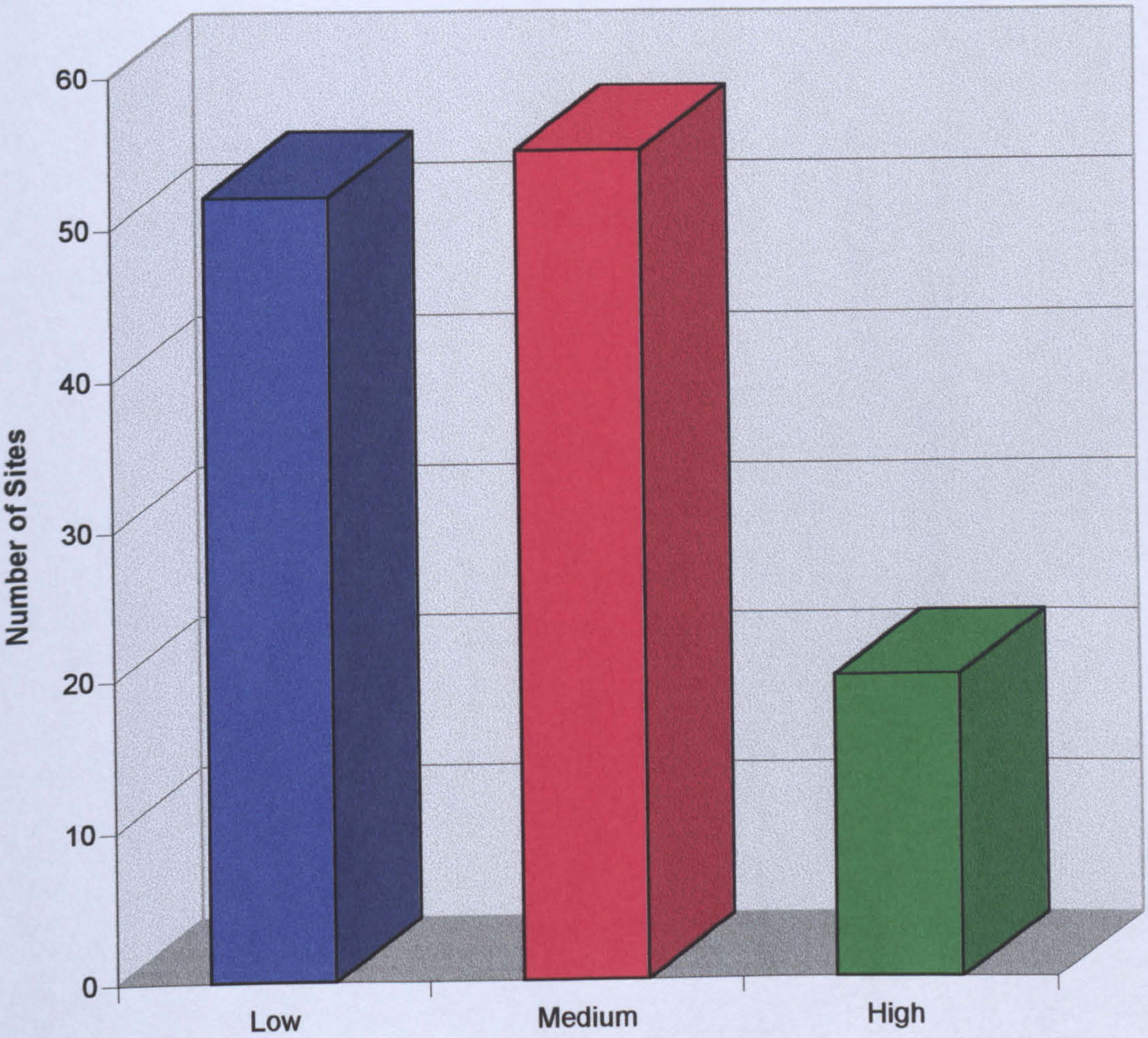
Seventeen sites do not appear to have experienced significant erosion. This represents 10% of the excavated sites and 7% of the total number of sites within the Study Area. This small group includes a number of well-known sites such as Prae Wood, Wheathampstead (Wheeler & Wheeler 1936), Skeleton Green (Partridge 1981), Gatesbury Track (Partridge 1980a) and Gorhambury (Neal et al. 1990).

Medium

Sites which have been interpreted as having *medium* survival are those in which the archaeological deposits have experienced significant erosion although the overall plan of structural features, including dwellings, has survived.

Fifty eight sites have been assessed as belonging to this category. This represents 26% of the total number of sites and 35% of the excavated sites. They include a wide range of sites across the Study Area and are represented typically by rural plough-damaged sites that have been extensively excavated. Notable sites that fall within this category are Foxholes (Partridge 1989) and Puddlehill (Matthews 1976).

Figure 4.5: Degree of Survival of Evidence



Low

Sites which have been interpreted as having *low* degree of survival are those in which the archaeological deposits have been heavily truncated by erosion and/or a significant proportion of the area of the site has been destroyed to the extent that an overall plan can't be recovered. Typical sites that fall within this definition have had all deposits removed by ploughing apart from the lower fills of negative features. They also include sites which have been damaged by subsequent occupation dating to the Roman, Medieval or later periods such as Lockleys (Ward-Perkins 1937), Ermine Street, Puckeridge (Potter and Trow 1988) and the sites found within Verulamium Roman town (Frere 1983). Fifty two sites have been identified within this category. This represents 23% of the total number of sites and 32% of excavated sites.

Conclusions

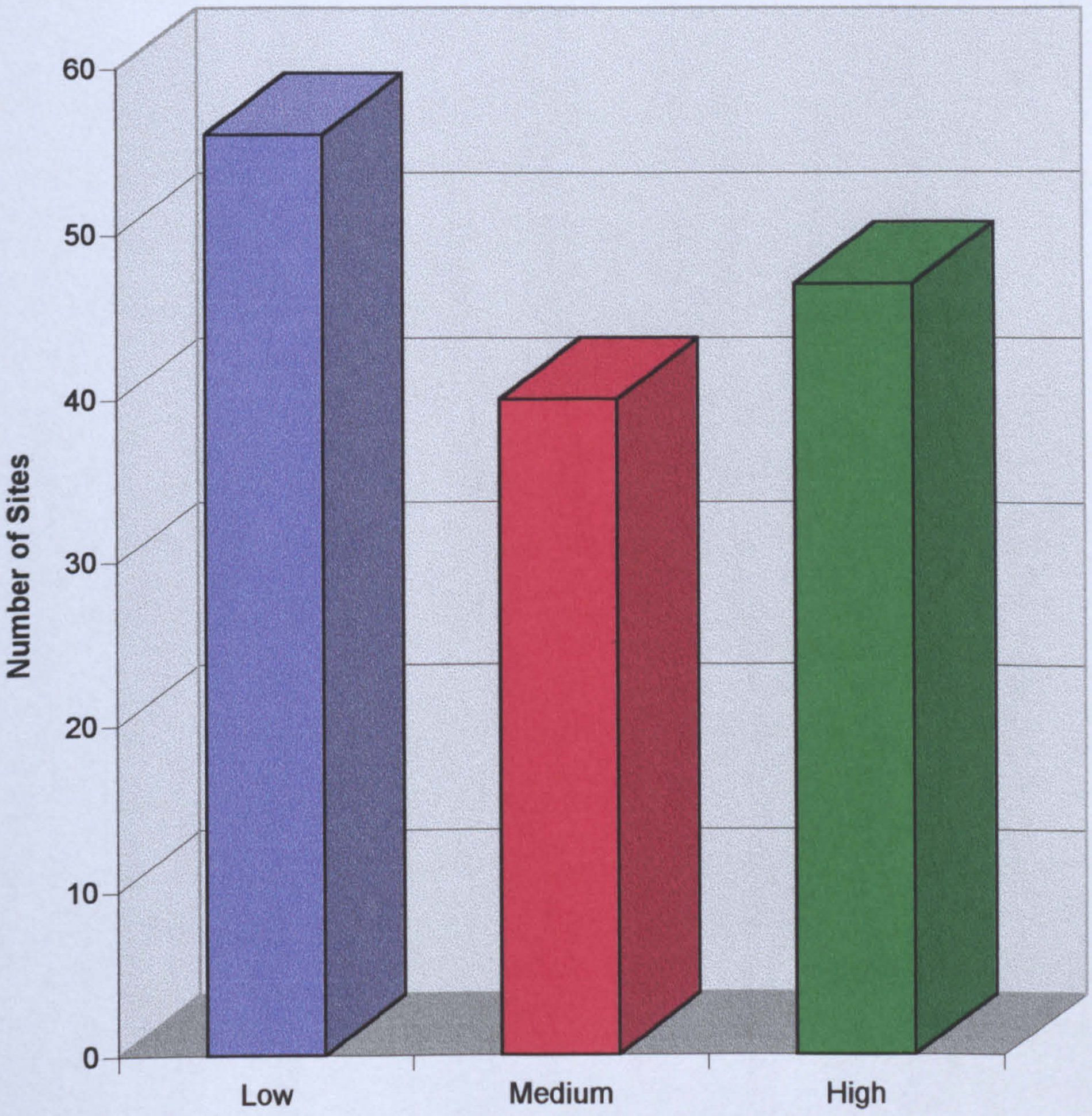
Almost all of the sites for which the degree of survival of the archaeological evidence is known can be demonstrated to have been substantially eroded. This is probably typical for most of southern England where the destructive affects of ploughing and residential development are widespread. However, it can be argued that the combination of high agricultural potential and rapid population rise from the later 19th century within the Study Area has meant that erosion has been as high as in any other geographical area in England. This has undoubtedly affected the range of questions which can be asked of the evidence, exemplified perhaps by the high archaeological value placed on the few sites within the *high* category such as Skeleton Green and Gorhambury.

The Standard of Excavation (Figure 4.6)

Introduction

This criterion is intended as a guide to the general standard of excavation particularly with respect to the reliability of identification and recording of the structural evidence. The aim is to broadly assess the degree to which the records of an excavation are likely to be an accurate representation of the nature and extent of the structural and artifactual evidence. For some sites the information needed to

Figure 4.6: Standard of Excavation



make a judgment is not available and in these cases the assessment has been to a large extent subjective. Figure 4.6 shows the proportions of the three categories which have been assessed.

High

This category represents those excavations where systematic procedures have been carried out for the recording of artifacts and ecofacts and there appears to have been good recovery of structural evidence.

Forty seven excavated sites have been assessed as falling within this category. They are mostly represented by the large number of excavations undertaken since the 1980s, for which the sampling strategies and excavation techniques are usually explicitly stated in the report.

Medium

This category represents those sites where the main structural features have been recorded and key artifacts recovered, but where significant evidence (structural evidence, artifacts or ecofacts) has not been recorded.

Forty five excavated sites have been assessed as having a medium level of recovery of evidence. They include the majority of excavations undertaken since the 1940s. They also include sites in which the presentation or interpretation of the evidence is deficient and some recent small-scale excavations where only minimal recording has occurred.

Low

This category represents a poor level of recovery of structural evidence. Typically this would include severely under-resourced excavations, most excavations carried out before 1940 and salvage recording during development. Fifty-one excavated sites have been assessed as falling within this category.

Conclusions

Of the 143 sites for which the standard of investigation has been assessed, 92 (64%) fall within the 'high' and 'medium' categories. This reflects the fact that over 75% of the excavations have taken place since the 1960s; either by professional excavation units or well-resourced local societies. However, the value of the evidence from the remaining 36% of sites is in most cases only low in terms of addressing issues of size, function and chronology.

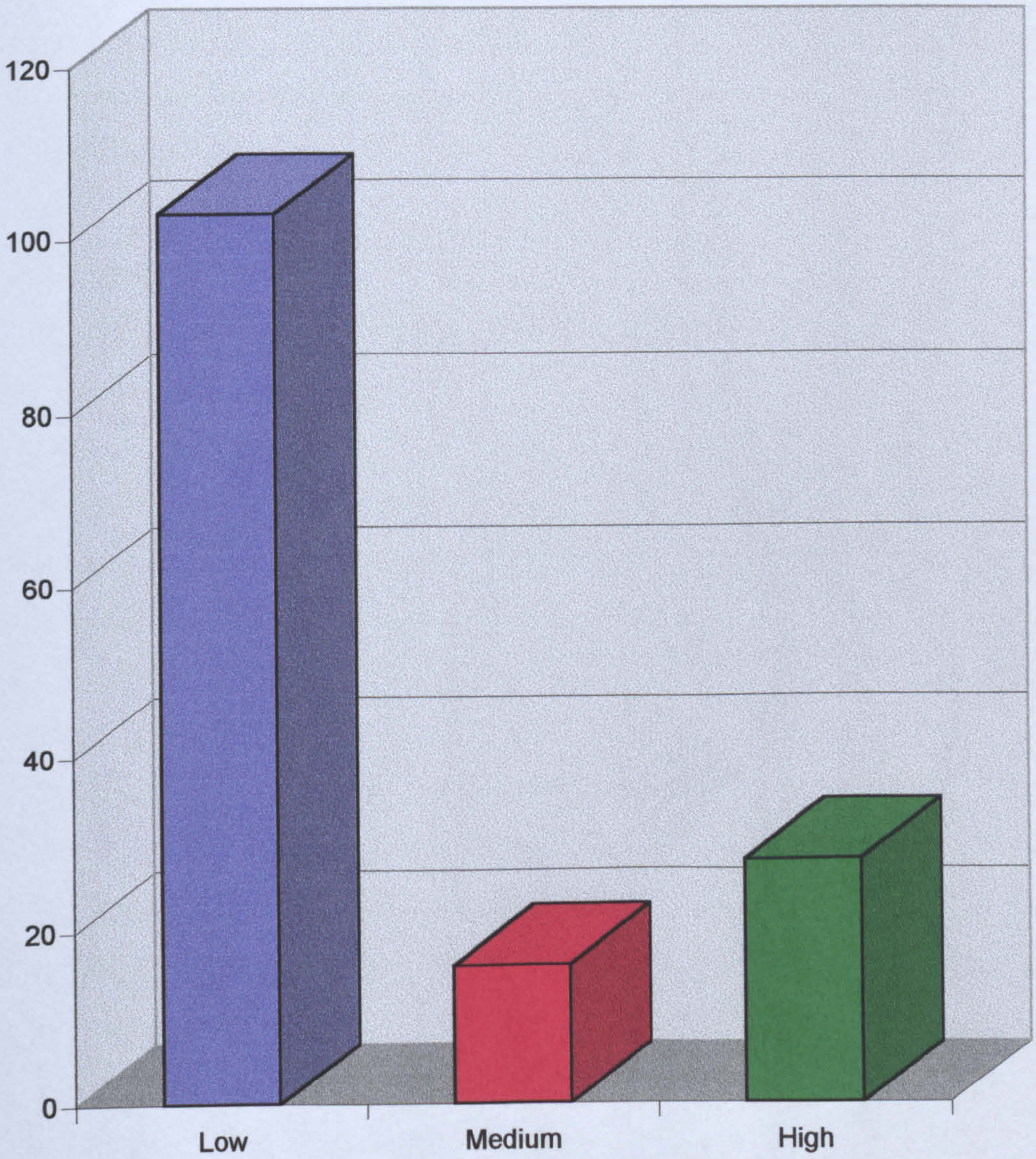
The Scale of Excavation (Figure 4.7)

Introduction

The criterion provides a rough assessment of the proportion of the total area of the site excavated: the aim of which is to evaluate how representative the excavation is likely to be of the site. The approximate proportion excavated has been divided into three categories: high (greater than 20%); medium (between 20% and 2%); and low (less than 2%). The figures themselves are not designed to have any particular significance other than as a general indication of the proportion of the site excavated. It is also acknowledged that the excavation strategy adopted in terms of excavation trench location can greatly effect the representivity of the excavated sample of a site.

Of the three categories, *low* has been relatively easier to assess than the other two. Although the size of many settlements can be guessed at within a very broad range, (e.g. 0.1 to 10 hectares) there are few in which it is not known with any degree of certainty. Small investigations can therefore be relatively confidently ascribed to the *low* category, where as, for even very large area excavations, the limits of a site are only rarely found. Assessing the size of the area investigated based on the available evidence has also proved to be problematic in many instances. Figure 6 shows the proportions of the three categories assessed.

Figure 4.7: Scale of Excavation



High

This refers to sites for which it has been estimated that more than 20% of the postulated area of the settlement has been investigated.

Twenty eight excavations have been assessed as falling within this category. The majority (over 90%) are excavations which have taken place since the 1970s and include all of the sites excavated at Stansted Airport, Harlow, Puddlehill and Wendens Ambo.

Medium

This refers to sites in which it estimated that between 2% and 20% of the area of the settlement has been investigated.

Eighteen sites have been assessed as falling within this category. Several are sites situated within the large settlement complexes at Braughing and Baldock, and for these, the estimate is very approximate

Low

This refers to sites for which it is estimated that less than 2% of the total area of the settlement has been investigated. Although the estimate of the proportion is approximate, for most of the sites which fall within this category, the size of the investigation is sufficiently low for a reasonable assumption about the small scale of the work to be made.

103 sites are within this category. For the majority of these, the real figure is probably significantly less than 2% Most are sites which are only known from salvage recording.

Conclusions

Sixty nine percent of the total of 149 assessed excavated sites fall within the *low* category and only 18% within the *high* category. Although the above figures have

been crudely estimated, they do suggest that the vast majority excavations are unlikely to be representative of the site in terms of structural evidence and artifacts.

The Standard of pottery publication (Figure 4.8)

Introduction

The aim of this criterion is to assess how useful the analysis and publication of pottery, which is one of the numerous and important Late Iron Age artifact classes, can be in terms of understanding key aspects of social and economic development, especially the production, use and exchange of pottery. In particular, analysis of the proportion of imports and other fine-ware pottery within assemblages has potential to provide important information concerning the role and status of a site and how this might have developed during the Late Iron Age. Quantification (inclusion of details of weight and sherd numbers for pottery fabric groups for each site phase) has therefore been chosen as the most important aspect of analysis. Figure 4.8 shows the proportions of the three categories.

High

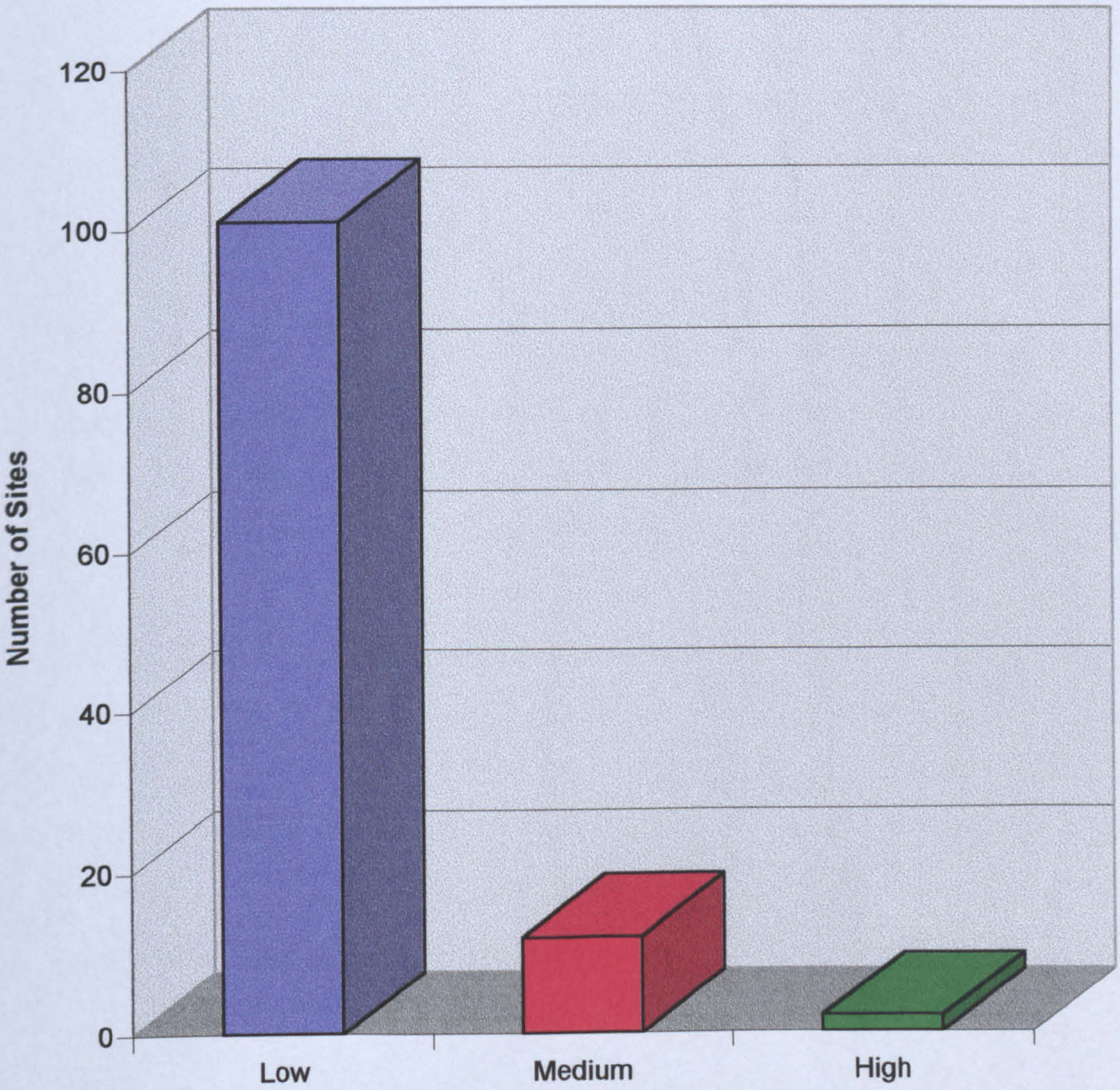
To fall within this category, the report should provide details of quantification of all fabric groups by phase or for all features.

Only one site (Wendons Ambo) has a pottery report with full quantification. However, the report does not contain any characteristic 'Belgic' pottery or imports and therefore is of limited usefulness for the thesis.

Medium

For this category, the report should provide selective quantification of fabric or forms, and/or quantification by weight or sherd count for the site as a whole. Eleven pottery reports have some degree of quantification. .

Figure 4.8: Standard of pottery publication



Low

In this category the report should provides details of presence/absence for fabrics and forms by phase, or for all major features. One hundred sites have published pottery reports which do not have any details of quantification.

UP

This indicates that that the pottery has not been published. Fifty four sites have been assessed having produced significant assemblages of pottery which have not been published.

Conclusions

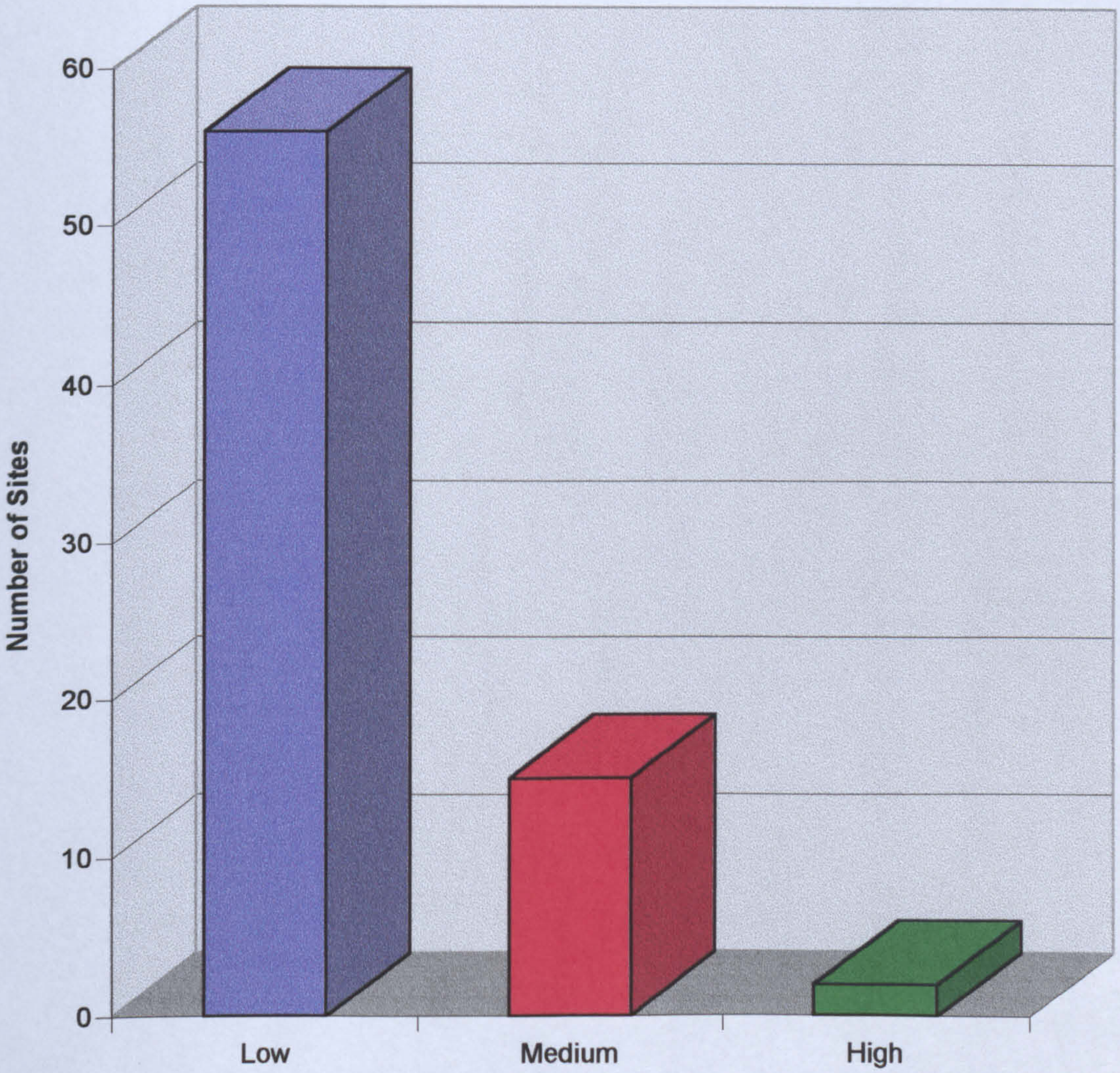
The low number (5%) of sites which have published reports of a *high* or *medium* standard imposes severe limitations upon the questions can be asked of the Late Iron Age evidence for the Study Area. The limitations apply to a number of areas including the precision to which sites can be dated, patterns of pottery use and discard within sites, the relative importance of local, regional and inter-regional trade, evidence of local pottery manufacturing and evidence for settlement status and hierarchies, amongst others. The quality of published pottery reports for the Study Area is also poor in relation to other geographical areas. For example, the majority of Iron Age pottery reports published in Hampshire, Sussex and the Upper Thames Valley since the 1960s fall within the 'high' class (information from county journals and excavation monographs)

Evidence of Environment and Economy (Figure 4.9)

Introduction

This criterion is intended as a general assessment of the quality of information about environment and economy, with particular reference to evidence of agricultural production, processing and consumption, from the remains of grain and domestic animals. The aim of the assessment is to examine the potential of the evidence to contribute to an understanding of the nature of the agricultural economy of the Study Area during the Late Iron Age, and from this to examine the extent to which the agricultural economy has influenced settlement location and

Figure 4.9: Standard of environmental data publication



development. This includes evidence from animal bone, snails, plant remains and soil analysis. Figure 4.9 shows the proportions of the three categories.

High

Indicates that the published report contains significant information about the local environment and agricultural economy and that the remains have been quantified.

Two excavated sites have evidence of local environment and agricultural economy, with some quantification of the evidence.

.

Medium

Indicates that some information is available from animal bone or grain assemblages, but limited of no quantification has been attempted. It also indicates instances where for taphonomic or sampling reasons, only limited information can be obtained from the assemblages.

Fifteen excavated sites (8%) have some information available from animal bone or grain assemblages.

Low

Indicates that no information is available about the local environment or agricultural economy of the site.

Fifty-six excavated sites have no information available about the local environment or agricultural economy of the site.

Conclusions

As with the assessment of the quality of pottery publication, the low proportion of sites which are within the 'high' and 'medium' categories means that the evidence has only very limited potential to contribute to an understanding of the agricultural economy of the Study Area.

The Quality Criteria: Conclusions

The above assessment has been a very rapid, generalised and partly subjective exercise, which is therefore acknowledged to be flawed and unreliable, particularly in the detail of figures presented. It does nonetheless provide the basis for several more reliable generalised conclusions which can be made of the evidence;

1. the published evidence of pottery is of very limited value for addressing issues related to the temporal patterns of production, use and exchange and how these might relate to key social and economic developments,

2. the potential of the Late Iron Age evidence to address the key questions of the thesis relating to understanding social and economic processes in the Study Area, particularly with respect to the function of sites and their context within the local landscape, is restricted to a relatively small proportion of sites (less than 10%) for which the survival of evidence, proportion excavated and standard of excavation are all reasonably high.

For the majority of sites, (over 75%) the evidence is only of use for spatial referencing, and establishing broad and relatively simple patterns of chronology and site function.

4.2 Accounting for Geographical Biases in the Data

4.2.1 Introduction

This section of the thesis will assess geographical biases in the Late Iron Age evidence. Two aspects will be covered;

1. the generation of idealised model settlement distribution pattern to provide a rough framework against which the analysis of the Late Iron Age evidence can be assessed,

2. an assessment of the principal non-archaeological factors which have distorted the current geographical distribution of Late Iron Age sites.

4.2.2 A Model for the Density of Late Iron Age Sites

Introduction

A simple model has been developed of the approximate spatial density of Late Iron Age sites within the Study Area from which a theoretical total number of sites can be calculated. The aim of the model is to provide a broad framework against which the known density of Late Iron Age site data can be tested. In particular, the data from the model will be used to identify the larger distortions in the distribution of known sites such as large falsely negative blank areas and site clusters caused by non-archaeological factors. It is also hoped that the model will help to identify archaeologically significant clusters of sites. However, because of the inherent deficiencies in the model, its purpose will identify only the larger and most significant distortions.

The model represents the density of non-specific 'sites' rather than settlements so that it can be directly compared with the known Late Iron Age site data. Such 'sites' can represent a range of types of activity from a refuse midden or a dense manuring scatter, to a cemetery, farmstead or even a large nucleated settlement. It is therefore important to recognise that the data produced by the model is not designed to specifically represent Late Iron Age population or settlement density, although it can under some circumstances be used to provide general indications or trends.

Estimates of Iron Age and Roman Settlement Density

The most recent attempt to estimate the average density of Iron Age and Romano-British settlements on a national basis is that by Millett which uses a number of

regional and local studies to arrive at a national average of 0.8 settlements per square kilometre (Millett 1990:18-34). This provides a useful benchmark figure from which it is possible to compare the estimate made for the Study Area. However, the figure was not based on any surveys within the Study Area or in a comparable area, and it is too general to be of specific use in estimating the density of sites for the Study Area.

In terms of more directly relevant estimates of Iron Age or Roman settlement density for the Study Area, there are two studies within the eastern region, one of which is within the Study Area and the other of which is a comparable area.

The Fransham Survey

The first is Rogerson's study of Fransham parish in Norfolk (Rogerson 1995). This is a detailed study of a single parish located on the western edge of the Norfolk Boulder Clay. The parish is 12.1 square kilometres in area and the current land-use is predominantly arable agriculture. In terms of soils and topography, it is broadly comparable to the Boulder Clay environmental zone of the Study Area.

With respect to the Iron Age, Rogerson's study consisted of a systematic fieldwalking survey of the parish. From this, a total of six probable Iron Age sites were identified from scatters of pottery, representing an average density of 0.5 sites per square kilometre. The number of sherds of pottery at each site ranged from 15 to 250, which occurred over areas with a diameter of between 25 and 65 metres (Rogerson 1995:45-47). In addition to the six probable sites, several small ill-defined scatters of pottery were identified, but the status of these scatters was uncertain and they were not recorded as Iron Age sites.

The reliability of the average density figure is questioned by Rogerson on two grounds.

1. The pottery styles and fabric varied significantly between some of the sites. This suggests that there was either significant variability in terms of pottery usage and

disposal or, more probably, not all of the sites were occupied at the same time. This would indicate that the average figure is likely to be an overestimate of settlement density.

2. This counterbalanced by Rogerson's conclusion that fieldwalking is not a good technique for finding Iron Age sites on the boulder clay soils. This is due to the difficulties of recognising the generally soft and friable Iron Age pottery. Because of this factor Rogerson concludes that the average density figure is probably an under-representation of the total number of Iron Age settlements in the parish.

The Williamson Survey

The second study is that by Williamson in northwest Essex (Williamson 1984). The study comprised a fieldwalking project in which 28 square kilometres was systematically fieldwalked by the author: this forms the largest area of controlled archaeological field survey in the Study Area.

Methodology

Three separate blocks totaling 16 square kilometres, selected as being representative of the natural environments and landscape types, were intensively fieldwalking in three metre interval transects. This was designed to pick up evidence of the general background, low-level finds scatters including possible manuring scatters, in addition to the more concentrated scatters indicative of settlements.

The detailed survey was supplemented by a less intensive survey of a further 12 square kilometres with transects spaced at 15 metre intervals. Eight of these kilometre squares were chosen randomly from the remaining part of the total survey area and four remaining square kilometres were chosen to answer specific questions. The survey area falls entirely within the Boulder Clay environmental zone and most of the surveyed area was on chalky boulder clay soils of the Hanslope Association. The area surveyed is shown in Figure 4.11

Williamson discusses in detail the affects of the various biases which can affect the recovery and interpretation of fieldwalked material and the limitations of systematic fieldwalking as method of examining early settlement patterns. He attempted to quantify some of the effects of the biases by conducting two simple experiments.

In the first experiment, sherds of Iron Age and Roman date were repeatedly scattered in harrowed fields in a variety of soil, and lighting conditions. The fields were then walked in three metre transects. The results showed that Iron Age material was less visible in all conditions, the recovery rate ranging from 12% to 48% compared with 24% to 60% for the Roman pottery, with the difference being most marked on chalk soils and in dry conditions. The reasons given for the consistently lower recovery rate of the Iron Age material were the dull colour of the sherds which tended to make them merge into the ploughsoil, an effect which was particularly marked with the flint tempered fabrics, and the irregular shape of most of the sherds which, because of their lower firing temperature, tended to disintegrate more easily than the harder Roman and medieval fabrics.

In the second experiment, total collection of two randomly selected 20 metre by 20 metre squares was attempted on 10 known Iron Age and Roman sites. The results showed that when compared with the Roman sites, the Iron Age sites were represented by fewer and smaller sherds. The average sherd weight was also higher on the level clay sites than the chalk sites and the sites situated on slopes.

Results

A total of 36 concentrations of Roman debris substantial enough to indicate permanent settlement were recovered in the 28 kilometres fieldwalked representing an average density of 1.3 sites per square kilometre. In addition, 35 pottery scatters recovered in the same area which were considered to indicate the site of an Iron Age settlement, representing a density of 1.25 sites per square kilometre. However, the vast majority of the Iron Age sherds were undiagnostic and it was not possible for Williamson to date sites more precisely within the Iron Age.

Conclusions

The systematic nature of the two fieldwalking surveys has provided reasonably accurate and representative figures for the density of Iron Age pottery scatters within their survey areas. The average densities of sites are significantly different, although the mean average of the two is 0.875 scatters per square kilometre, which is close to Millett's national average figure of 0.8. The difficulty with using such surveys to represent settlement density is that the accurate dating of most sites is not possible and the nature of the occupation that the scatters represent is also unclear in most instances. The reconstruction of contemporary settlement patterns is therefore generally not possible. In addition, the nature of the various taphonomic and observation biases noted by both Willaimson and Rogerson can effect the detection of sites.

The Deficiencies of the Model

The estimation of site distribution has been determined largely from environmental criteria, particularly the agricultural potential of the land within the six environmental zones, and by extrapolating from the few systematic surveys which have been undertaken. Agricultural potential is defined from the optimum yield in terms of agricultural produce from a given area of land, based upon soil fertility, drainage, availability of water, climate, height and aspect. There are several factors which need to be taken into account when using the estimated figures.

1. There is little information available from the Study Area about Late Iron Age soils, vegetation and the type of agricultural technology used. Generalisations have therefore been made from the few sites with such evidence and other comparable areas

2. The estimation of agricultural potential for a given area assumes that the optimum agricultural regime was undertaken. It is however likely that agricultural regimes with outputs substantially below the optimum figure were the norm.

3. The definition used for archaeological sites (which includes ritual and burial sites and extra-mural deposits) is not necessarily synonymous with settlement and population and will have been influenced by other social and economic factors in addition to agricultural potential. The number and distribution of settlements within a given area will also have been influenced by non-agricultural factors such as wealth from industrial production and exchange or the presence of administrative centres, amongst many others. It can also be assumed that social factors played a part in the location of all settlements, although these are almost impossible to estimate and take into account for estimating regional patterns with the currently available evidence.

4. The systematic surveys are few in number and are not representative of the Study Area as a whole.

For these reasons, it has not been possible to provide reliable or accurate figures for the potential densities of sites within the six environmental zones. Therefore, it has been decided to calculate a theoretical maximum and minimum site density figure somewhere within which it is considered the real site density figure is likely to lie. It should however be emphasised that the figures themselves do not have any inherent statistical significance and are in most instances little more than informed guesses.

The Model

The Boulder Clay Zone

The surveys undertaken by Williamson (1984) and at Stanstead (Brooks and Bedwin 1989) covered approximately 3% of the zone, were both systematic, and included reasonably representative samples of the zone, including river valley and clay plateau areas. Therefore, they can provide a statistical basis for estimating site density for the zone. Between them, the surveys found a mean average of 1.2 Iron Age sites per square kilometre although the pottery recovered from the sites found in the Williamson survey is ambiguous in terms of dating, and could represent Early or Late Iron Age sites. An assessment of the Late Iron Age settlement density should therefore take account of this dating ambiguity. Given the much lower

density found in the survey of a broadly comparable area at Fransham (Rogerson 1995), a range of settlement density from an average of 0.5 to 1 sites per square kilometre would seem to be more realistic This would provide a theoretical total number of sites in the zone of between 450 and 900

The Chalk Upland Zone

The systematic fieldwalking surveys by Hudspith (1995; 1997; 1999) and Hall (1991) provide some guide to the likely density of Late Iron Age sites within this zone. Ten sites were found within the approximately 17 square kilometres surveyed within the zone, representing an average site density of 0.6 per square kilometre. The sample is only a small proportion of the zone (5%) and is concentrated in one area. It may therefore not be representative of the zone as a whole. The variable methods used for the surveys and the small sample size fieldwalked also reduce the reliability of the evidence. In consideration of this, a range of site densities 50% either side of the average survey figure of 0.6 (between 0.3 and 0.9) has been chosen as the basis for the model. This would give a conjectured total of between 100 and 302 sites for the zone.

The Gravel Zone

No systematic surveys have been undertaken within the zone. The agricultural potential is generally more variable than is the case with the Chalk Upland or Boulder Clay zones, with fertile river valleys and areas of productive brickearth interspersed with extensive areas of acidic, dry rough pasture. Therefore, estimating average site density is even more problematic than for the Chalk Upland zone. However, given the poor productivity of the acid grassland areas, the site density was probably lower than that of Boulder Clay zone. A theoretical range of between 0.4 and 0.8 sites per square kilometre has therefore been estimated, giving a hypothetical total of between 79 and 159 sites.

The Clay-with-Flints Zone

This zone is also variable in terms of agricultural potential with the river valleys being much higher than the clay-with-flints soils on the plateau areas. Several

systematic surveys which can be used to estimate a site density have however been undertaken within the zone. The Ashridge Survey which was situated at the edge of the Bulbourne valley, found a density of sites of over 0.7 sites per square kilometre (Morris & Wainwright 1995). The presence of evidence for ironworking at several of the sites does however suggest that the figures may be distorted by local factors, and the survey area is therefore probably not be representative of the zone as a whole. The other surveys, although smaller in size, were carried out on the plateau area and are therefore likely to be representative (Hudspith 1995; 1997). Three sites were found within the approximate total of 9.3 square kilometres that was fieldwalked within the zone, representing an average of 0.32 sites per square kilometre. This is slightly below the 0.5 sites per square kilometre site density found at Fransham in Norfolk (Rogerson 1995) and may be a more typical figure for the less productive clay soils of the plateau areas.

On the basis of the two surveys and an assessment of the agricultural potential of the zone, a very rough predicted site density of 0.2 to 0.7 sites per square kilometre has been assumed for the model. This gives a theoretical total of between 100 and 270 sites for the zone.

The London Clay Zone

The potential for arable agriculture is within this zone low is significantly lower than the other five zones due to the heavy nature and poor drainage of the soils. The dominant agricultural regime was probably a mixture of extensive pasture for cattle and pigs, and some more intensive open, grassland pasture. Considering the lower productivity in terms of energy yields of pastoral regimes the estimate for site density is 0.2 to 0.4 sites per square kilometres. This would give a hypothetical total figure of between 45 to 92 sites.

The Gault Clay Zone

The zone has an agricultural potential which theoretically lies between that of the more fertile and better drained Boulder Clay zone and the London Clay zone. An

estimate midway between the two 0.25 to .075 would give a hypothetical ideal total between 32 and 65 sites.

Conclusions

Table 1 shows the estimated range of site numbers for the six zones. Adding the figures together produces a theoretical range of Late Iron Age sites for the Study Area as a whole of between 843 and 1845, which represents a mean average density of between 0.4 and 0.8 sites per square kilometre. This is at the lower end of Millett's national average figure for Late Iron Age and Roman of 0.8, but is substantially higher then the known density of Late Iron Age sites within the Study Area which is 0.1 per square kilometre.

Table 4.1, estimated figures for Late Iron Age sites.

Zone	Minimum	Maximum
Boulder Clay	450	900
Chalk Upland	100	302
Gravel	79	159
Clay-with-Flints	100	350
London Clay	45	92
Gault Clay	32	65
Total	806	1868

4.2.3 An Assessment of Biases and Distortions of the Evidence

Introduction

The plot of the distribution of Late Iron Age sites within the Study Area shown in Figure 4.1 reveals a very uneven pattern with a number of large, localised clusters of sites interspersed with extensive areas in which there are few or no sites. One of the key aims of the thesis is to assess the influence of environmental, social and economic factors operating in the Late Iron Age on this distribution pattern. However, before doing this, it is first desirable to understand the extent to which the distribution is the result of non-archaeological factors. Therefore, the following assessment has been made of some of the non-archaeological biases which it is

considered are likely to have significantly distorted the Late Iron Age settlement pattern.

However, most of the evidence has been collected unsystematically and is subject to a variety of distorting factors many of which are difficult to quantify. In this respect the evidence from the Study Area is more difficult to assess than is the case for most of the north and west of England where destructive development from agriculture and urban/sub-urban development has been much less marked. As an example of this difference Ferrell, in a recent study of Iron Age settlement in Northeast England, was able to state that for the areas chosen:

"bias, resulting from later activity or fieldwork methodology may be readily assessed" (Ferrell 1997:230).

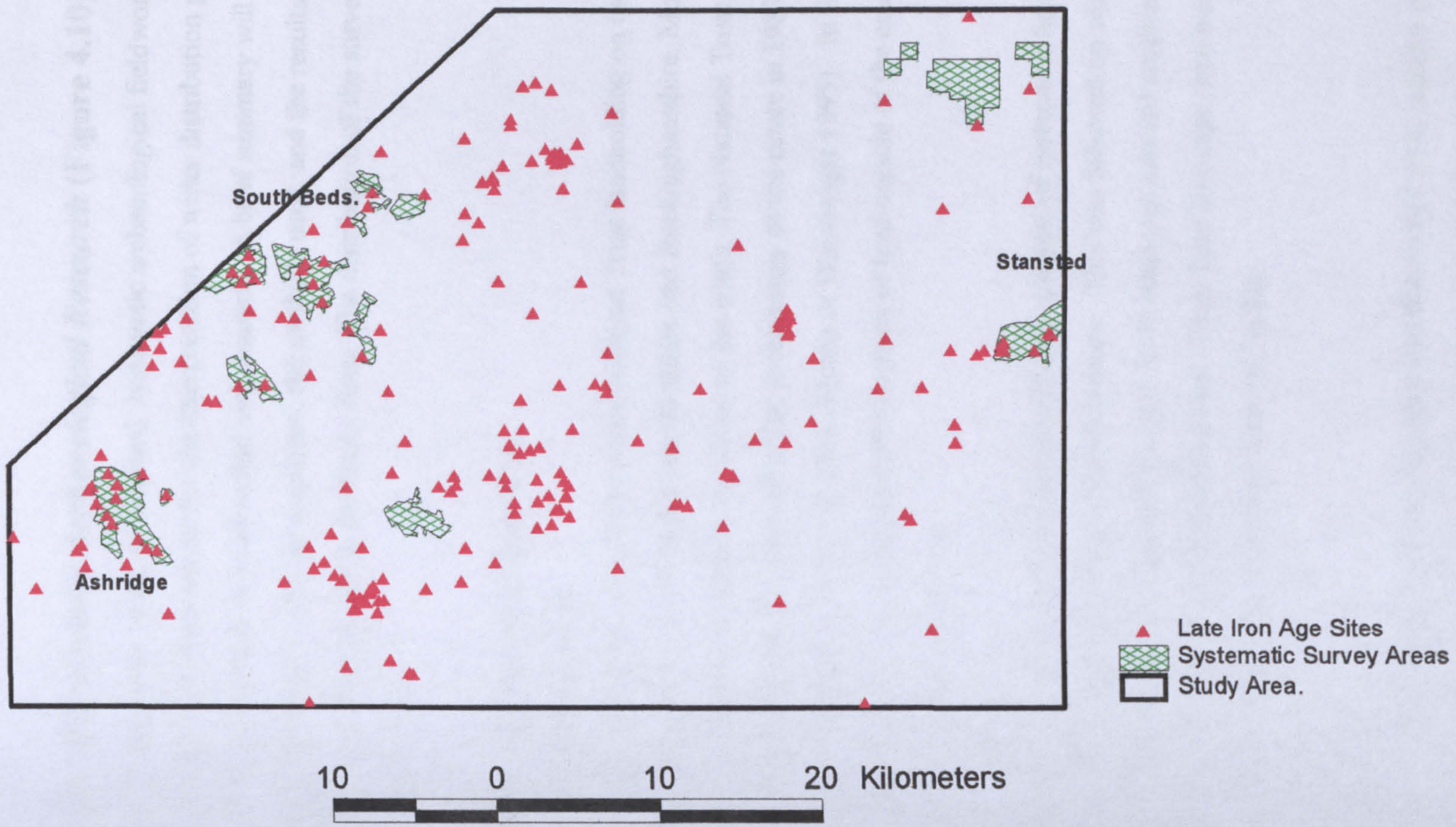
For the Study Area, the process of assessing bias and distortion in the evidence is much more problematic. The purpose of this exercise will therefore be to account only for the major distortions represented by abnormal clusters of sites, or blank areas. These will include the effects of archaeological fieldwork as well as non-archaeological factors such as development and woodland masking.

This section is divided into three parts;

1. an assessment of the affect of systematic archaeological research on the distribution of sites,

Areas of Systematic Survey

Figure 4.10



2. an assessment of the affect of unsystematic archaeological research,
3. an assessment of other distorting factors such as development and masking by woodland.

Areas of Systematic Archaeological Research (Figure 4.10)

Sites found as the result of localised, systematic archaeological fieldwork survey can have important implications for the interpretation of wider distribution patterns and they therefore need to be identified and assessed. A brief summary will therefore be made of the type of survey employed, the methods used, and the results obtained for surveys undertaken within the Study Area. The distribution of the surveys is shown in Figure 4.10.

The Ashridge Survey (Figure 4.11)

Survey and methods

The Ashridge Estate is a 1100 hectare National Trust landholding on the Chiltern Hills along the border between Hertfordshire and Buckinghamshire. Most of the estate overlooks the Bulbourne Valley to the south. The National Trust commissioned a detailed survey of the archaeology of the estate in 1983 which was undertaken between 1983 and 1986 (Morris & Wainwright 1995). In the event, the survey also took in an additional 200 hectares of land outside of the estate. Figure 4.11 shows the survey area.

The survey method consisted initially of a programme of systematic fieldwalking to identify finds scatters and earthwork remains. This was followed up with a measured survey of the earthworks at 1:1000 scale and selected small-scale excavation of some of the identified sites. Three Late Iron Age sites were known of within the survey area (gazetteer Nos. 64,76,82).

Results

A total of eight new Late Iron Age sites was discovered from scatters of Late Iron Age pottery, which together with the three previously known sites, represents a density of 0.84 sites per square kilometre. All of the pottery scatters were

Ashridge Survey

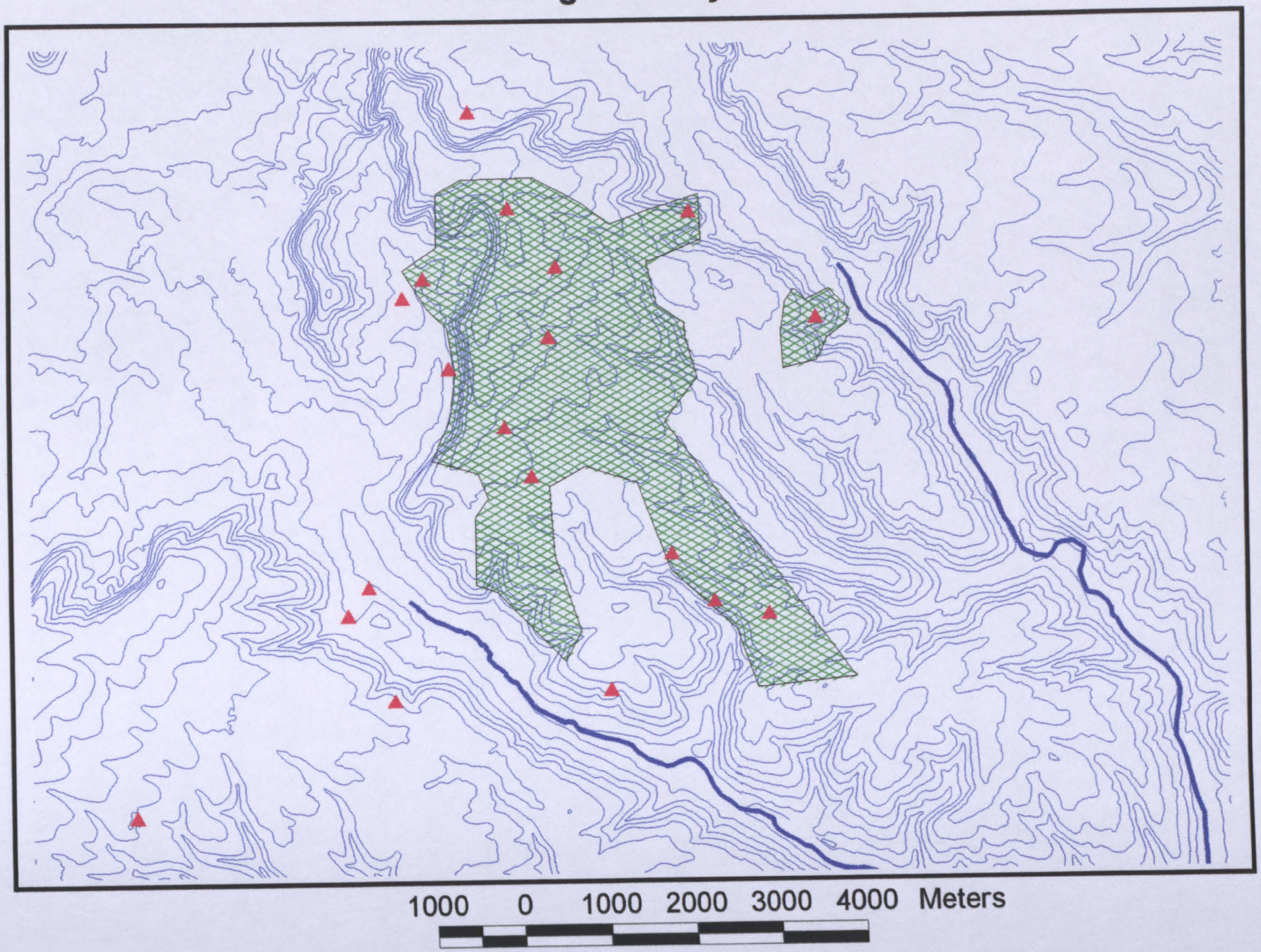


Figure 4.11

associated with the earthworks of enclosures, trackways and field boundaries. The excavation of selected features, including field boundaries and lynchets produced finds and occupation material dating to the Late Iron Age (Morris and Wainwright 1995 and Wainwright pers. comm.). The presence of well-preserved and previously undetected sites in what is one of the largest areas of woodland in the Study Area demonstrates the fact that woodland can effectively mask extensive landscapes which include Late Iron Age evidence.

Stansted Airport Project (Figure 4.12)

Survey and methods

The Stanstead Project was set up by the Archaeology Section of Essex County Council in 1985 as a response to the planned expansion of Stansted Airport (Brooks & Wall 1988; Brooks & Bedwin 1989). The project consisted of a mixture of excavation, fieldwalking and watching briefs, and ran continuously until 1991. The total area investigated was 600 hectares, of which 400 hectares was intensively fieldwalked.

The project area is located on the boulder clay plateau of west Essex, two kilometres to the east of the River Stort and the town of Bishops Stortford.
The fieldwalking method consisted of walking all of the surveyed area with transects set at ten metre intervals. Significant clusters of finds were then resurveyed with the transect intervals set at two metres.

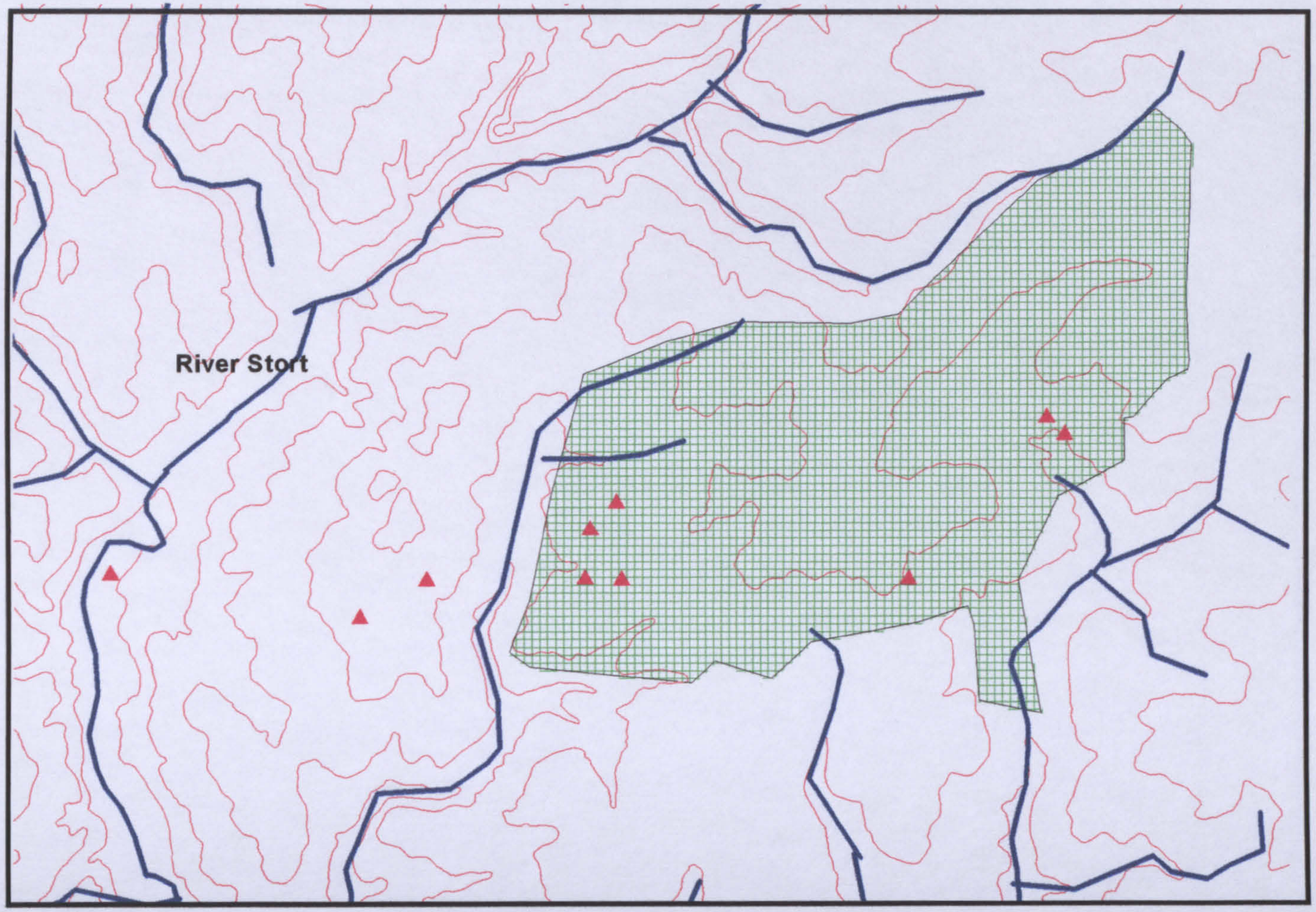
Results

A total of seven Late Iron Age sites were discovered during the course of the project representing an average density of 1.15 settlements per square kilometre. Five were initially revealed from the fieldwalking project, and two were found at a later date during watching briefs (Brooks & Wall 1988).

The project is important for the thesis because it is the largest systematic and comprehensive archaeological investigation within the Study Area, and because it took place on the most widespread landscape type (chalky boulder clay plateau).

Stansted Airport Survey

Figure 4.12



For this reason the results have, directly or indirectly, formed the basis of much of the site density model which was outlined above.

Hudspith 1989-1 Survey (Figure 4.13)

Survey Area and Method

A systematic fieldwalking survey was carried out between 1988 and 1991 by Mr R. Hudspith of a 15 square kilometre area around the urban area of Luton town (Hudspith 1995). The survey area was divided into two parts;

1. a geologically mixed area of chalk and boulder clay of approximately ten square kilometres to the north of Luton, of which four square kilometres was within the Chalk Upland zone of the Study Area,

2. an area of clay-with-flints of approximately five square kilometres to the south of Luton. This lay within the Clay-with-Flints environmental zone.

Almost all of the area fieldwalked is situated on plateau and interfluves and at a height of over 100 metres O.D. The area was fieldwalked along lines spaced at 25 metres intervals. This meant that approximately 4% of the total fieldwalked area was surveyed.

Results

Three Late Iron Age sites were found within the northern area, representing an average density of 0.6 sites per square kilometre. The Sundon site (gazetteer No. 4) produced a frequency of 6-10 sherds of Belgic pottery per hectare; Sundon Park (No. 5) over 11 sherds per hectares; and Sundon 2 (No. 174), 1-5 sherds per hectare. The Sundon 2 finds were however distributed over a larger area (several hectares) than on the other two sites.

Two sites were found within the southern area, presenting an average density of 0.4 sites per square kilometre. They produced a frequency of 1-5 sherds per hectare (Hudspith 1995:134-6).

South Beds/North Herts Fieldwalking Surveys

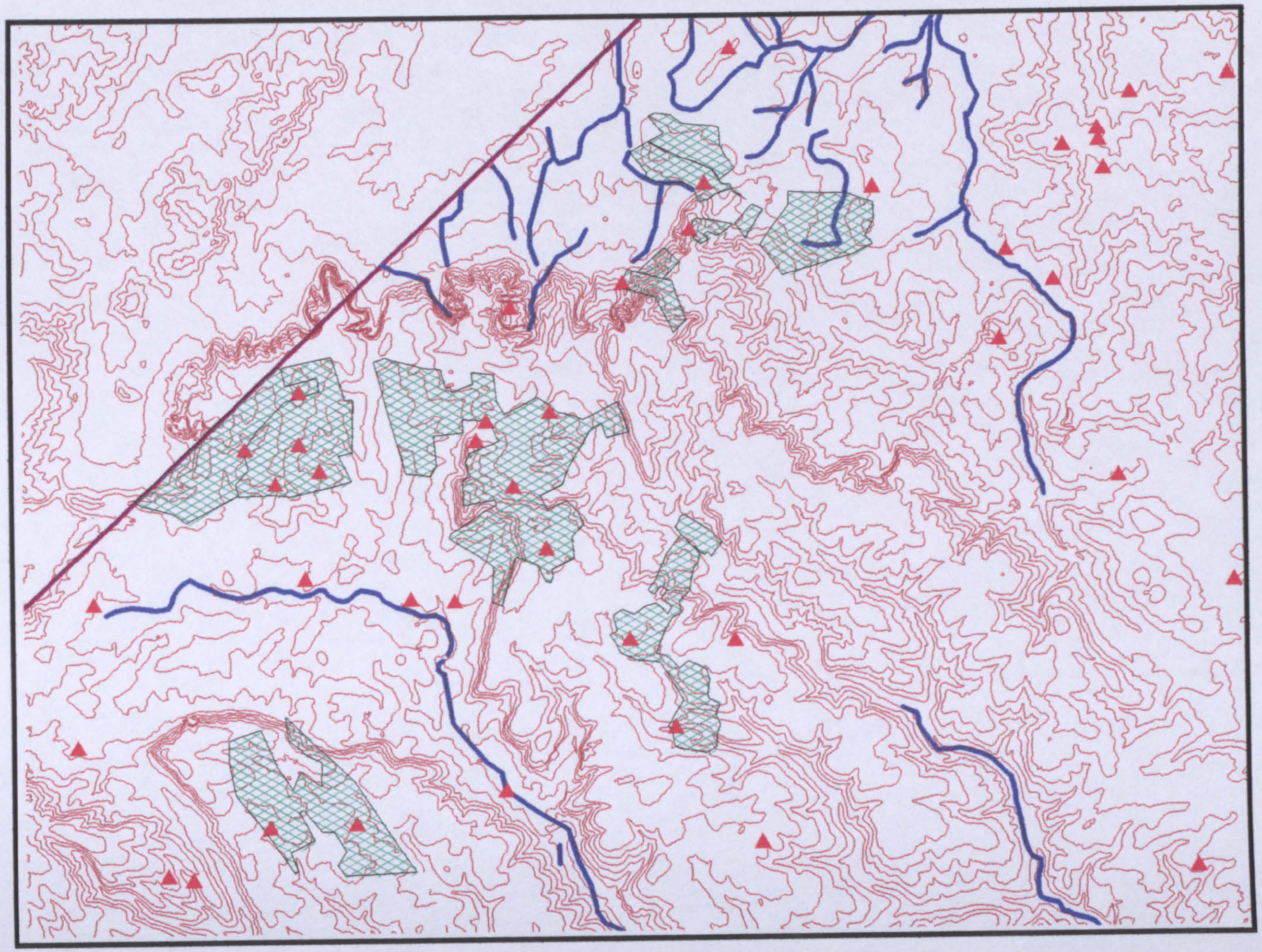


Figure 4.13

Hudspith 1992-4 Survey

Survey and Method

Two areas were fieldwalked; a 4% sample of a 5 square kilometres area within the Clay-with-Flints zone between Harpenden and Sandridge; and a 2% sample of an 11 square kilometre area northeast of Luton which straddles the Clay-with-Flints and Chalk Upland zones. One Late Iron Age site (gazetteer No. 38) was known from the area.

Results

No Iron Age sites were found in the Harpenden/Sandridge area, and five small scatters of Late Iron Age pottery were found in the northeast Luton Area which together with the one site already known, represents an average density of 0.54 sites per square kilometre (Hudspith 1997).

Hudspith 1997-8

Survey and Method

A 2% sample of three areas were fieldwalked amounting to c4.0 square kilometres within the Chalk Upland zone.

Results

Two Late Iron Age sites were found (Nos. 211, 216) representing a density of 0.5 sites per square kilometre (Hudspith 1999).

Hall Survey

Survey area and method

Sundon parish was surveyed in 1977-8 by David Hall as part of a survey of four parishes in South Bedfordshire (Hall 1991). Three square kilometres of the survey was located within the Chalk Upland zone of the Study Area. The method consisted of walking a 100 metres strip of each field in the parish.

Results

Two Late Iron Age sites, represented by scatters of Belgic pottery, were discovered within the Study Area, representing an average density of 0.66 sites per square kilometre (Hall 1991:54).

The Systematic Surveys: Conclusions

A total area of 50 square kilometres has been subject to some form of systematic survey, which amounts to 2% of the Study Area. Within this area 32, Late Iron Age sites are known, representing 14% of the total, 27 (12%) of which were found from the surveys themselves. These figures show that the density of sites (0.5 per square kilometre) is five times the average for Study Area (0.1). It can therefore be concluded that the surveys have had a distorting affect on the distribution of known sites.

Areas of Unsystematic Archaeological Research

Introduction

Archaeological research in the Study Area has historically been concentrated within a relatively small proportion of the total area, resulting in a very patchy archaeological coverage. Some areas such as St. Albans have a long and distinguished history of research, while other large and potentially rich archaeological areas, such as the Boulder Clay Plateau of East Hertfordshire, have not been subject to any research or investigation.

It is probable that most of the geographical pattern of Late Iron Age sites in the Study Area has been the subject of one or more biases and distortions caused by non-archaeological factors such as development and the activities and preferences of particular archaeologists. However, the scale of localised fieldwork in some areas such as St. Albans and Welwyn Garden City is such that it is likely to have significantly biased the overall distribution of sites in favour of these areas. In this section, therefore, an attempt will be made to define the areas of unsystematic research, explain the background and the history of research in each case, and assess

their likely impact upon the overall settlement pattern. A key aim of the exercise will be to assess whether the concentrations of Late Iron Age evidence in these areas is unusually high or if it falls within the estimated range of site numbers, provided by the site density model that might reasonably be expected (see above 4.2.2).

St. Albans District (Figure 4.14)

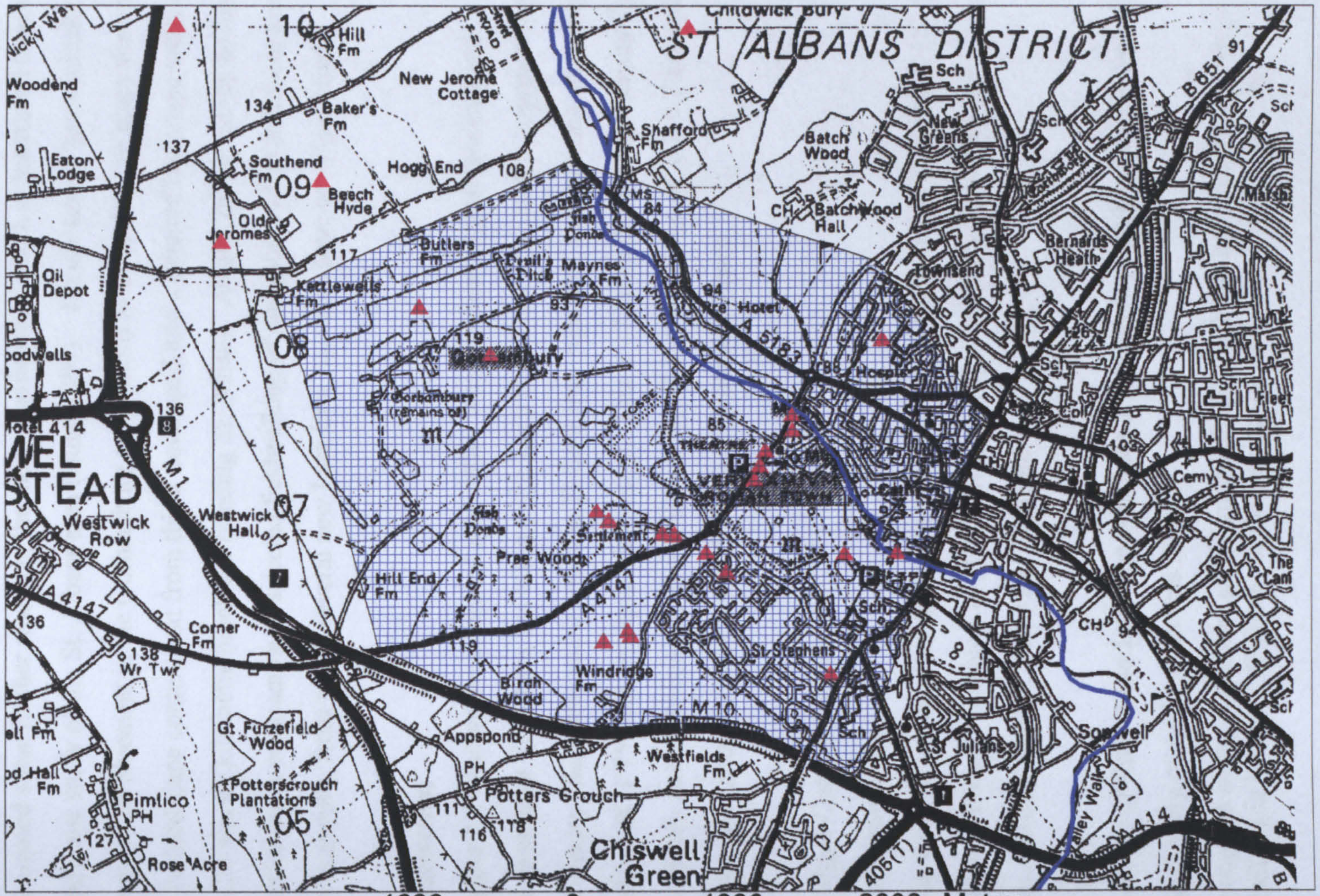
Background

The resources and expertise which have been employed in the St. Albans area over the past 50 years have made it one of the most intensively studied Late Iron Age landscapes in southern England. The excavations carried out by R E M and T V Wheeler at Verulamium and Wheathampstead in the 1930s (Wheeler & Wheeler 1936) put St. Albans firmly on the archaeological map and provided a cultural legacy within Hertfordshire which has survived until the present day. Amongst their most notable and lasting achievements was, the foundation on the site of the Roman basilica of a museum specifically dedicated to the archaeology of Verulamium Roman City.

Verulamium Museum has maintained a field archaeology capacity since its inception and a number of excavations have been carried out in and around the Roman city by successive museum keepers (e.g. Anthony 1968; Saunders & Havercroft 1982; Niblett 1999). Since the early 1970s the museum has also provided a professional field archaeology service for St. Albans City and District that has included rescue archaeology, field survey and aerial photography. As a consequence of the high level of fieldwork activity within the district, a significant number of new Late Iron Age sites has been discovered and excavated since the 1970s.

Substantial excavations by Sheppard Frere in the 1960s at Verulamium (Frere 1964,1983; 1984), and by David Neal at Gorhambury in the 1980s (Neal et.al. 1990) have maintained the high academic profile of Verulamium. They have also

St Albans: Area of Unsystematic Research



Survey Area
Late Iron Age Sites
River Ver

Figure 4.14

stimulated some further research, the most significant of which is Jonathan Hunn's landscape study of the St. Albans area (Hunn 1994). Hunn's survey grew initially from his involvement in the Gorhambury excavations as an attempt to place the villa in its landscape context and from this it developed into a detailed landscape study of a 126 square kilometre block surrounding St. Albans. As part of the survey he has carried out a programme of selected fieldwalking of enclosures identified from aerial photographs, from which several new Late Iron Age sites have been identified.

Assessment

Figure 4.14 shows the estimated area within which archaeological research and excavation at St. Albans has taken place since the 1930s. The area is approximately 12 square kilometres and it contains 21 Late Iron Age sites, representing an average density of 1.75 sites per square kilometre. This is 17 times the average density for the Study Area substantially above the estimated average range of 0.2-0.7 sites per square kilometre for the Clay-with-Flints environmental zone.

Welwyn Garden City (Figure 4.15)

Background

The Welwyn Garden City area of unsystematic research is shown in Figure 4.15. It includes Welwyn Garden City, Old Welwyn village and parts of the parishes of Datchworth, Ayot St. Peter and Codicote.

Records of Roman and Late Iron Age finds at Old Welwyn go back to 1742 when the Society of Antiquaries was shown:

"two urns containing bones and a bronze fibula' which had been recovered from a chalk pit in Welwyn" (Minutes of the Society of Antiquaries, August 1743),

but it was not until 1906 when Squire Dering of Lockleys unearthed two wealthy burials whilst constructing a deep cutting for the Welwyn to Hertford road (which had been obscuring the view from his front window) that the presence of an important Late Iron Age site was first recognised at Welwyn (Smith 1911).

Welwyn: Area of Unsystematic Research

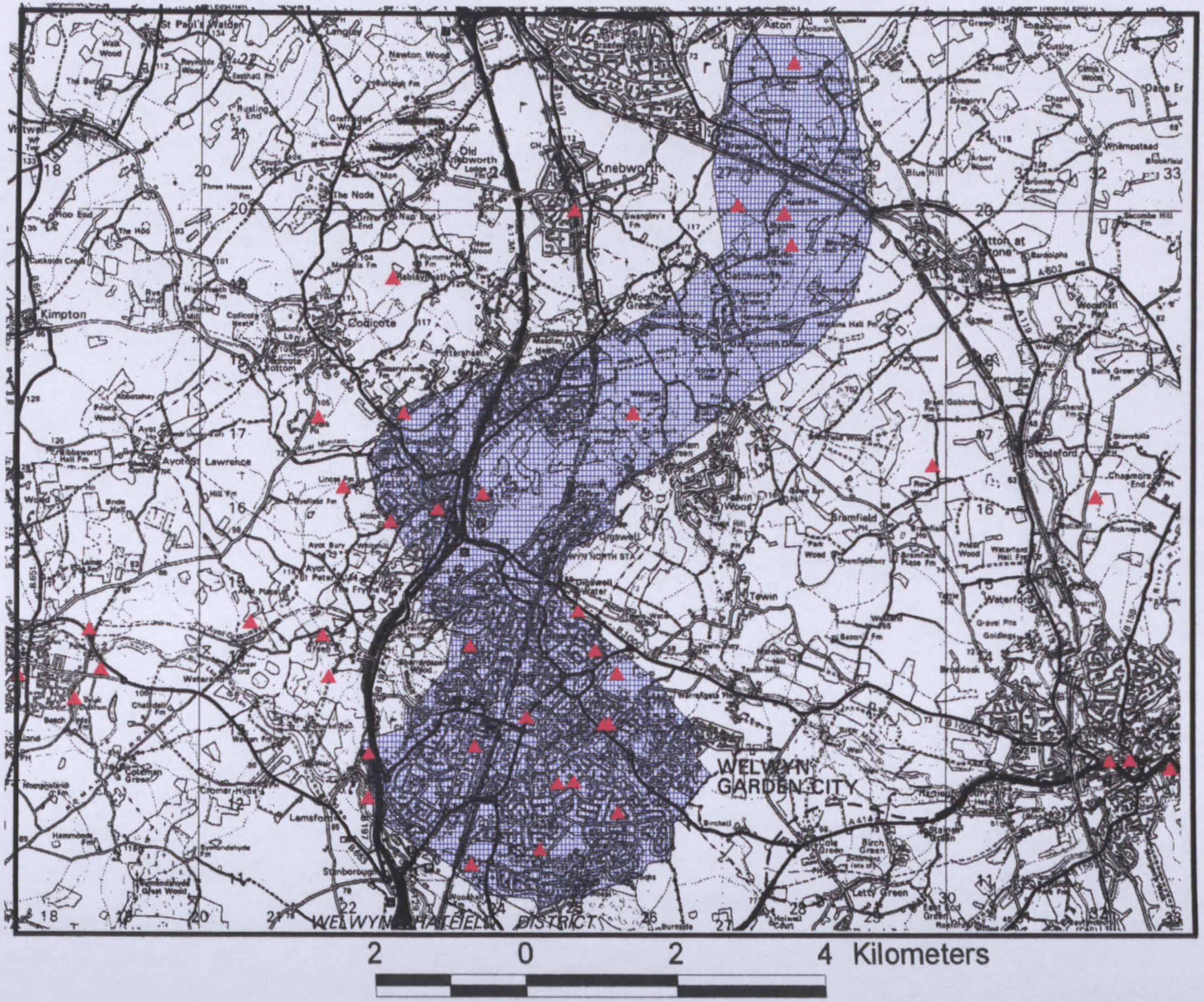


Figure 4.15

However, although Old Welwyn produced the first Late Iron Age finds, most of the subsequent fieldwork up to the 1970s has been concentrated at Welwyn Garden City a few miles to the south. The construction of a new settlement at Welwyn Garden City in the late 1920s and 1930s coincided with a heightened interest in the Late Iron Age and Roman periods in the local area, generated by the Wheelers' excavations at Verulamium and Wheathampstead (Wheeler and Wheeler 1936). The Welwyn Garden City Regional Survey Committee was set up by a group of local archaeologists in the early 1930s to observe the construction of the new town and collect material for a new local museum, and between 1928 and 1939 they discovered seven new Late Iron Age sites (Hughes 1939). A further three sites were discovered between 1945 and 1954 and in 1953 a small excavation was carried out at one them (Arnold 1954).

In the 1960s recording and excavation in Welwyn Garden City was undertaken by Tony Rook and the Lockleys Archaeological Society (now known as the Welwyn Archaeological Society) and up to 1968, when the scale of development had begun to tail off, a total of sixteen Late Iron Age sites had been identified in a total area of approximately 20 square kilometres (Rook 1968a:51-3). Between 1965 and 1968 Rook also investigated four of the sites to a greater or lesser extent (Rook 1968a, 1968b,1970a,1970b).

From the 1970s, the activities of the Welwyn Archaeological Society have concentrated in the area to the north of Welwyn Garden City and a further five Late Iron Age sites have been discovered in this area. Figure 4.15 shows the area within which it has been estimated from reported and published finds that two research groups have concentrated most of their fieldwork.

Assessment

A total of 27 Late Iron Age sites is known from the 34 square kilometres of the Welwyn Garden City area, representing a density of 0.79 sites per square kilometre. This is at the higher end of the estimated average of 0.4 to 1 per square kilometre

which might be expected for the Boulder Clay and Gravel environmental zones within which it is situated.

Baldock (Figure 4.16)

Background

The small town of Baldock lies at the north of the Study Area on the route of the Icknield Way. A Roman presence at the town has been known of since the mid eighteenth century (Page 1914:149), but it was not until the 1920s that the local museum curator, Percival Westell, discovered and excavated what turned out to be extensive Late Iron Age and Roman remains on Upper Walls Common (Westell 1925; Applebaum 1932). Since then a number of excavations have been undertaken in the town by the local museum and the Ministry of Works/DoE, mostly in response to development proposals. As a result of this work, the archaeological remains at Baldock are the most extensively investigated of the thirty or so historic small towns within the Study Area. However, the only fully published excavations, are those undertaken on Upper Walls Common between 1968 and 1972 (Stead and Rigby 1986). A detailed geophysical survey has also been undertaken by the Ancient Monuments Laboratory of all of the available areas of the historic core of the town.

Assessment

Figure 4.16 shows the estimated area of unsystematic survey at Baldock which has been approximately mapped from the distribution of excavation and survey projects. It is 1.9 square kilometres in area and contains a total of 13 Late Iron Age sites, representing an average density of 6.8 sites per square kilometre. This is over ten times the estimated average for the Chalk Upland environmental zone and is the highest density of sites within the Study Area.

Baldock: Area of Unsystematic Research

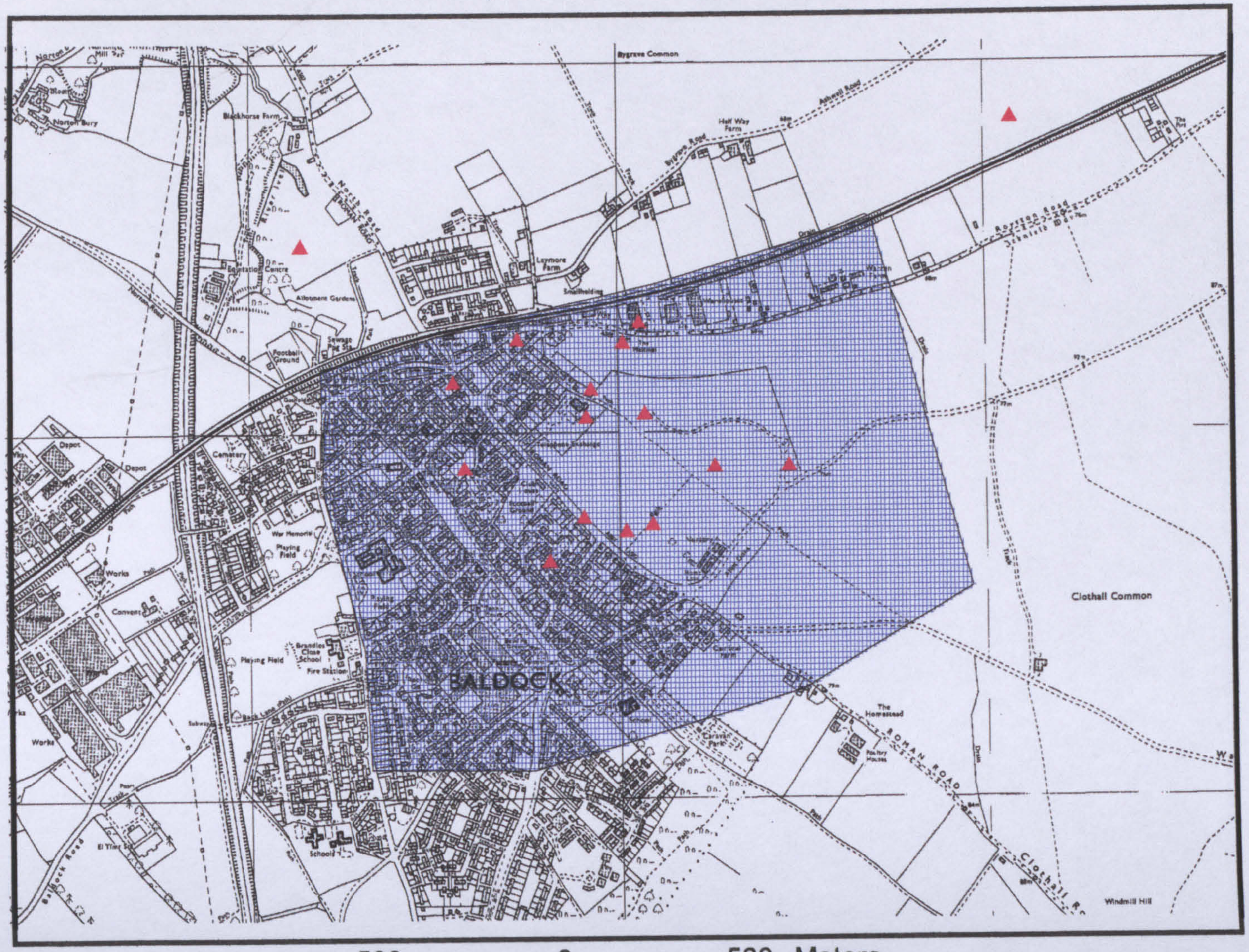


Figure 4.16

Braughing/Puckeridge (Figure 4.17)

Background

The Braughing/Puckeridge area of unsystematic survey is situated within the Boulder Clay environmental zone in East Hertfordshire. Roman remains have been known since the early 18th century, but it was not until the construction of a railway cutting and station to the south of Wickham Hill in the 1860s that Late Iron Age finds were identified (Page 1914:142-5; Cussens 1870:185-6). These comprised 32 bronze and silver coins of Tasciovanus and Cunobelin and a gold coin of Cunobelin (ibid.).

More finds were recovered following the enlargement of the station in 1895, although there is no specific reference to Late Iron Age coins (Page 1914:150-2). By the time of the publication of the V.C.H. by 1914, Braughing is identified by Page as a small Roman town and a "British village" (Page 1914:140) and it appears to have been the focus of antiquarian activity with at least one large collection of finds being deposited with the British Museum. There is also a contemporary later 19th century reference to large quantities of finds being uncovered every year on Wickham Hill after ploughing (Page 1914).

The first investigation within the area was a small poorly recorded excavation in 1936, carried by local farmer, Gerald Henderson, in Gatesbury Field on the opposite side of the river valley from Wickham Hill. This produced a large collection of Late Iron Age material including pottery and brooches (Partridge 1981:323-50). Subsequently, in 1949 a small exploratory excavation was carried out on the site of a Roman masonry building on Wickham Hill by a local schoolteacher, John Homes, using boys from the school. This revealed a substantial Roman building together with a road and underlying Late Iron Age remains which comprised post-holes and pits (Holmes 1953).

With Holmes' excavation having identified Braughing/Puckeridge as a major Late Iron Age and Roman settlement, a series of excavations were carried out in the 1970s, mainly in advance of development proposals, by the local archaeological

Braughing: Area of Unsystematic Research

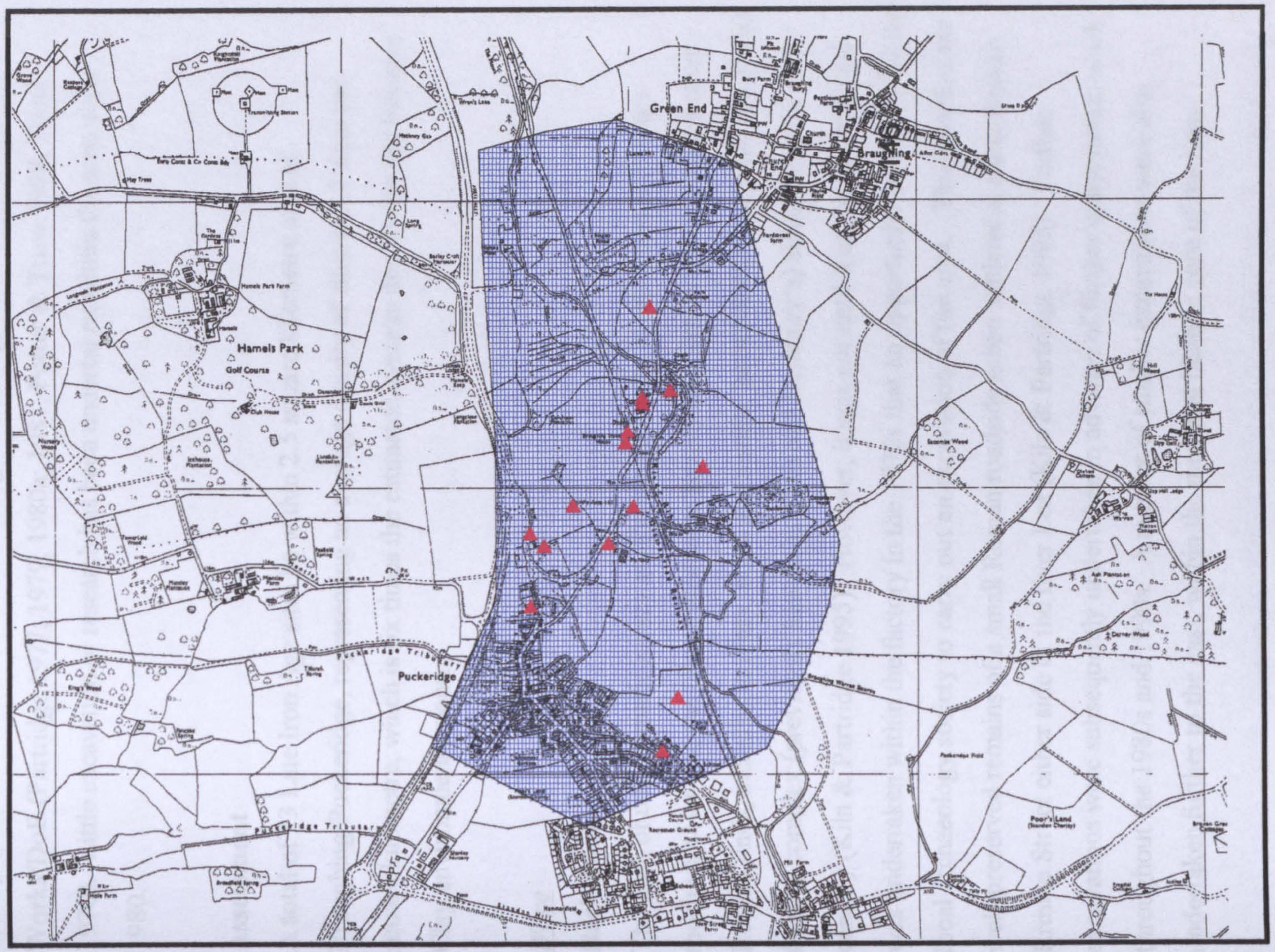


Figure 4.17

society (the East Hertfordshire Archaeological Society) and the Ministry of Works/DoE (Partridge 1977; 1979; 1980a; 1981; Potter & Trow 1988; Stead 1970). Little excavation or research has been undertaken within the area since 1980.

Assessment

A total of 13 Late Iron Age sites lie within 2.5 square kilometre area at Braughing/Puckeridge, representing an average density of sites is 5.2 sites per square kilometre, which is six times the estimated average density for the Boulder Clay environmental zone.

Ware

Background

The area of unsystematic survey at Ware includes the historic centre of Ware medieval town and the Glaxo/Wellcome factory complex to the west of the town. Roman finds, including pottery, coins and burials, have been known from the Glaxo factory complex (previously known as Allen and Hambury's) since the early 19th century (Kiln & Partridge 1995). However, it was not until a major construction was undertaken within the factory in the 1970s that an opportunity was taken by the local archaeology society to carry out an excavation of the area. This revealed the well-preserved remains of a small Roman roadside urban settlement along Roman Ermine Street either side of the river Lea (Kiln & Partridge 1995). Further excavations were subsequently undertaken in advance of further construction work throughout the 1980s and 1990s. A number of smaller excavations were also undertaken further to the east, within the medieval historic core of the town.

Assessment

A total of five Late Iron Age sites have been found within the one kilometre area, representing an average density of five per square kilometre. This is over four times the maximum postulated average for the Gravel zone.

Unsystematic Surveys: Conclusions

The five areas referred to above have been identified as the most significant areas of unsystematic research within the Study Area. The boundaries have all proved to be difficult to define and, are, to varying extents, subjective, although given the imprecise nature of the subject of unsystematic research this is perhaps not surprising.

80 Late Iron Age sites are known from the total of 58 square kilometres identified for the five areas: 35% of the total number of sites have been found in 2% of the Study Area. An initial conclusion would be that unsystematic research has, in itself, grossly distorted the geographical distribution of Late Iron Age sites. There are however reasons for supposing that other factors are likely to have served to mitigate this affect.

Four of the five areas contain the sites of Roman towns and were known as the sites of substantial Roman settlements from the later 19th century (much earlier in the case of St. Albans). They have been, as a consequence, the focus of antiquarian collection and research in the early part of this century. Of the four, only Braughing was identified as a Late Iron Age settlement on account of finds of a number of bronze, silver and gold coins.

The discovery of Late Iron Age sites within these areas was in four cases a by-product of the focus of activity on known Roman remains. It was only from the 1930s that research and collection appears to have been specifically directed at Late Iron Age remains in these areas with the work of the Wheelers at St. Albans, and on a much smaller and less scientific scale, with Henderson at Braughing/Puckeridge. Therefore, the concentration of research in areas of known Roman remains is likely to have biased the distribution of Late Iron Age settlements towards these settlements. It is, however, also likely that significant clusters of Late Iron Age sites were also present on the site of these Roman towns and may consequently have reduced the effect of the bias.

Statistical Analysis

Introduction

Four of the five areas of unsystematic research have produced densities of Late Iron Age sites which are higher than the estimated average site density for that area. The extent to which the concentration of sites is significant in terms of the estimated site density for each area is, therefore, important in terms of the interpretation of the site clusters and assessing the extent of bias caused by the unsystematic research.

The simple one-sample Chi-squared statistical test, as recommended by Shennan (1988:65-70), has been chosen as a suitable method to test the significance of the clusters. This method has been chosen because of its simplicity and the fact that it can be used to test locational models, such as the site density model refered to above, that are based on idealised settlement distributions. There are, however, several inherent difficulties in using statistical analysis and more specifically the Chi-squared test, on the data and hypothesis on which this study is based.

Firstly, the settlement distribution model is itself based on very imperfect data and as a consequence has a range of distributions rather than a single figure. Secondly, the Chi-squared test requires at least two independent categories to be tested against the idealised figure and the expected number of sites should also be five or greater for each category if only two categories are used. This means that at least two areas have to be tested together and in the case of one area (Ware) the number is three. It is, however, felt that the desirability of having a means of hypothesis testing, however imperfect, outweighs these disadvantages.

The Test

The aim of the one-sample chi-squared test is to compare a sample population against a specified theoretical population and to see how well they correspond or 'fit'. This is done by forming a *null hypothesis* which is in the case of this study is that: *an observed sample of sites and an expected number of sites form part of the same population*. The evidence is then tested against this 'hypothesis of no difference'. The test, therefore, looks at the differences between the two samples

and asks how probable it is that they formed part of the same population. In the case of the example used below it is asking; 'how probable is that the sample population is part of the ideal population' or; put simply, 'is the sample distribution (site numbers within a survey area) within the range that could be expected if the ideal distribution were true (the estimated number derived from the site density model)'.

The formula for the one-sample Chi-squared test is:

$$x^2 = \sum_{I=1}^{k} \frac{(O_i - E_i)^2}{E}$$

Where *k* represents the number of categories, O_i the observed number of cases for each category, E is the expected number of cases and x^2 the chi-squared symbol.

There are two levels of significance that are generally used for the chi-squared test: 0.01 and 0.05, with the former being the more conservative; i.e. the one for which the null hypothesis is only rejected if the probability of it being valid is one in a hundred or less.

Tested Examples

Because of the inherent problems with the data and the limitation of the test, a number of examples have been tested giving a range of levels of significance. The conservative test of significance (0.01) has also been used.

The Significance of all of the Areas of Unsystematic Research

This will test the significance of the observed site distributions within the five areas against the model site density for the environmental zones in which the areas are situated as well as the overall average density for the Study Area. The observed distributions will be tested against the mid point and highest point of the expected number of sites generated from the site density model.

1. Testing against the mid-point of the expected range given in the site density model gives the following sum:

$$\frac{(21\text{-}5.4)^2}{5.4} + \frac{(27\text{-}25.5)^2}{25.5} + \frac{(13\text{-}1.1)^2}{1.1} + \frac{(13\text{-}1.9)^2}{1.9} + \frac{(4\text{-}0.6)^2}{0.6}$$

St. Albans Welwyn G.C. Baldock Braughing Ware

$$= 45.06 + 0.08 + 128.73 + 64.84 + 6.936$$

$$= 245.67$$

The chi-squared value which must be compared with this figure is: 13.277. For the null hypothesis (that the observed distributions are not significant) to be true, the chi-squared value should be greater than the value on the right hand side of the equation formula.

The final value is: 245.67 > 13.277; therefore the null hypothesis is rejected and the sum of the site distributions would not be expected to occur within the idealised expected population of sites.

2. Testing the observed number of sites against the highest point of the expected range produces the following figures for the two halves of the equation: 148.9 > 13.277. Again the null hypothesis is rejected and the sum of the site distributions would not be expected to occur within the idealised expected population of sites.

3. Testing the observed number of sites against the high-point of the mean average expected range for the Study Area as a whole (0.81 sites per square kilometre) produced the following result: 177 > 13.277. This null hypothesis is therefore once more rejected. The fit is slightly worse (163.73 difference) than calculation 2 above (134.7 difference) which takes into account a weighting for the environmental zones (see section above) . This suggests that the weighting may provide a slightly closer approximation to the real average density of sites for the Study Area.

4. The site density figures for two of the areas (Welwyn Garden City and Ware) are much lower than the other three. Testing the significance of these two areas by themselves at the 0.010 level of significance using the same figures as for calculation 1 above, produces a figure of 7.006 which is less than the Chi squared value of 9.210. Therefore, the site densities of these two area are not significant.

Conclusions

The test confirms that the five areas of unsystematic research have together produced densities of sites which are significantly higher than the estimated average densities of sites. However, two of the five areas (Welwyn Garden City and Ware) have not produced significantly high densities of sites.

Biases Caused by Development

Urban Development (Figure 4.18)

Up until the end of the nineteenth century, the extent of urban development within the Study Area was under one percent of the total area. This was due largely to the dominating economic affect of London, which effectively suppressed the growth of towns within its extensive hinterland. A number of new urban areas have, however, been created within the Study Area in the twentieth century and the proportion of urban development now stands at over 10%. The relative growth in the proportion of urban and other built developments during the first 60 years of the century has been one of the highest of any area in the country. The following section provides an assessment of the potential distorting affects which the larger urban developments may have had on the distribution of Late Iron Age sites.

Major Urban Areas

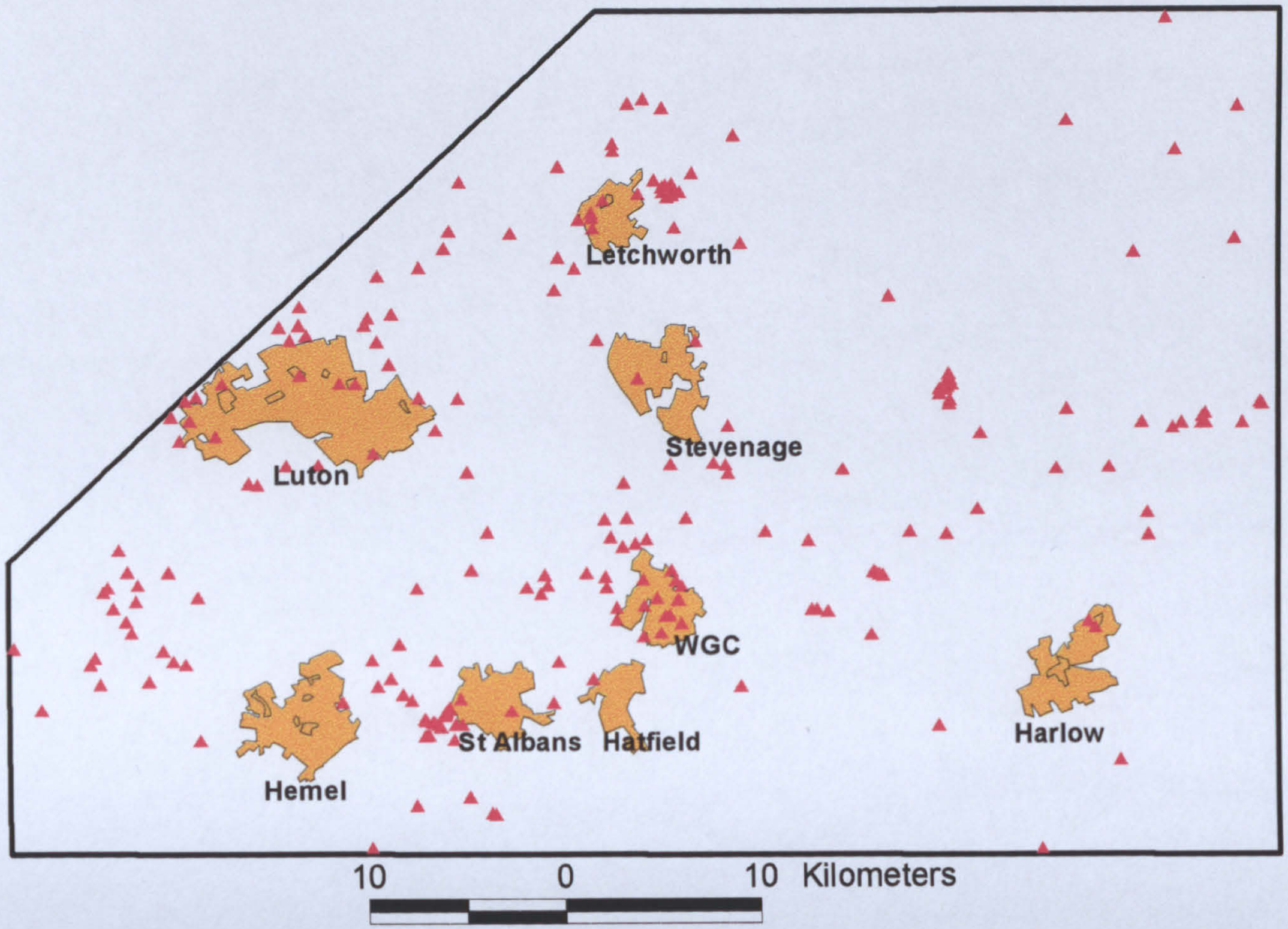


Figure 4.18

The Garden Cities

Hertfordshire is the birthplace of the Garden City Movement: two of the large twentieth century urban developments, Letchworth and Welwyn Garden City, were created on farmland between 1902 and 1940.

Letchworth Garden City

The 8.3 square kilometre area of Letchworth town was constructed in the first half of the twentieth century and was the first of the Garden Cities. The four Late Iron Age sites known from the town were discovered after 1930, by which time, most of it has already been built without archaeological recording of the development. The estimated average density of Late Iron Age sites of 0.3-0.9 per square kilometre for the zone would therefore indicate that the large area (over 5 square kilometres) included in the initial development of the town is likely to have included between one and four Late Iron Age sites.

Welwyn Garden City

Most of the 11.9 square kilometre area of the town was developed between the 1920s and the 1980s. Its construction was observed by local archaeologists (see above: unsystematic research) and partly as a consequence of this, a total of sixteen Late Iron Age sites were discovered within the urban area. This is within the estimated range of 0.5-1.0 sites per square kilometre provided by the site density model.

The New Towns

Between 1946 to 1980 new towns were built on farmland at Stevenage, Hemel Hempstead, Harlow and Hatfield to cater for overspill population from London.

Stevenage

The urban area of Stevenage is approximately 16.5 square kilometres. No Late Iron Age sites were known from the town area before it was built, although there are several Roman sites including a Roman barrow cemetery. There was minimal archaeological monitoring of the construction of the town and, probably, as a

consequence of this only one Late Iron Age site was identified from casual finds of pottery (gazetteer No. 47). Further development of the town since 1980, of approximately 0.5 square kilometres has been subject to archaeological monitoring and recording: a Late Iron Age site has been revealed from this (No. 154). The estimated site density for the town area is 0.5-1.0 sites per square kilometre, indicating that between 8 and 16 sites might reasonably be expected to be present within the urban area.

Hemel Hempstead

The urban area is approximately 19.6 square kilometres. As with Stevenage, there was not any archaeological monitoring of the construction of the town and no Late Iron Age sites are known from the urban area. The estimated site density for the urban area is 0.2-0.7 sites per square kilometre which means that between 4 and 13 sites might reasonably be expected to be present within the urban area.

Hatfield

The area of the town is approximately 7.5 square kilometres. There was some archaeological monitoring of the construction of the town, and one Late Iron Age site is known from the construction of Hatfield Aerodrome (gazetteer No. 66). The estimated site density for the urban area is 0.4-0.8 sites per square kilometre, which suggests that between 3 and 6 sites may have been present in the urban area.

Harlow

The urban area of Harlow is approximately 15 square kilometres. The site of the Roman temple next to the river Stort at Harlow has been known since the 1920s (Wheeler 1928) and subsequent excavation has confirmed its Iron Age origins (France and Gobel 1985). Late Iron Age remains are also known from the Holbrooks site (gazetteer No. 14). There appears to have been some minimal archaeological monitoring during the construction of the new town during the 1950s and 1960s (Medlycott 1996) although the estimated site density for the area of 0.5-1.0 per square kilometre would indicate 7-15 sites within the urban area.

Other Urban Development

As with most areas of England, there has been substantial piecemeal and unplanned urban development. Most of this was generally small and is generally unquantifiable. The exceptions are the urban areas of Luton/ Dunstable and St. Albans.

Luton

The built-up area of Luton and Dustanble is 45 square kilometres, most of which was developed during the later nineteenth and twentieth century without any archaeological monitoring. Five Late Iron Age sites are known from within the urban area. The estimate of site density for the area is 0.3-0.9 per square kilometre which would indicate that between 13 and 40 sites might be expected to be present.

St. Albans

The urban area of St. Albans is 12.5 square kilometres, of which approximately 10 square kilometres has been developed in the 20th century most with minimal archaeological monitoring. One Late Iron Age site is known from the area. Based on the estimated site density of 0.2-0.7 per square kilometres, between 2 and 7 sites might be expected to lie within the urban area. The presence of the dense cluster of Late Iron Age sites to the west of the town may, however, affect the expected number of sites.

Statistical Test

The one-sample Chi-squared test has been used to test the significance of the major urban areas on the distribution of Late Iron Age sites. In particular, whether the urban areas are statistically significant falsely negative areas. Two tests are used:

1. The number of Late Iron Age sites is compared with the idealised average number of sites calculated from the low-point of the estimated site density for the environmental zones in which the towns lie. The aim is to determine if the areas of urban development are significantly below the expected average settlement density for these areas.

Calculating the known and expected number of sites for each of the areas and entering the figures on the chi-squared formula, gives the following sum:

$$\frac{(4-2.5)^2}{2.5} + \frac{(16-6)^2}{6} + \frac{(1-8.5)^2}{8.5} + \frac{(0-4)^2}{4} + \frac{(1-3)^2}{3} + \frac{(4-13)^2}{13}$$

Letchworth **W.G.C.** **Stevenage** **H. Hempstead** **Hatfield** **Luton**

$$= 0.9 + 16.6 + 6.6 + 4 + 1.3 + 6.2$$

$$\frac{(2-7)^2}{7} + \frac{(1-2)^2}{2} +$$

Harlow **St. Albans** $= 39.6$

3.5 0.5

The chi-squared value at the 0.01 significance level which must be compared with this figure is: 20.09. For the null hypothesis (that the observed site distributions are not significant) to be true, the chi-squared value should be greater than the value on the right hand side of the equation formula.

The final value is: $39.6 > 20.09$; therefore the null hypothesis is rejected and the sum of the site distributions would not be expected to occur within the idealised expected population of sites. However, the number of sites at Welwyn Garden City is significantly *higher* than the lowest estimated figure and therefore distorts the figure. If Welwyn Garden City is removed from the calculation, the equation is $33 > 18.47$, which is still significant.

2. The significance is compared with the mean average known Late Iron Age site density for the Study Area as a whole. The aim of the test is therefore to determine if the urban areas have significantly distorted the site distribution pattern for the Study Area.

Calculating the known and expected number of sites for each of the areas, excluding Welwyn Garden City, gives the following sum:

$$12.1 + 0.22 + 2 + 0.12 + 0.055 + 0.16 + 0 = 14.655$$

The final value in this test is: $14.655 > 18.47$. Therefore, the null hypothesis is not rejected and the sum of the site distributions of the urban areas is not significantly less than the average for the Study Area.

Conclusions

Twentieth century urban development has covered a significant proportion of the Study Area. The eight largest towns between them have an area of 134 square kilometres which is 5% of the total area. Analysis of the estimated number of Late Iron Age sites which might be expected within the urban area of these towns has shown that seven of the eight have significantly less sites than might have been expected if archaeological monitoring of the urban development had occurred. This has probably distorted the local distribution of Late Iron Age sites in the vicinity of these towns. This conclusion is supported by the fact that the density of sites within the only town (Welwyn Garden City) in which archaeological monitoring occurred during the construction of the town is within the calculated estimated range.

However, the analysis of the overall distribution of known sites within the Study Area has shown that the seven urban area have not significantly distorted the distribution of sites.

Woodland

Woodland could have a potentially distorting affect on the distribution of Late Iron Age sites as it covers approximately 7% of the Study Area and most of the woods have not been surveyed archaeologically. In addition, where archaeological remains are known to exist within woodland they are rarely datable to a particular period. However, in those instances where detailed archaeological survey has taken place, datable Late Iron Age remains have often been discovered. The two

most important examples of this are Prae Wood, St. Albans (Wheeler and Wheeler 1936), the Ashridge Survey (Morris and Wainwright 1995) which are two of the largest woodlands in the Study Area. It can therefore be assumed that the woodlands of the Study Area have potential for the presence of many as yet unknown Late Iron Age remains.

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The woodland cover of the Study Area is, however, distributed reasonably evenly and the majority occurs as discrete parcels of less than 100 hectares. Therefore, whilst the presence of woodland could have a distorting affect on the local distribution of Late Iron Age sites, its overall affect on the distribution of sites within the Study Area is probably not significant.

Settlement Distribution Biases within the Study Area: Conclusions

(Figure 4.19)

Figure 4.19 shows the identified areas of archaeological research, the larger urban areas and the distribution of known Late Iron Age sites.

Garden Cities, New Towns and Other Development

The construction of towns and other settlements, together with infrastructure in the form of roads and industrial estates has probably been one of the most important determinants of the current known pattern of Late Iron Age sites. The areas of the seven largest settlements shown in Figure 4.18 reveal that their construction (without adequate archaeological record) has probably distorted the local distribution of Late Iron Age sites, thus supporting the above statistical analysis.

Since the 1950s, most large-scale development within the study area has been subject to some degree of archaeological recording. The concentration of most of this development outside of the 'Green Belt' designated areas, which make up over half of the study area, has resulted in a clear bias in favour of these parts of the Study Area.

Areas of Systematic and Un-Systematic Archaeological Research

Systematic Surveys

Figure 4.19 shows that areas of systematic archaeological research have mostly taken place in parts of the Study Area which have a higher than average density of known sites. The research does not, therefore, appear to have distorted the localised distribution of sites to a great extent. In addition, even though much of the data produced from the surveys is not of high quality in terms of evidence of date and context, the systematic nature of the surveys has enabled a rough estimation of site density to be calculated for the Study Area.

Unsystematic Surveys

The areas of unsystematic archaeological research have all taken place in areas of known Roman remains apart from the Welwyn Garden City area. The concentration of archaeological research in these areas has resulted in a considerable distortion of the known distribution of Late Iron Age sites, with the 58 square kilometres covered by the surveys (2% of the total area) containing 80 sites (35% of the total number).

The Significance of the Site Clusters

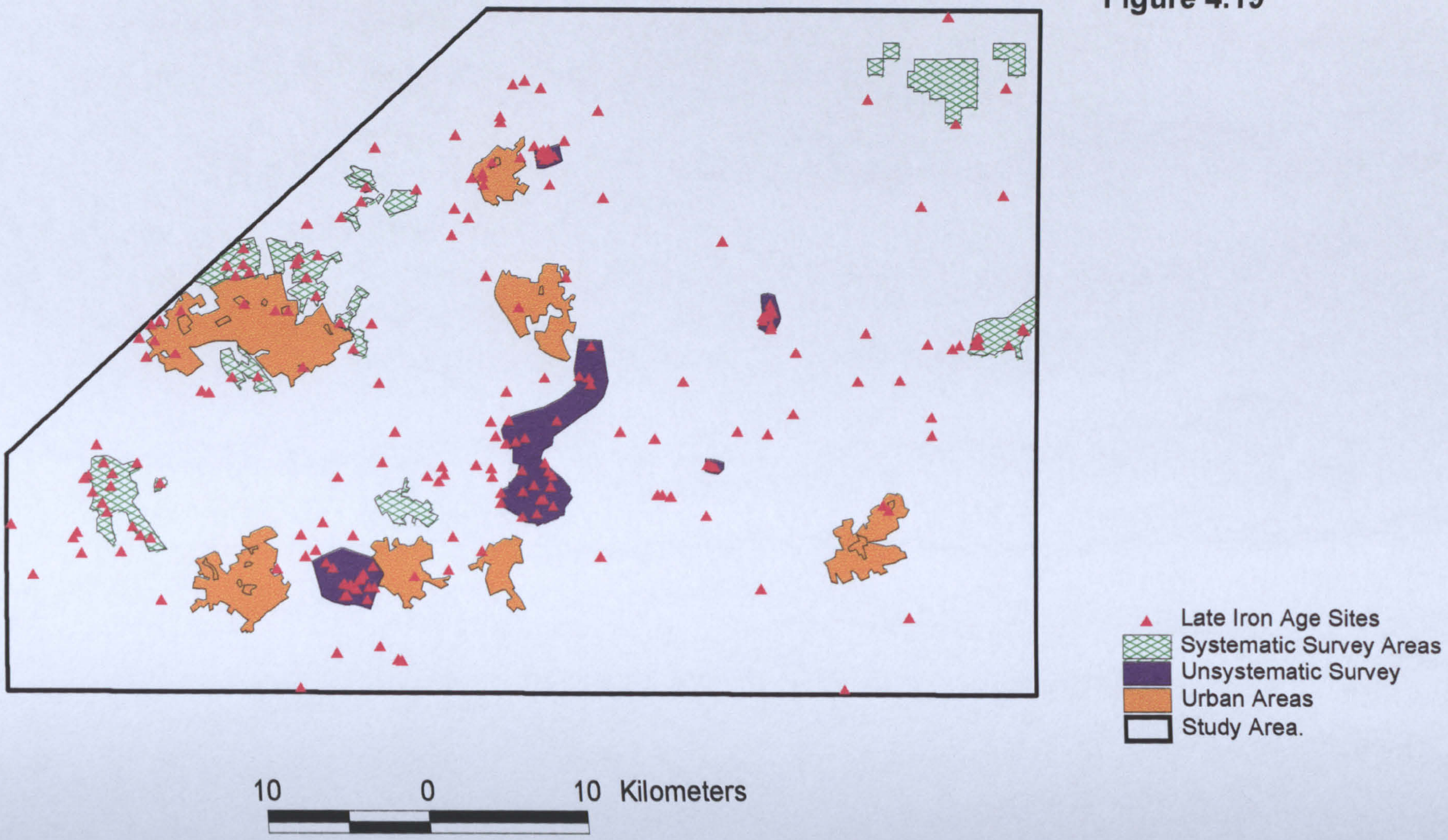
Three clusters of Late Iron Age sites (Baldock, Braughing and St. Albans) produced from unsystematic archaeological research have been identified as statistically significant in terms of the site density model.

Conclusions

Development and local archeological research (both systematic and unsystematic) have been the determining factors in the location of over 90% of the known Late Iron Age sites in the Study Area. In particular, 50% of the sites have been found within the 5% of the Study Area covered by the major areas of localised

Geographical Biases

Figure 4.19



archaeological research. The geographical distribution of sites is therefore unlikely to be representative of the true Late Iron Age pattern of sites.

Table 4.2 provides a simple break-down of Late Iron Age sites for each of the environmental zones. The columns show (from left to right); the number of known sites within each zone; the average site density; the estimated density of sites and the range of sites numbers.

Table 4.2, Late Iron Age sites within environmental zones

Environmental Zones	Number of sites	Density per square km	Estimated density range per square km	Range of site numbers
Boulder Clay	68	0.071	0.5-1.0	450-900
Calcareous Upland	64	0.119	0.3-0.9	100-302
Clay-with-Flints	51	0.108	0.2-0.7	100-350
Gault Clay	9	0.067	0.25-0.75	32-65
Gravel	31	0.156	0.4-0.8	79-159
London Clay	2	0.015	0.2-0.4	45-92

By far the largest difference between the observed and expected number of sites is for the Boulder Clay zone, which has the second lowest observed site density, but has the highest expected density and absolute number of sites. However, the surveys at northwest Essex (Willaimson 1984) and Stanstead (Brooks and Bedwin 1989), and recent excavation at Thorley (McDonald 1996) have demonstrated that later prehistoric settlement is likely to be present over much of the zone. It can therefore be concluded that the most significant distortion in the observed geographical distribution of Later Iron Age sites has been caused by the absence of archaeological research or development in the Boulder Clay environmental zone. This fact imposes limits upon the usefulness of spatial analysis of site distribution across the Study Area.

4.3 Chapter 4: Conclusions

The assessment of the site evaluation criteria has revealed that, whilst a large number of sites have been investigated, the available evidence is of limited value for addressing the key questions of the thesis regarding the reasons for the high density

of sites in the Study Area and to attempt to gain further understanding of social and economic processes. Questions which relate to the Study Area as a whole are, therefore, restricted by the evidence to the assessment of broad patterns of chronology; extrapolating general patterns from a small proportion of the sites with good evidence for function and context; and spatial and temporal comparisons with other data sets.

The assessment of the factors which have affected the geographical distribution of Late Iron Age sites has revealed that the pattern of archaeological fieldwork has resulted in a significant bias against the extensive areas of clay soils which make up over 80% of the Study Area and in favour of the areas of major Roman settlements located within river valleys.

CHAPTER 5: SITE LOCATION AND DATING

5.1 Introduction

In this chapter, the geographical distribution of the known Late Iron Age sites within the Study Area will be assessed in relation to some factors which may have influenced their location. The aim will be to consider the extent to which the factors have influenced the number and distribution of sites. Chronological patterns in site location and dating will also be considered including some aspects of the relationship between Late Iron Age and Early Roman settlement.

5.1.1 Methodology

The decision to locate settlement at a given point will have been influenced potentially by one or more of a range of factors. However, for the following reasons it has only been possible in this assessment to consider the four factors, which are listed in Table 5.1:

Table 5.1, factors which will be assessed

1.	Physical landscape
2.	Distance from running water
3.	Major communication and exchange routes
4.	Later Bronze Age and earlier Iron Age settlement

1. The Availability and Usefulness of the Relevant Digital Data Sets.

The analysis has been undertaken on a Geographical Information System program (ArcView 3.0) using digital data. This method has been chosen because of the high speed of calculation which is possible by using the programme. Multiple calculations and comparisons can therefore be rapidly undertaken. However, the ability of the program to produce archaeologically meaningful answers is dependent, to a large extent, upon the availability of digital data, its precision and its accuracy.

Geographical Data Precision

Data precision is the given margin or error of a mapped location. The standard which has been used is 100 metres, which means that the geographical location of a given point or line can be up to 100 metres from the mapped location, and where two data sets are compared, the distance between two points or lines could be up to 200 metres from that given. 100 metres is the minimum degree of precision and for some data sets, (e.g. the site gazetteer), a precision of 10 metres is common. However, this is not universal and the 100 metres 'lowest common denominator' of data precision has therefore been adopted. The data set which have been used are those for which at least a 100 metres precision level can be achieved.

Data Accuracy

The accuracy of the data (the extent to which the data has been mapped in the correct location) has been assumed for the purposes of the assessment to be 100%, although it is acknowledged that minor errors will be present. As with geographical precision, the data sets which have been used are those in which the accuracy can be verified.

Digital Data Used

In addition to the site data, the digital data sets listed in Table 5.2 have been used as the basis of the four factors:

Table 5.2, sources of digital data

1.	Ordnance Survey contours at 10 metre intervals
2.	Ordnance Survey 1:50000 and 1:10000 base maps
3.	Rivers, mapped from the Ordnance Survey 1:50000 base maps
4.	Roman roads and communication routes mapped from 1:50000 base maps
5.	Environmental Zones, interpreted from digitally mapped 1:50000 Soil Survey data

2. The Extent to which Comparisons can be made between the Digital Data Sets

The digital data sets have been selected because they are readily available, or have been easily created from base map data. The following is a brief explanation of the types of digital data which have been used and the potential of each for spatial analysis.

The Characteristics and Potential of Spatial Digital Data in the ArcView Programme

Spatial data on the ArcView program can be represented in three ways:

1. Points
2. Lines
3. Two-dimensional shapes or 'polygons'

Each of the types of data has characteristics in terms of the way in which it can be used for spatial analysis.

Points are single geographical positions. They are usually grouped into 'themes' on the basis of shared characteristics, e.g. the Late Iron Age sites of the gazetteer. Point data can be analysied spatially with other data sets, although comparison with line and polygon data is much more straightforward than comparison with other themes of point data. The earlier Iron Age sites are also represented by points.

Four of the data sets (rivers, roads, contours and communication routes) are represented by lines. These can be readily analysed against point data. For example, the number of site points within a given distance from a line (road, contour or river) can be calculated.

The environmental zones are represented by polygons. These have the most potential in terms of spatial analysis with the ArcView program. For instance, the number of sites within, or within a given distance, of each of the zones can be calculated.

The ArcView programme also has the potential to ask multiple spatial questions. For example, the number of sites within a given distance of a height contour, a given distance from a river, within a particular environmental zone, and a given distance from a communications route can be calculated The facility is only limited by the number of digital data sets available and reliability of the data.

3. The Limitation of the Questions which can be asked of the Evidence

The analysis in Chapter 4 above has concluded that the geographical distortions caused by archaeological fieldwork impose considerable limitations upon the questions that can realistically be asked of the Late Iron Age evidence. For example, the absence of fieldwork in the extensive boulder clay areas means that the analysis of soils in relation to site location is unlikely to result in archaeologically significant conclusions. The assessment has, therefore, been restricted to factors for which it is considered that distortions in the evidence are likely to be the least pronounced.

The poor quality of much of the evidence also imposes limitations upon the type of analysis which can be carried out. For most sites accurate dating is problematic and there is insufficient evidence to characterise form and function. Therefore, comparison by means of spatial analysis of the above digital data sets (e.g. roads, rivers, communications routes) with the distribution of certain types of site data, such as evidence of industrial processing or specific types of agricultural activity is not possible. The only types of data recorded for the sites which can realistically be analysed spatially for the whole of the Study Area are, therefore, the geographical location of the site and the approximate date-range of occupation.

5.2 The Significance of Physical Landscape

The aim of this section is to determine if any patterns are discernible in the location of Late Iron Age sites with respect to physical landscape and to assess their significance. To this end, a simple five-fold system of physical landscape classification has been devised for the Study Area. This has been produced from a combination of Ordnance Survey digital contour data at 10 metre intervals, soils and digital data for the 12 largest rivers. The types of landscape and their definitions are show in Table 5.3. Figure 5.1 also shows the distribution of the five types of landscape within the Study Area.

Landscape Types

Figure 5.1

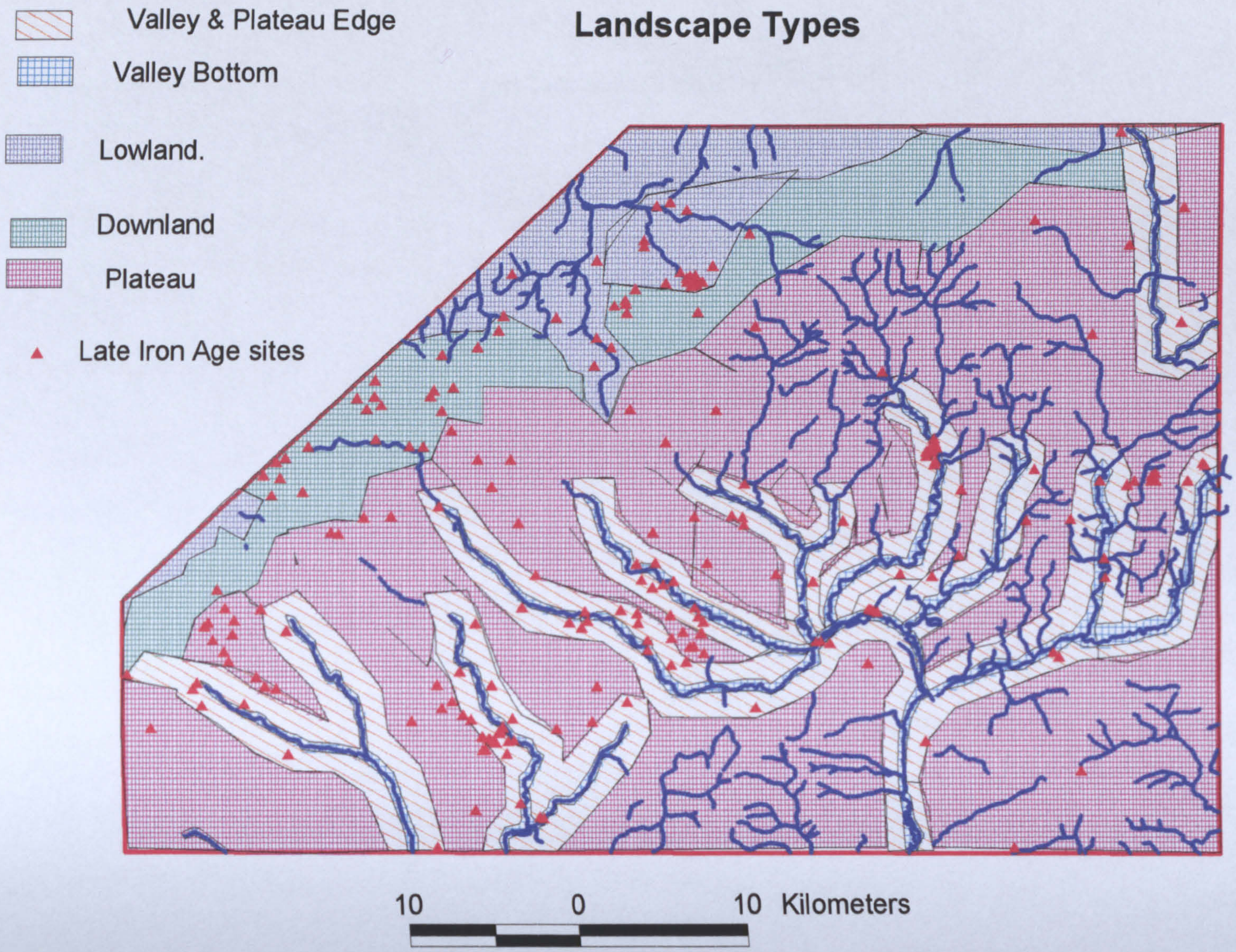


Table 5.3, landscape types

Type	Definition
Plateau	glacial clay areas that are further than 500 metres from the edge of a major river valley or lowland area.
Downland	upland chalk scarp of the Chiltern Hills
Valley and Plateau Edge	the area between the flood plain of the major river valleys and a distance 500 metres from the edge of the valley
Valley Bottom	river flood plains or any level area within 200 metres of a major river.
Lowland	low-lying areas which are not within river valleys

5.2.1 Analysis

Table 5.4 provides a breakdown of the percentages of the sites for each of the five landscape types.

Table 5.4, proportions of sites and areas

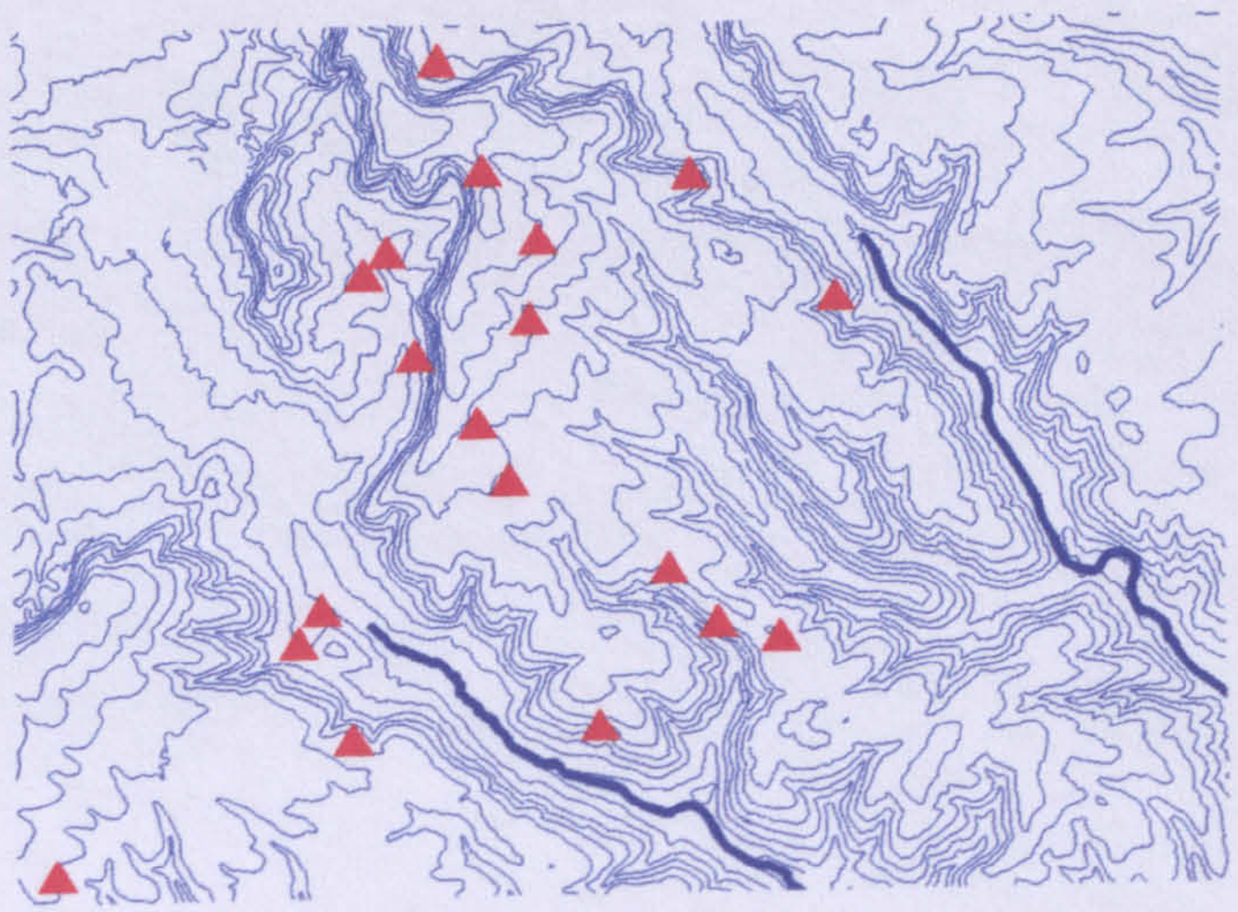
Topographical Type	Percentage of Sites	Percentage of Area	Average Density
Valley and Plateau Edge	34	20	0.15
Valley Bottom	13	5	0.24
Plateau Areas	27	56	0.05
Lowland	12	9	0.13
Downland	13	11	0.12

Valley and Plateau Edge

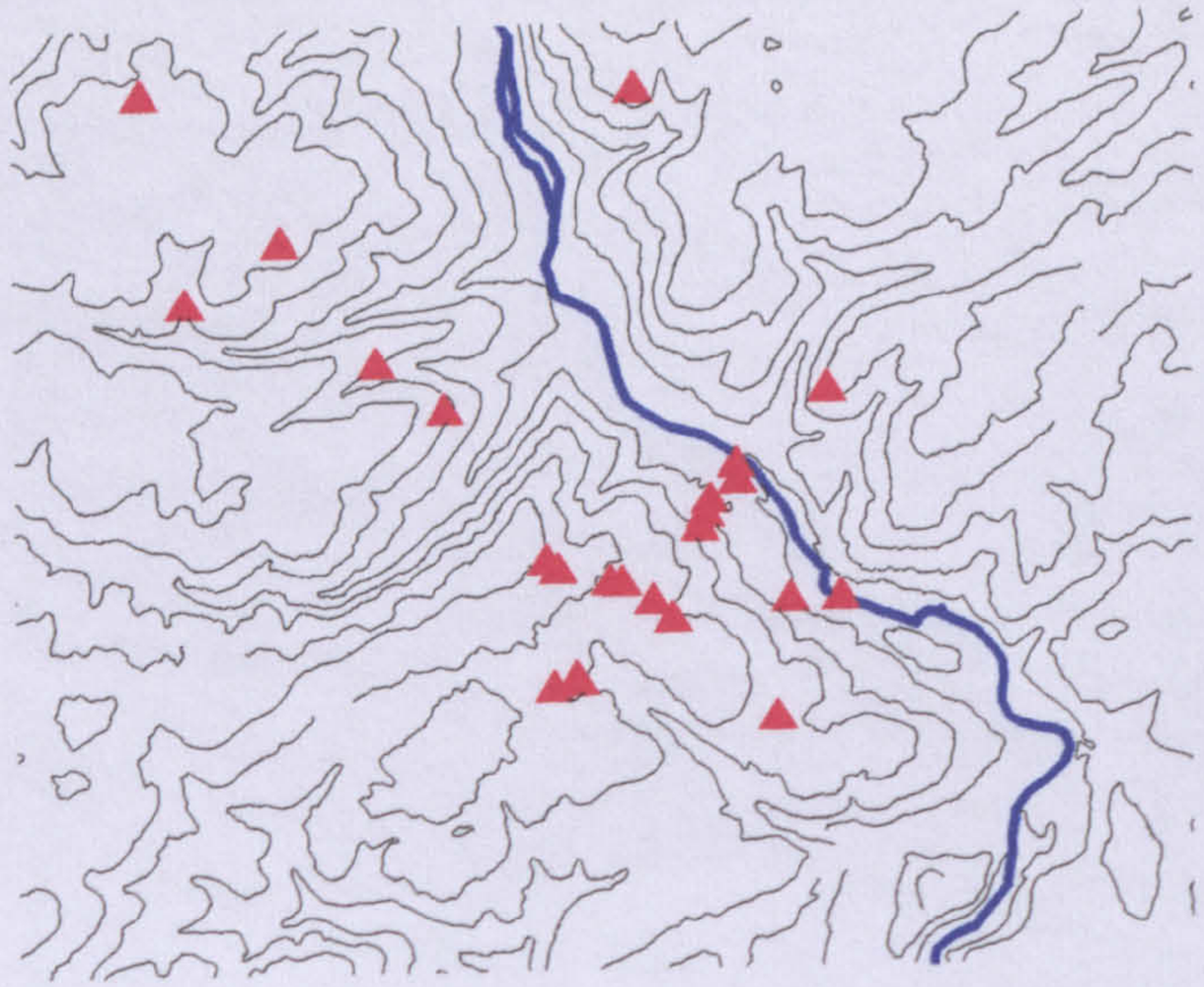
Comparison of the proportions of sites and areas in Table 5.4 reveals that the River Valley and Plateau Edge landscape type is the most common in terms of site numbers and has the second highest site density. There has been some bias in favour of this type from archaeological fieldwork, much of which as been concentrated within river valleys particularly at St. Albans, Ashridge and Braughing. However, Figure 5.1 shows that distribution of sites within this landscape type is generally widespread throughout the Study Area. The preference for valley and plateau-edge locations is also evident within all of the areas of systematic and unsystematic archaeological fieldwork within the Study Area. Figure 5.2 shows the location of sites and contours in four areas which have been subject to archaeological fieldwork. Within each of the areas, the preference for site location within valleys or at the interface between the valley side and level plateau is apparent. The reasons for this preference is understandable economically as

Local Landscape: Examples

Figure 5.2



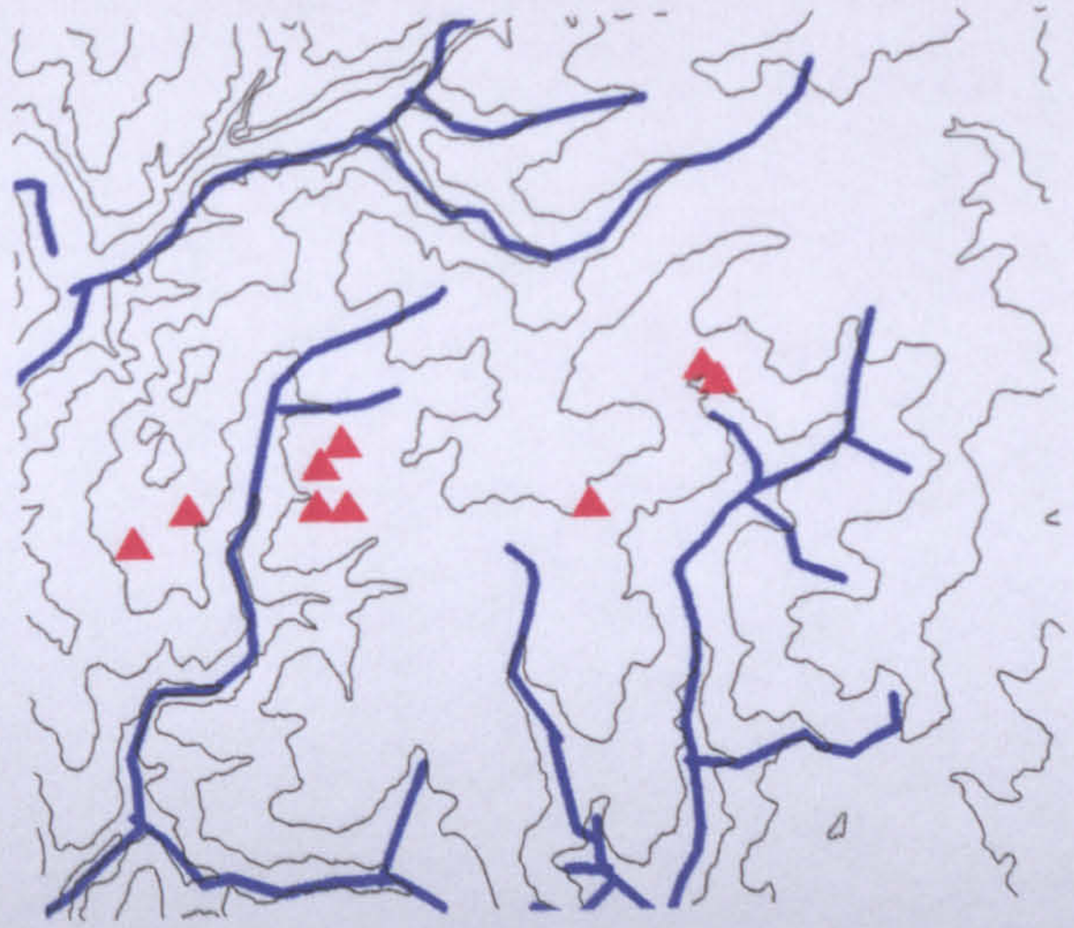
Ashridge



St. Albans

Welwyn Garden City

LIA sites ▲



Stansted

such locations would have provided access to a variety of agricultural zones, including the light well drained soils of the valley sides for arable cultivation, and the plateau areas for stock rearing (see Chapter 3). There are, however, other factors, particularly their enhanced visibility, which are also likely to have influenced site location at the edges of valleys.

Valley Bottom

The highest proportion of sites in relation to land area occur in the bottoms of river valleys. As is the case with the plateau-edge located sites, the advantages of the river valleys in terms of their high agricultural potential would have made them favourable locations for sites. The ready availability of water for livestock as a means of transport and communications, would also have added to the advantages of settlement within valleys. There has, however, also been a significant bias in favour of the discovery of sites in these locations due to the historic concentration of archaeological research on the substantial Roman settlements located in river valleys and the related development for gravel extraction and housing for modern settlements.

Plateau Areas

The lowest proportion of sites occur in plateau locations. This is almost certainly in part due to a negative bias from the lack of archaeological fieldwork in comparison with the other topographical types. However, the few areas of systematic survey which have included clay plateau areas (Stansted on the boulder clay and Hudspith (1997) on the clay-with-flints) has revealed only two sites on a plateau location from the total of 16 square kilometres surveyed (Brooks and Bedwin 1989; Hudspith 1997). This suggests that the level plateau areas were relatively less favoured than the valley and plateau edge locations.

Lowland

All of the sites within this landscape type are located on the lighter chalk and gravel soils with none known from the heavier Gault Clay soils which were probably less favoured for agriculture. The proportion of sites within this type is also biased by the inclusion of the 14 sites within the area of unsystematic research at Baldock.

Downland

The density of sites for this landscape type falls in the middle of the range of the five types and is similar to that of lowland. However, the downland landscape has been less subject to geographical distortions from archaeological fieldwork than the other four types (see Figure 4.19). The density of known sites within this landscape type is therefore more likely be an accurate representation of the real figure.

5.2.2 Conclusions

Even if the various geographical distorting factors are taken into account, the Valley/ Plateau Edge and Valley Bottom landscape types appear to be the most favoured locations for Late Iron Age sites. 47% of the total number of sites are present within these landscape types which together cover 25% of the Study Area. This is almost twice as high as the Lowland and Downland types and suggests that these areas were preferred for site location. Most of the sites occur in clusters which are also areas of relatively concentrated archaeological research, but the preference for these landscapes is also apparent generally across the Study Area. Sites densities within the Lowland and Downland types are similar and both are significantly lower than Valley/Plateau Edge and Valley bottom types although the lowland figure is distorted by the inclusion of Baldock. At the bottom end of the scale, the Plateau type appears to be the least favoured location. The average figure is biased by the lack of archaeological fieldwork in these areas, and the assessment of agricultural potential in Chapter 3 and the site density model in Chapter 4 suggests that the real density of sites on the clay plateau area (which comprises almost all of the Plateau landscape type) is likely to have been substantially higher than the 0.05 per square kilometre average. However, it can be concluded that the relative natural advantages of Valley/Plateau-Edge over the Plateau type are likely to have resulted in real higher site densities in the former areas.

5.3 The Significance of Distance from Water

Access to clean water from rivers in the Late Iron Age would have been necessary for domestic consumption, many industrial processes and the management of livestock,

especially the rearing of cattle. Rivers are also likely to have provided an important means of communication and some may have served as social boundaries. Rivers are, therefore, likely to have been a significant influence on the location of Late Iron Age sites.

The aim of this enquiry is to assess the relationship between Late Iron Age sites and rivers, by examining the distance between sites and the nearest source of running water represented on the current Ordnance Survey 1:50000 map. The proportion of the total number of sites located between 100 metres and 3000 metres of a river will be calculated at intervals of 100 metres with a view to assessing locational preferences.

5.3.1 Comparable Case Studies

Two related studies in East Anglia, which is the driest part of Britain, have shown that in areas of low rainfall access to water is likely to have been an important factor influencing the location of prehistoric settlement. Legge has demonstrated a relationship between the distance of the Bronze Age settlement at Grime's Graves, Norfolk from water sources and the maximum distance that the Ministry of Agriculture recommend that should be travelled by lactating cows (Legge 1981:96). The principal of this relationship has also been developed by Martin in a study of the location of Iron Age settlement in the county of Suffolk (Martin 1988:68). Martin has mapped those parts of Suffolk which are more than two kilometres from a source of running water, on the basis that these 'dry' areas would have been unsuitable for the rearing of cattle. By overlaying the distribution of known Iron Age sites he has revealed a relationship between the two, with the Iron Age sites largely confined to the areas with reasonable access to water (Martin 1988:68, fig. 59). Therefore, It is probable that the areas more than two kilometres from running water would have been unsuitable for cattle rearing and been a constraint upon Iron Age settlement.

The relationship observed between settlement and water in East Anglia may be applicable to the Study Area, which is also an area of relatively low rainfall, although not as low as East Anglia. However, comparisons between Suffolk and the Study Area

reveal important differences which need to be taken into account when making a strict application of this principle.

Firstly, most of the 'dry' areas in Suffolk are situated on the sandy soils of the Breckland and coastal Sandlings. These are significantly dryer than any of the soils within the Study Area and they possess virtually no potential for water sources from standing water such as ponds. The parts of the Study Area which are more then two kilometres from running water are, in contrast, all within area of heavy clay soils, which have a much higher potential for sources of standing water from ponds. In this respect, Martin may also underestimate the potential of clay areas of Suffolk to provide water for cattle from ponds.

Secondly, most of the extensive clay plateau areas of the Study Area are dissected by numerous rivers and streams, with the result that over 90% of the Study Area is within two kilometres of a sources of running water. This compares with approximately 65% of the county of Suffolk.

5.3.2 The Relationship of Iron Age Sites to Rivers

The limitations of the data

The data on rivers has been digitised from the Ordnance Survey 1:50000 mapbase. This is almost certainly less extensive than the river network that existed in the Late Iron Age, especially with regard to smaller rivers and streams, which are either too small to represent on the map or which have disappeared since the Late Iron Age. The calculations made below are therefore likely to under-represent the spatial relationship between sites and rivers. In addition, several other factors regarding the accuracy of the data need to be considered:

1. the geographical accuracy of rivers on the OS mapbase is up to 20 metres from the much more precise OS vector landline data,

2. the digitising process itself has reduced the accuracy such that the location of any stretch of river could be up to 50 metres from it true position,

3. the potential error in the location of the Late Iron Age sites is between 10 metres and 20 metres (see above). However, the potential error in the location of some of the sites which are only known from antiquarian observation is likely to be much greater. Therefore, 100 metres has been chosen as the margin of error for the relationship between sites and rivers.

In order to take into account these potential errors, the gradation interval of the distance of Late Iron Age sites from rivers used in Figure 5.3 has been chosen at 100 metres.

Results

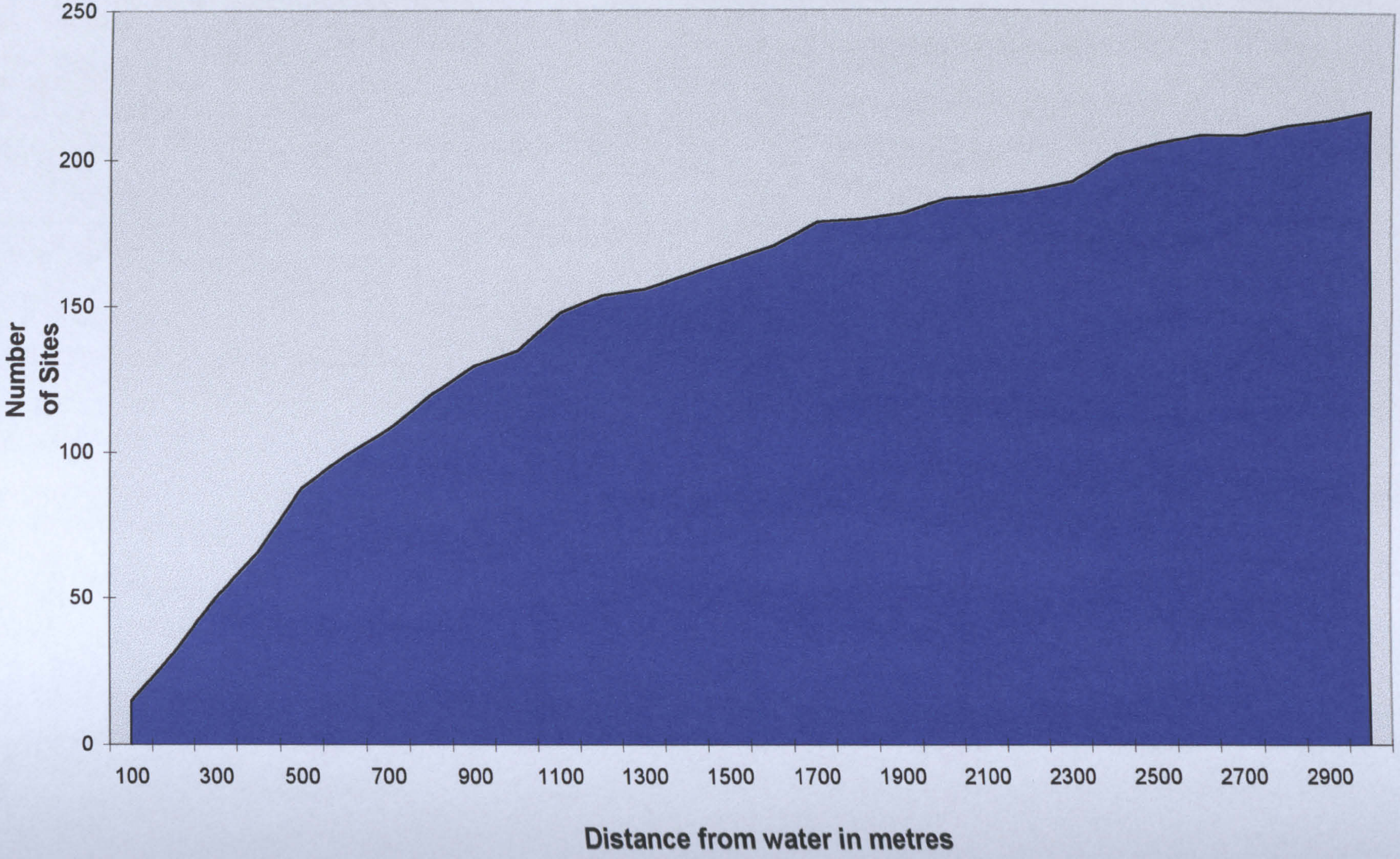
The graph in Figure 5.3 shows a cumulative plot of the distance of the 226 known Late Iron Age sites from the nearest river at intervals of 100 metres, from 100 meters to 3000 metres. The distribution of rivers and Late Iron Age sites is also shown in Figure 4.1 (above page 99).

The plot shows a reasonably uniform rate of increase in the cumulative number of sites from 15 (5%) at 100 metres from the nearest river to 217 (95%) at 3000 metres, with the majority (53%) of sites lying within 800 metres of the nearest river. The convex curve of the plot shows that the rate of increase in the number of sites slows relatively gradually as the distance from the nearest river increases with the exception of two points which have more pronounced change of slope. The first is at 500 metres distance, and the second, which is slightly less pronounced, is at 1100 metres. Of the two, the 500 metres distance is likely to be the more significant as the commulative total of sites at this point is 38% and it includes just under 20% of the Study Area. In comparison, 65% of sites are within the 1100 metre distance which includes 70% of the Study Area. There may therefore have been a preference for site location within 500 metres of a river.

There are however two other factors which could also account for this relationship.

1. For most of the river valleys within the Study Area the average distance between the river and the edge of its valley is in the range of 300-1000 metres. A relationship

Figure 5.3: Relationship between sites and distance from water



between Late Iron Age site location and the edges of river valleys has been identified above (see Table 5.4). The relationship could therefore be due to other environmental factors inherent to river valley locations such as the higher agricultural potential of their soils.

2. The general distortion of the site evidence in favour of river valleys due to development and archaeological research has been referred to in Chapter 4 above. This has also almost certainly contributed to the concentration of sites within the 500 metre distance from rivers.

Conclusions

The graph does not show any clear relationship between site location and the two kilometre distance from water criterion which as Martin has identified as being significant in Suffolk (Martin 1988). Eighty two percent of the sites were found to be within a distance of two kilometres from water, but as approximately 90% of the land area of the Study Area lies within two kilometres of a river, no clear relationship can be demonstrated. Those parts of the Study Area that are greater than two kilometres from a river are also clay plateau areas, which have generally received little attention from archaeologists and have, as a consequence, an unknown, but possibly high potential for the presence of more Iron Age and Roman settlements.

The assessment of the relationship between sites and distance from running water has show a preference for them to be situated less than 500 metres from a water source. The extent to which this relationship is influenced by water alone is not clear as most of the water sources are represented by major rivers which are also the location of the better agricultural land. The analysis of the distance from water of all locations in the Study Area has also shown that almost all of the area is within two kilometres from water. In term of constraints upon agriculture, water availability is therefore unlikely to have been a major factor. This will be further explored in section 5.4.1 below as part of the discussion of river communications.

5.4 Transport and Communications

In this section the relationship between the location of Late Iron Age sites and some of the major overland transport and communications routes within the Study Area will be examined. The routes chosen for assessment are those which are known to have been in use before the medieval period (cAD 1066). These comprise the most important Roman roads and the Icknield Way. The potential of rivers for communications and the transport will also be considered.

5.4.1 Transport and Communications in the Late Iron Age

The following is a summary consideration of travel undertaken beyond the local, day-to-day range of activity in the Late Iron Age. Whilst it is acknowledged that such a division of travel between local and longer-distance is inherently artificial, it is hoped that it will provide a background to the assessment of the relationship of Late Iron Age sites and the major long-distance communication routes.

1. *Movement of stock*

The movement of domestic animals is likely to have been one of the most common reasons for longer-distance travelling. It could occur for a number of reasons depending upon the type of agricultural regime practiced and the species of animal concerned. For sheep and cattle, which were probably the most economically important domestic species within the Study Area, the movement of animals would need to take place over land preferably with access to pasture and water on route. For cattle, steep gradients would also be avoided wherever possible. Other reasons for the transport of stock beyond the daily range could include movement to fresh pasture, transport to a place of slaughter, transhumance by semi-nomadic communities and the payment of tribute or food render.

2. *Bulk Transport of Commodities*

This category is intended to include commodities (both raw materials and manufactured goods) which might need to be transported from the centre of production or exchange. It comprises a range of goods that is variable in terms of the ratio of weight to economic value including grain, hides, animal carcasses, wood, metal ores, some types of

manufactured goods such as pottery, iron currency bars and liquid products such as beer, wine and sauces.

Overland transport

Little direct information is available concerning the methods used for the overland transport of bulk commodities in the Late Iron Age. Therefore, assumptions have to be made by using analogies from other periods and geographical areas. For overland transport generally in antiquity, ox-power is likely to have been the main method of traction available to pull carts or carry goods, with donkeys and mules probably also used to a lesser extent and horses only rarely. However, all these animals are slow and need to be supplied with relatively large quantities of food en-route, making such transport relatively expensive (Finley 1975).

In terms of vehicles for the overland transport of commodities, two wheeled carts are known from the Arras Culture burials in eastern Yorkshire in the second and third centuries BC (Stead 1991a). Although only known from the burials of high-status individuals, they could probably have been used for the transport of bulk commodities if required. However, in the absence of metalled roads, the transport of heavy goods by cart or other wheeled vehicle would have been difficult in all but the ideal conditions of dry, level terrain. Even then, it will have been slow and relatively expensive in terms of the time and effort required.

River transport

The potential importance of coastal and inland river transport and communications from the Late Bronze Age to the Roman period has been demonstrated by a number of recent finds of wooden boats in the Humber estuary, at Dover and at Blackfriars in London (McGrail 1997:1998). In particular, the Hasholme wooden logboat from the Humber provides a model of the type of boat that could have been used in most inland rivers in the Iron Age including those within the Study Area (Millett and McGrail 1988).

The Hasholme Logboat

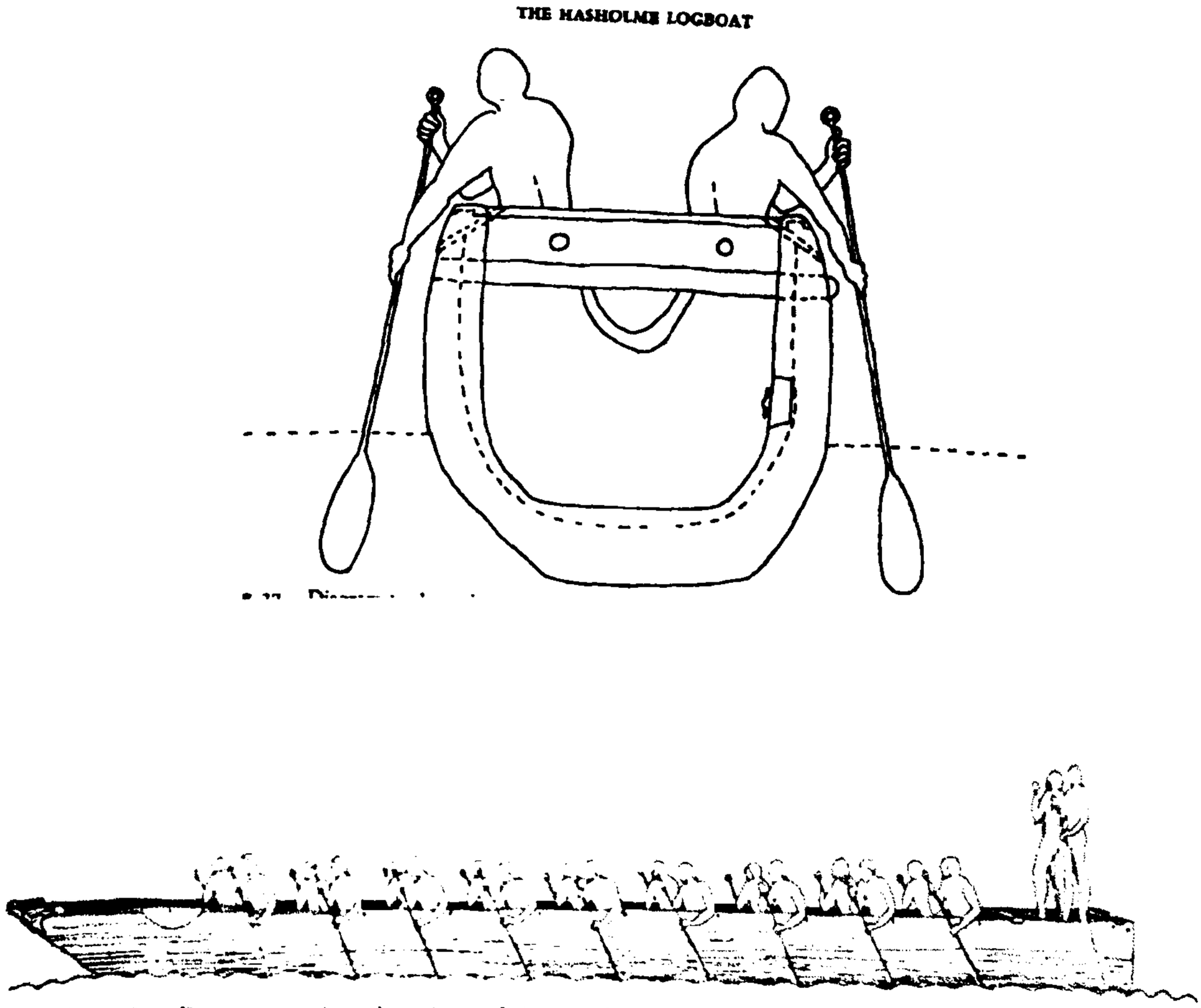


Fig. 28. Reconstruction drawing of the Hasholme boat underway with a crew of eighteen paddlers and two steersmen

Role	Description	Weight of load (kg)	Height of load (m) [1]	$\overline{GM}_T$ (m) [2]	Draft (m)	Freeboard (m)
A	Lightship (4398 kg)	—	—	—	0.38	0.87
B	Maximum men (20)	1200	—	+0.060	0.46	0.79
C	5 men + 3502 kg[3]	3802	−0.30	+0.110	0.63	0.62
D	5 men + 5502 kg[3]	5802	+0.18	+0.001[4]	0.75	0.50
E	5 men + 6802 kg[5]	7102	−0.06	+0.060	0.83	0.42
F	5 men + 8602 kg[5]	8902	+0.18	+0.020	0.94	0.31

(After Millett and McGrail 1988:Figs. 27,28 and Table 8)

Figure 5.4

The boat is comprised of a large hollowed-out log over 15 metres long and one metre in diameter, dated to the fourth century BC, which it is estimated could have carried five people and a 5.8 tonne cargo in 0.75 metres of water (Millett and McGrail 1988:133-4). It would not have been stable enough for travelling across open seas or for sailing, other than in a light breeze, but would have been eminently suitable for coastal and inland waters. Logboats such as the Hasholme boat would also have been more economic to produce and use than the alternative, more technically sophisticated plank-built boats, provided that suitably large timbers were readily available (McGrail 1997:210). Once built, the logboat would also be very durable; requiring very little maintenance, especially in comparison with overland vehicles and pack animals.

An economic comparison between overland and coast transport in antiquity is provided by the Emperor Diocletian's edicts of the later third century AD which suggest that the cost of the shipment of grain from one end of the Mediterranean Sea to the other was less then carrying the same load 75 miles overland (Finley 1975). Although better roads and larger ships available in the third 3rd century AD, relative comparisons with the Late Iron Age of southern England are probably still valid. Another much later analogy is provided by the reduction in the cost of pottery transport by 85 % following the construction of the Staffordshire canal in the eighteenth century (Salway 1984:563). The relative advantages of transport by river overland would also have made it worthwhile to exploit the smallest of rivers by transferring loads to smaller boats if necessary.

The transport of bulk commodities in the Iron Age by river would, therefore, have been considerably more economic than overland transport by cart or pack animal. As result, the distance to the nearest navigable river and how far the destination was from a river would probably have been important considerations when undertaking a journey. The analysis undertaken in section 5.3.2 above has shown that 90% of the Study Area is within two kilometres of a river. Although most of the rivers are currently not navigable by modern standards, it is likely, given the level of modern river abstraction, that a high proportion would have been navigable by small boats in the Late Iron Age, particularly shallow-draft logboats. The transport of a cargo of bulk commodities between any two

parts of the Study Area is, therefore, likely to have been undertaken for most of its route by river.

3. Travel to Central Places and Places with Specialist Functions

Travelling to and from settlements and other places with specialist functions is likely to have formed an important, if intermittent aspect, of life for most of the Late Iron Age population. This could include a wide range of activities such as travel to major political or administrative centres for the payment of tribute or the exchange of goods and the travelling to places of religious or ceremonial significance.

4. Travelling of the Social Elite

The existence of a Late Iron Age social elite within the Study Area that appears to have exercised political and administrative control over large geographical areas is attested from the evidence of burials, coins, imported artifacts, settlements and literary sources (see Haselgrove 1984 for a summary of the evidence). It can also reasonably be assumed that the elite were supported by a retinue of followers whose functions is likely to have included military support, administration and religion. There is, however, currently little archaeological evidence for the existence of such retinues apart perhaps from the recent discovery of the burials of a probable warrior and a medical specialist dated cAD 60 at Stanway, Colchester (Crummy 1993;1997).

Collection of the tribute or taxation required to support an economically non-productive elite and retinue could have either taken place at a central location or from the dispersed points of production; both of which will have involved some travelling beyond the home base. The assumption inherent in most discussions of the period is that the former method was used; with produce taken to administrative centres in much the same way as occurred with the later Roman villa estates. However, the latter method of the elite and retinues regularly travelling between a number of settlements within their territory may also have occurred. Such a process is well attested for the Middle Anglo-Saxon period in England and Wales where food renders were collected at centrally-controlled estate centres located throughout the administered territory (Welch 1992). For societies in which a market economy is not well developed, the consumption of food renders close to the point of production can be much more efficient than central collection and

storage. The act of the elite themselves regularly travelling through their territory also provided an efficient means of administration in Middle Anglo-Saxon England and Wales including the local administration of justice (Welch 1992). Whilst there is no direct evidence for a similar system of locally-controlled estates in the Late Iron Age, the limited evidence for a market economy and the absence of evidence for large centrally located storage facilities suggests that such a system, or a variation of i, could have existed. Therefore, it is possible that the travelling generated by relations of social obligation between the elite and producers consisted of a combination of producers taking their produce to designated centres, and the social elite or their representatives collecting and/or consuming produce closer to the point of production.

In addition to travelling to deliver or collect tribute or renders, communication between the members of the elites themselves including between those of different social groups would have been important to help maintain their political and social control. This would have included the exchange of prestige goods, payment or collection of tribute, cementing family or dynastic links by marriage and attendance at social and religious gatherings. In the apparently fluid political situation which existed in the Late Iron Age of the Study Area (e.g. as described by Rodwell 1976) travelling between administrative and political centres is therefore likely to have been frequent.

Routes

Although the above economic and social factors may have motivated many journeys between settlements as well as other places and locales within the Late Iron Age landscape, the choice of routes to be travelled will have been determined by processes which are much less easy to define. Tilley has pointed out that all movement within landscapes is in some form socially prescribed or constrained including the direction of movement and the way in which places are approached. In particular, paths through landscapes provide a structuring of the places they link in a 'linear order': their creation and maintenance is dependent on a series of previous precedents in term of networks of movements in the landscape (Tilley 1994:28-30). Therefore, overland routes through the landscape in the Late Iron Age are likely to have developed over long periods of time and will have been dependent upon a combination of inter-related factors particularly the social significance of the places through which they pass. In this respect,

the visibility of places, whether natural or man-made, from routes is of particular importance. This is a theme which will be explored for some Late Iron Age routes in Chapter 7 below.

5.4.2 The Date and Location of Overland Routes (Figure 5.5)

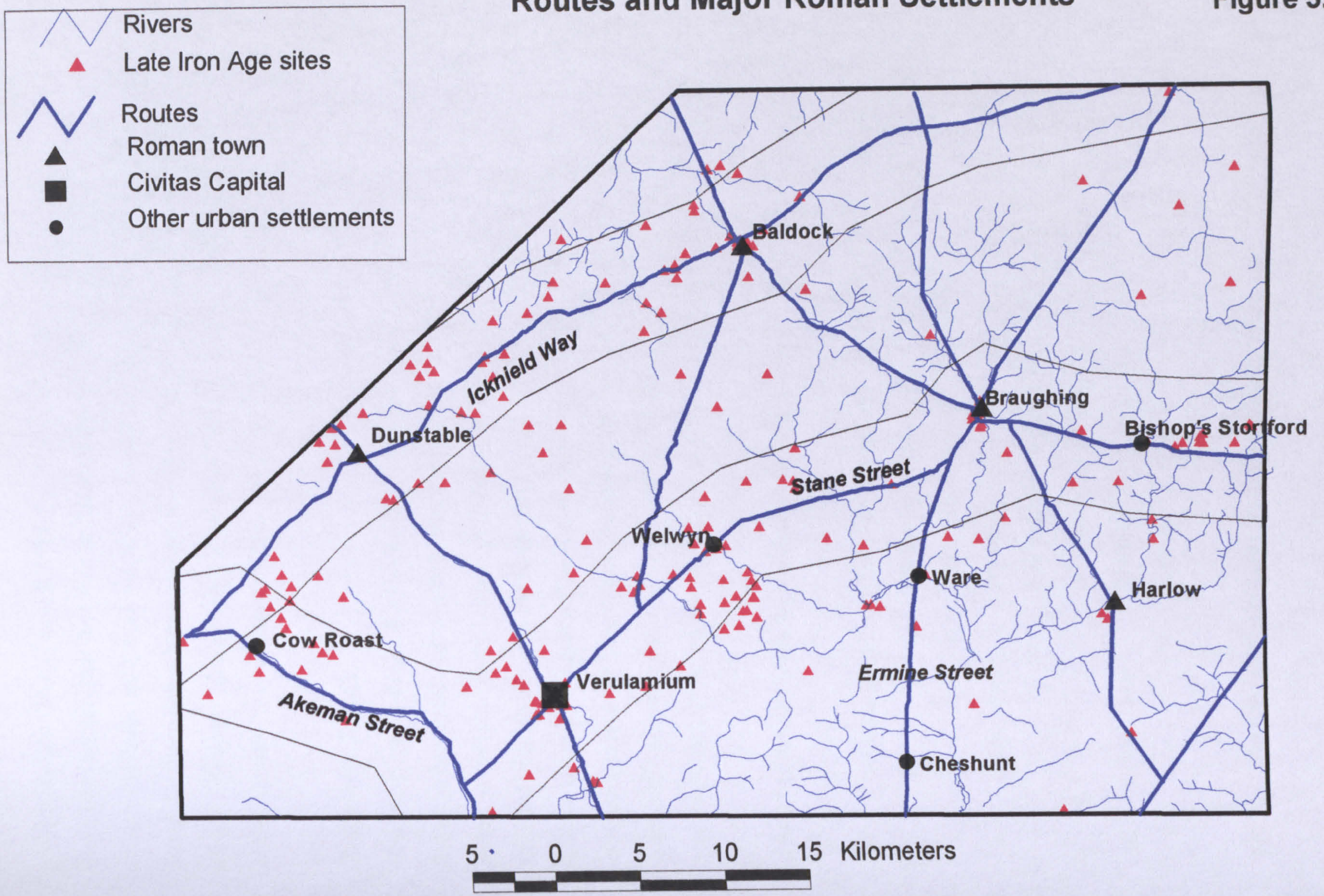
The most important pre-medieval communication routes within the Study Area are shown in Figure 5.5 . The routes have been selected for comparison with Late Iron Age sites on the basis that the location of each is known with a relatively high degree of certainty and it is considered possible that one or more of them may have been used in the Late Iron Age.

1. The Icknield Way

Only one of the routes (the Icknield Way) is known to have been in use in the Late Iron Age. It forms part of a long-distance route (including The Ridgeway) between Wiltshire and Norfolk and dates from the Neolithic period. Its use within the Study Area during the Late Iron Age is indicated by the construction of a bank and ditch along the route immediately to the west of Baldock. This was located during the excavations at Blackhorse Road, Letchworth (Moss Eccardt 1988:54-5). It was a substantial earthwork, approximately twenty metres wide in total, of which the bank was twelve metres wide and survived to a height of two metres. The ditch deposits survived to between 1.7 and 3.1 metres deep and contained sherds of Late Iron Age pottery. The total distance from the top of the bank to the bottom of the ditch varied between six and eight metres. A sunken trackway approximately ten metres wide was located to the north of the bank. It contained wheel ruts and a single fragment of pottery dated to the mid first century AD (Moss-Eccardt 1988:54). The bank and ditch therefore probably date – on the basis of the pottery – to the Late Iron Age or earlier. The date of the trackway is less clear. Its association with the earthwork suggests that they are likely to be contemporary, although it is also likely that the trackway continued to be used in the Early Roman period. A similarly large but undated ditch was also located along the line of the Icknield Way 3.6 kilometres to the west at Wilbury Hill. Here, the ditch was 7.5m wide and survived to a depth of 1.75 metres, the bank having been removed by

Routes and Major Roman Settlements

Figure 5.5



plough erosion (Moss Eccardt 1988:52). The evidence from the these two sites therefore suggests that the route of the Icknield Way was formally marked by a substantial linear earthwork which may have been several kilometres long, with traffic along the route being heavy enough to create a hollowed trackway along part of its length. However, this evidence is localised, and in itself, does not demonstrate that all of the Icknield Way within the Study Area was in use in the Late Iron Age.

2. Roman Roads

The other routes follow Roman Roads. Two of the roads, Watling Street and Ermine Street, are national routes which were constructed in the first century AD. Watling Street is the route from London to Chester which passes through Verulamium Roman City and Ermine Street is the route from London to York which passes though the Roman town at Braughing. There is no evidence for a Late Iron Age date for the routes of these roads in the Study Area. However, the fact that the two towns (Braughing and Verlulamion) have Late Iron Age origins (see below) suggests that it is possible that some stretches of the routes were in use in the Late Iron Age.

The other Roman roads are regional or local routes:

- *Akeman Street:* the road from London to Cirencester which runs through the Chilterns along the Bulbourne Valley at the south-west corner of the Study Area
- *Stane Street:* the road between the Roman towns of Verulamium to Colchester which passes through the Roman settlements of Welwyn and Braughing within the Study Area.
- *Back Lane:* the road between the Roman towns of Braughing and Baldock
- *The road from Verulamium to Baldock*
- *The road between Braughing and Harlow Roman towns*
- *The road between Braughing and Great Chesterford Roman towns*

All of these roads were probably constructed in the later 1st century AD, although as will be argued below, it is possible that some may have Late Iron Age origins.

5.4.3 Results of the Analysis

The effects of the distortions in the distribution of Late Iron Age sites which were identified in Chapter 4, need to be taken into account for the following analysis. In particular, the three dense clusters of sites at St. Albans, Baldock and Braughing all lie close to a Roman road and therefore distort the figures of the proportion of sites within a given distance of these roads. Thus, for the purposes of this exercise the analysis will be undertaken twice with the sites from three clusters included, and also with them excluded from the calculations.

The clearest patterns apparent in Figure 5.5 are the clustering of sites along the route of the Icknield Way to the west of Baldock and a less marked clustering along Stane Street, Akeman Street, Watling Street and the Verulamium to Baldock road.

Icknield Way

Table 5.5 shows the total number of sites within a range of given distances from the Icknield Way.

Table 5.5, the relationship of sites with the Icknield Way

Number of Sites	Increase	Distance from the Icknield Way
23		500 metres
36	13	1000 metres
42	6	1500 metres
49	7	2000 metres
59	10	2500 metres
65	6	3000 metres

It can be observed that the rate of increase in numbers between 500 and 1000 metres is 90-100% higher than the increase between 1000 and 2000 metres and the rate of increase between 2000 and 2500 metres is 40-50% higher.

The possible significance of these figures can be considered by comparing the proportion of the total number of sites within the Study Area that the figures represent, with the proportion of the Study Area contained within the area examined.

Using this comparison, 29% of the total number of sites are within 3000 metres of the Icknield Way, and the area encompasses 16% of the Study Area. This demonstrates a statistically significant, if undramatic relationship. If the cluster of sites at Baldock is removed from the calculation, the proportion of sites reduces to 21%, which is less significant. However, if only the area to the west of Baldock (within which all but three of the sites lie) is considered, the area is reduced to 11% of the Study Area and the relationship becomes much more significant. A similar level of significance can also be demonstrated for the number of sites within the other recorded distances from the Icknield Way, with the 0-500 distance being the most significant.

There is, therefore, a statistically significant relationship between Late Iron Age sites and the route of the Icknield Way and its environs, known locally as the 'Icknield Belt'. The reason for the sharp fall-off in the numbers of known Late Iron Age sites to the east of Baldock is unclear. It is unlikely to be due to statistically significant bias resulting from differences in the intensity of archaeological fieldwork between the two areas, as the area to the east has been subject to a number of archaeological surveys and investigations and contains a wealth of archaeological remains of other periods. It is highly likely that one or more of the numerous enclosures known from cropmarks to the east of Baldock (see Burleigh 1995a) date to the Late Iron Age. However, it is also possible that there may be a real difference in the density of Late Iron Age evidence between the two areas.

Stane Street & Akeman Street

The other major apparent clustering of sites is along the east/west route which includes Roman Akeman Street and Stane Street. Table 5.6 shows the number of sites with a range of given distances from the route.

Table 5.6, relationship of sites with Stane Street

Number of Sites	Increase	Distance from Route
30		500 metres
56	26	1000 metres
66	10	1500 metres
75	9	2000 metres
90	15	2500 metres
96	6	3000 metres

As with the Icknield Way, the rate of increase in numbers with distance is greatest between 500 and 1000 metres. However, most of the additional number of sites between those distances comprise the two large clusters at Braughing and St Albans.

Considering the significance of the relationship at the 2000 metres distance, 33% of the total number of sites lie within this distance, which comprises 12% of the total area of the Study Area. At the 3000 metres distance, the proportional difference is less with 42% of the total number of sites within 23% of the total area, but the relationship is still significant. If the clusters of sites (31 in total) at Braughing and Baldock are removed from the calculations, the proportions fall to 18% and 28% respectively. This still represents a statistically significant relationship, although it is much less marked.

Watling Street

There is a total of 34 Late Iron Age sites situated within 3000 metres of the road. This represents 16% of the total number, located within 7% of the total area of the Study Area. The relationship is, therefore, statistically significant. However, 21 of the total are represented by the site cluster at St. Albans, and 28 of the 34 are located within 3000 metres of the intersections of Watling Street with the Icknield Way and Stane Street. Therefore, these sites have already been counted in the above calculations for

those roads. Although it can't be determined from the spatial evidence which of the two alternative routes is the most significant, it will be argued below that the east/west routes (the Icknield Way and Stane Street) were probably important communication routes in the Late Iron Age and are therefore more likely to be related to the sites.

The Other Routes

None of the other identified Roman roads (Ermine Street, Back Lane, Braughing to Gt. Chesterford & Braughing to Harlow) has any statistically significant relationship with the distribution of Late Iron Age site locations. Moreover, if the clusters of sites at Braughing and Baldock are removed from the calculations, it can be observed from figure that less than a dozen (5%) of the total number of sites lie within 3000m of these routes.

5.4.4 Interpretation of the Results

Identification of Primary Overland Communications Routes in the Late Iron Age

The above analysis has shown that a statistically significant relationship exists between the spatial distribution of Late Iron Age sites and the two primary east/west routes across the Study Area (Stane Street and the Icknield Way).

Icknield Way

The clustering of sites within 3000 metres of the Icknield Way suggests that its role as a communication route is likely to have been a factor in the location of these sites. Other factors, including agricultural potential and the location of earlier settlement, (see below) will no doubt have been more important in determining the local situation of sites, but access to communications which the route afforded, is also likely to have been important. In addition, the archaeological evidence that the Icknield Way to the west of Baldock was demarcated and in active use in the Late Iron Age suggests that it probably was used generally as a communication route in the Late Iron Age.

Stane Street and Akemen Street

Although, unlike the Icknield Way, there is no direct evidence for its use in the Late Iron Age, the clustering of sites along the route of Stane Street and Akeman Street suggests that these roads may have formalised a pre-existing Late Iron Age route or routes along at least part of their length. The two roads link five major Roman settlements (from west to east: Cow Roast, St. Albans, Welwyn, Braughing and Bishop's Stortford). However, contemporary Late Iron Age settlements can also be demonstrated at a number of points along the two roads including at three of the above Roman settlements and five of the six largest Late Iron Age settlements or site clusters in the Study Area (Cow Roast, St. Albans, Wheathampstead, Welches Farm and Braughing). The route of Stane Street continues to the major Late Iron Age and Roman settlement at Colchester 50 kilometres to the east of the Study Area. Whether the route developed to link pre-existing settlements or was a factor in determining the location of some of the settlements is unclear from the evidence, although both are likely to be true. It is, however, reasonable to assume that some communications took place between these settlements in the Late Iron Age along Akeman Street and Stane Street, which are the most direct overland routes.

The Role of the Communication Routes

By considering the categorisation of the types of movement and communication in the Late Iron Age, outlined above, together with the evidence for overland communication routes, it is possible to speculate about the types of traffic that used the routes.

The Icknield Way

Movement of Stock

The route of the Icknield Way to the west of Baldock is situated within the Chalk Upland environmental zone. The assessment of agriculture in Chapter 3 has indicated that sheep rearing is likely to have been the dominant agricultural activity within this part of the zone. Although little is known in detail of sheep rearing in the Late Iron Age, it is likely that stock would need to be moved at certain times of the year from the place of rearing. This could be for purely agricultural reasons such as for shearing, breeding, movement to new pasture or to over-wintering cover. Movement might also be for exchange, payment of tax or tribute or other social or ceremonial reasons.

The Icknield Way could therefore have functioned as a route for the movement of large numbers of sheep. It follows the chalk ridge of the Chilterns, a natural routeway which is level for most of its length and which provides easy access to surrounding areas. It is also known to have been a transportation route for sheep in the medieval and post-medieval periods with several substantial sheep folds known along its length.

Transportation of bulk goods

Figure 5.5 shows that within five kilometres of Icknield Way there are only a few rivers which could have conceivably have been navigable in the Late Iron Age and all of them flow at right angles to the route. The transport of bulk goods between the settlements along the Icknield Way would, therefore, have had to have been largely overland, along the Icknield Way itself. The dry reasonably level route which the Icknield Way affords would however have reduced the relative economic cost of overland transport in comparison with the clay areas to the southeast and northwest.

Akeman Street and Stane Street

Movement of Stock

The route of Akeman Street and Stane Street passes through the Clay-with-Flints and Boulder Clay environmental zones. The assessment of agriculture in Chapter 3 has indicated that cattle rearing is likely to have been an important, if not the dominant, agricultural activity within these zones, with arable agriculture and sheep rearing also having an important but probably secondary role. As with the example of sheep rearing above, there is little direct evidence of the detail of the rearing of cattle and the processing of cattle products in the Late Iron Age, but it can be assumed that there would be occasions when cattle would be moved from the farm area for purely agricultural or wider economic or social reasons. In particular, the moveable nature of the wealth which cattle represent would make the transport to central areas for slaughter, collection of tribute or protection from rustling necessary from time to time. A case for the importance of the social and economic role of cattle in Late Iron Age society has been made by Nash (Nash 1984:100-101) who suggests that herds could have been accumulated by a warrior elite as an important form of wealth. Although the background to the warrior nature of the social elite which Nash describes may be

debatable, an important role for cattle as a source of wealth accumulation for the elite seems likely given the limited role of the money economy and the large numbers of cattle which it is argued above were present in the agricultural landscape. Therefore, it is suggested that the most economically important role for a Late Iron Age pre-cursor to Roman Akeman and Stane Streets would have been as a route for the movement of stock, primarily cattle, between settlements. The status and role of the five major Late Iron Age settlements situated on the route will be discussed in detail in Chapter 7 below. However, it is suggested that a stimulus for much of any movement of cattle along such a route would have come from these settlements. Furthermore, the suggested function of the route as a convenient means of moving cattle to these major settlements may have been influential in the location of the substantial number of other settlements which lie close to it. An important role for these settlements it is argued, would have been for the farming of the cattle prior to their movement to other settlements situated along the route.

Movement of Bulk Goods

A network of rivers connects all of the five major Late Iron Age settlements located on the route as well as most of the other sites which lie within 3000 metres of the route. Although the extent to which these rivers were navigable in the Late Iron Age is not known, it can be reasonably be assumed that the majority of the bulk transport of goods to and between settlements along the route would have taken place by river boat, possibly using a Hasholme type logboat. The role of the overland route represented by Roman Akeman and Stane Streets for Late Iron Age bulk transport is therefore likely to have been much less important than river transport.

Communications between the Social Elite

The location of the five major settlements along the route suggests that it would have been used for communications between these settlements, especially social and political contact between the social elites residing within them. This is also likely to have been the case with respect to communications with Colchester. Discussion of the nature of any communications is speculative, but it could have included the movement of commodities such as for the exchange of gifts, or payment of tribute. The commodities could have ranged from stock on the hoof, slaves, military support and luxury items.

5.4.5 Conclusions: Travelling and Communications in the Late Iron Age

The Role of River and Coastal Transport

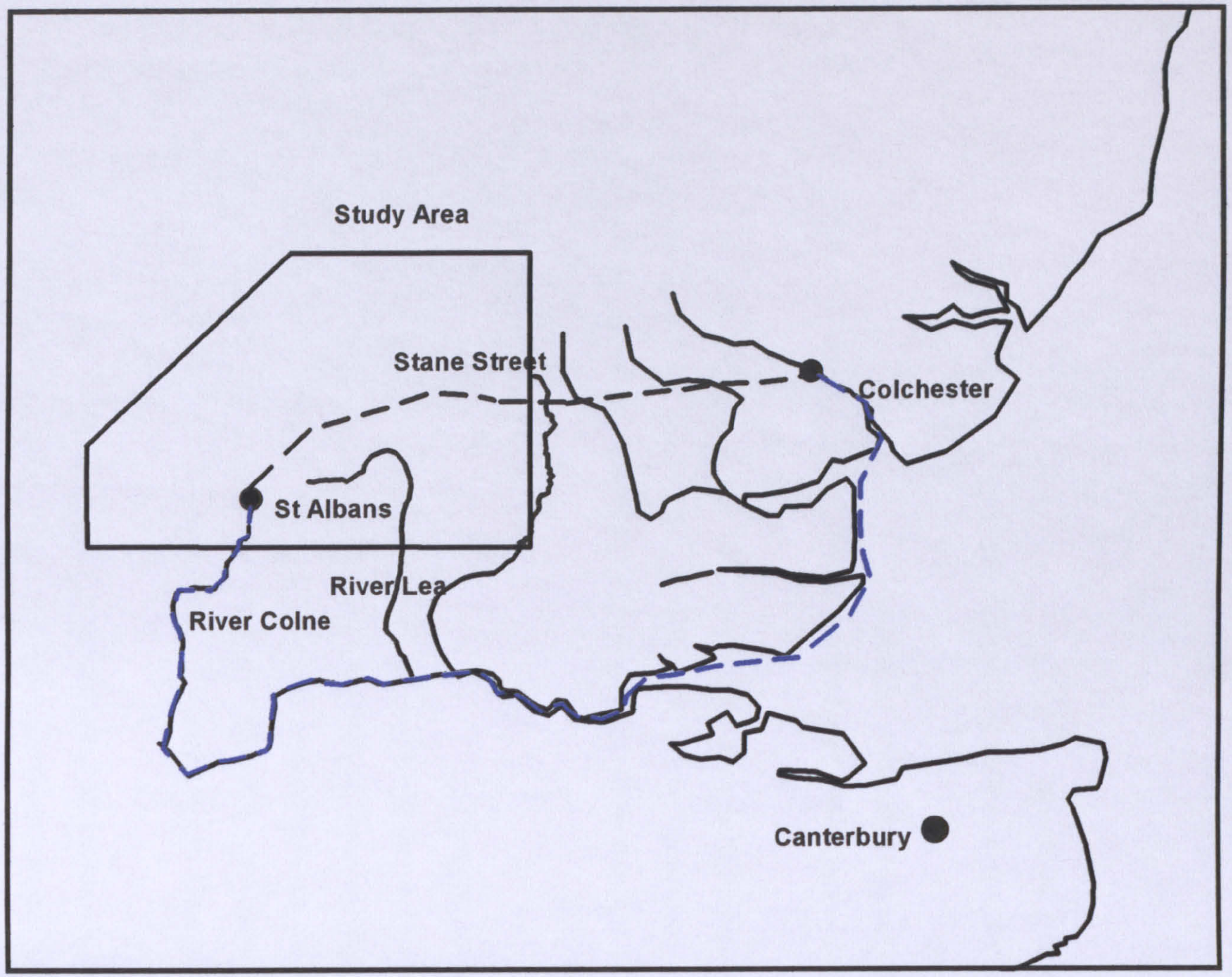
The arguments for the important role of rivers for the transportation of bulk goods within the Study Area have been outlined above. The large number of rivers and their distribution in relation to the known Late Iron Age sites means that it is highly likely that most bulk goods were transported by river for most of their route. Figure 5.6 shows the two major rivers in the Study Area (the Lea and the Colne) and the River Thames. Although it would have involved a long detour of over 130 kilometres, travel by river between the two river systems would have been theoretically possible without the need for overland travel. Figure 5.6 also shows the feasibility of communication via the river Thames with Colchester, northern Kent and beyond to Continental Europe. A comparison of the distance between St. Albans and Colchester by river and the most direct overland route (Stane Street) reveals that the river and coastal route, via the River Colne (Herts) the Thames and the River Colne (Essex), is approximately 210 kilometres where as the overland route is approximately 90 kilometres. Therefore, it can be concluded that, apart from those goods which could be easily carried on foot or on a pack animal, river transport would have been both quicker, less hazardous and considerably more economical than by overland. The same would also be true with respect to communications with two other major Late Iron Age centres in the region, Canterbury and Silchester, with the former connected via the Thames and Medway and the latter via the Thames and Kennet.

The Role of Overland Transport

The assessment of the evidence for the existence of major Late Iron Age overland communication routes has shown that there is a spatial relationship between site evidence and two east/west routes (the Icknield Way and the route of Roman Akeman Street and Stane Street). It is argued that both of these routes were used in the Late Iron Age primarily for the transport of domestic animals 'on the hoof' and that a significant proportion of this transport was between the point of production and the point of consumption and/or processing of the products of the animals (meat, bone,

Communication Routes Between St. Albans and Colchester

Figure 5.6



hides, wool etc.). This model is based on the assumption that the pastoral economy was sufficiently productive to be able to generate substantial surpluses of animals for the exchange with other products and/or the payment of tribute. However, given that such surpluses of animals were produced, the transport of live animals to a given destination would have been considerably cheaper in terms of effort than the transportation of animal products overland or even by river. It is also argued that the importance of these two routes for the transport of live animals was a factor in the location of sites. A secondary role in terms of use for these two routes, although it was probably of equal or greater social importance, is likely to have been as a means of communication between the social elites residing in the major settlements situated along them, and also possibly for access to outlying settlements within territories. The possibility that parts of these two routes has particular ritual or other social significance is also explored in Chapter 7 below.

Summary

The available evidence from drainage, topography and the location of Late Iron Age sites in the Study Area suggests the following model of two reasonably mutually exclusive methods for the transport heavy and bulk commodities:

1. live animals were transported overland, primarily along two nodal routes, which linked all of the major settlements,

2. other bulk goods were transported mainly by river, with overland transport playing only a minor role.

5.5 The Influence of Late Bronze Age and Earlier Iron Age Settlement

The aim of this enquiry is to assess the influence of later Bronze Age and earlier Iron Age settlement on the location of Late Iron Age sites. The later Bronze and earlier Iron Age evidence has been divided into two groups;

1. evidence of later Bronze and earlier Iron Age settlement which has not produced Late Iron Age evidence in the vicinity (five hundred metres) of the settlement,

2. Late Iron Age site gazetteer entries in Table 2.3 which have produced evidence for earlier Iron Age occupation. This is further sub-divided between:
    a. sites for which there is *in situ* evidence,
    b. those sites for which the evidence is represented by typologically early artifacts only, which are contained within Late Iron Age deposits.

5.5.1 Defining the Late Bronze Age and Earlier Iron Age

The period represents a chronological time-span of between approximately 1000 BC and 200/100 BC (Bryant 1995:17). This is a relatively long period in comparison with the time-span of the Late Iron Age, which is conservatively estimated at between 100 and 250 years (between 150-100 BC to AD 43-100). Settlement over such a long time-span has been chosen for comparison for the following reasons.

1. The Difficulty of Accurately Dating Occupation within this Period.

There are very few absolute dates and closely datable artifacts from occupation sites of the later 2nd millennium and 1st millennium BC from the Study Area (Bryant 1995:17). Pottery typology has, therefore, traditionally been the principal means of dating sites. However, the conservative and unchanging nature of the coarse pottery, in particular, during this period makes it use for dating within 200/300 years problematic, especially for small assemblages which contain few fine-wares (ibid.). Nonetheless, for the

majority of sites it is possible to make the general distinction between later Bronze Age and earlier Iron Age pottery assemblages on the basis of the typology of form and decoration, using the methods first introduced by Barrett (Barrett 1980). A recent re-assessment of the date of the transition from the Ewart Park to the Llyn Fawr metalwork phases – also traditionally recognised as the Bronze Age/Iron Age transition – to c800 BC provides a convenient date for the change in pottery styles (Needham et al.1997). However, it is recognised that, in reality, there is unlikely to be a clear correlation between changes in the pottery and metalwork. An overlap in the dating of later Bronze Age and earlier Iron Age pottery assemblages by as much as 200 years either side of the c800 BC date, is therefore possible.

2. The Significance of the Late Bronze Age

The assessment of the evidence for the environment and agriculture detailed in Chapter 3 above has shown that there is significant evidence for the expansion of settlement in the Study Area during the late Bronze Age. It is also argued above that agricultural expansion and population increase during the late Bronze Age and earlier Iron Age was a strong influence on Late Iron Age settlement location and development.

5.5.2 Presentation of Evidence: Dating and Characterisation

Chronology

The evidence for later Bronze Age and earlier Iron Age settlement is presented below in tabular form. Summary information concerning the date-range and the nature of the evidence is included within these tables. Table 5.7 below lists the abbreviations and definitions of the four chronological categories of evidence used. The term 'later prehistoric' is also included, although this is used simply as a shorthand for later Bronze and all of the Iron Age.

Table 5.7, chronological categories

Date	Definition
LBA/EIA	Occupation which could date to any point within the range 1000 BC-150 BC
LBA	Occupation dated within the range 1000-800/600 BC
EIA	Occupation dated within the range 800/600-150 BC

LBA EIA	Evidence for occupation throughout the range 1000 BC- 150 BC
Later Prehistoric	Late Bronze and Iron Age (c1000 BC to AD 50-100)

Characterisation

Table 5.8 lists the categories of the type of *in situ* evidence of deposits that are listed in the *Evidence* field. The objective of this simplification is to indicate, in very broad terms, the quality of information about the site and the extent to which it can be characterised. As such, the terms *habitation* and *occupation* are not closely defined. For sites where there is no evidence for *in situ* deposits, summary details of the classes of evidence represented is provided including mention of specific artifacts and quantification, as appropriate.

Table 5.8, categories of evidence

Summary Description	Explanation
Dated enclosure	Hillforts and other enclosures for which the nature of occupation is unclear
Occupation	Small-scale or ephemeral occupation evidence such as scattered pits etc.
Habitation	Evidence of structures
Substantial Habitation	Evidence of date, function and spatial organisation of settlement

Comparing the Late Bronze Age and Earlier Iron Age with the Late Iron Age

In respect of the event/monument/archive data model refered above (2.1.4), the basis of the evidence for Late Bronze Age and earlier Iron Age settlement which is presented below is primarily *monument* based , i.e. it aims to characterise the nature of the evidence, albeit in a very general manner. This has been undertaken in order to provide a context for the data in terms of chronological background and locational information. The basis of the information is, therefore, significantly different to the *event* based information of the Later Iron Age for which characterisation of the evidence is more problematic and which will be undertaken separately in Chapter 6 below. However, as the following assessment is not based on comparing the nature and type of settlement for the two data sets, their different basis should not prevent valid comparisons being made with regard to identifying chronological and locational patterns. In this respect, the main caveat is with the geographical clusters of Late Iron Age sites which are likely

to falsely exaggerate the number of sites in comparison to the later Bronze Age/earlier Iron Age evidence.

5.5.3 Late Bronze Age and Earlier Iron Age Sites without Late Iron Age Evidence (Figure 5.7)

Presentation of the Evidence

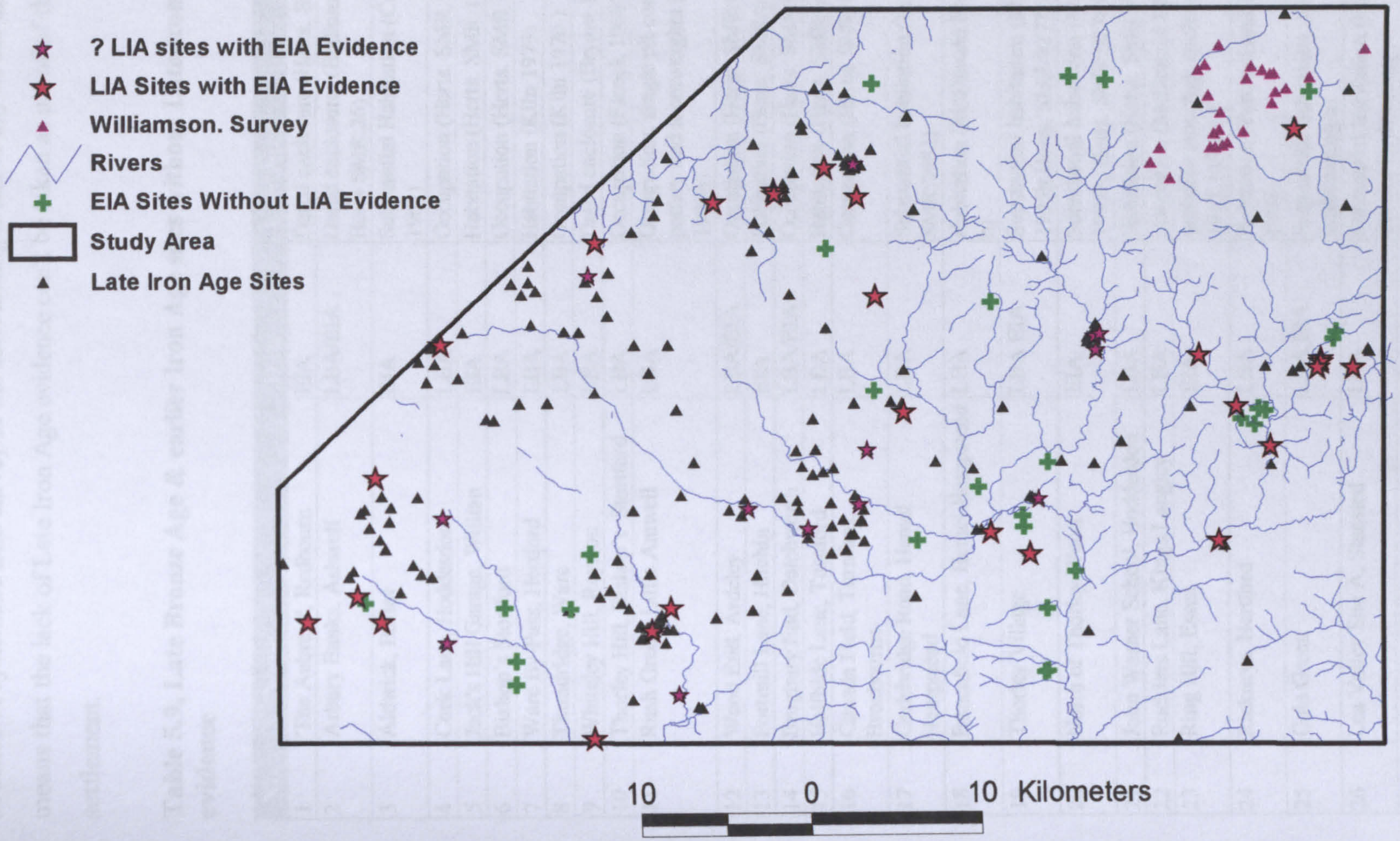
The location of Late Bronze Age and earlier Iron Age sites which have not produced Late Iron Age evidence is shown in Figure 5.7. Brief details for each site are also listed in Table 5.9. The information comprises the name, approximate date and a summary of the evidence including the main bibliographical reference.

The sites listed are those which have not produced Late Iron Age evidence in the vicinity (within 500 metres) of the earlier Iron Age settlement. Movement of the focus of habitation of settlement over several hundred metres is a common feature of later prehistoric settlement in East Anglia which has recently been discussed by Hill (Hill forthcoming a). The distance of 500 metres has therefore been chosen in order to exclude these 'wandering' settlements from the distribution.

The evidence is taken from Bryant (1995), supplemented by information from the relevant Sites and Monuments Records. The distribution of settlements has been subject to essentially the same geographical distortions as the Late Iron Age sites which are detailed in Chapter 4, above. There is however a significant, if unquantifiable, bias in favour of the discovery of Late Iron Age settlements compared with those of the earlier Iron Age due to the much greater quantities of pottery produced on them and the common presence of datable metalwork, especially brooches. Therefore, it is probable that the known distribution of earlier Iron Age settlements substantially under-represents their true number. The corollary of this bias is that the absence of evidence for the Late Iron Age on these sites is likely to be real in the majority of cases. However, the

All Later Prehistoric Sites

Figure 5.7



absence of systematic field survey of the surrounding areas of any of the above sites means that the lack of Late Iron Age evidence can't be taken as proof of the absence of settlement.

Table 5.9, Late Bronze Age & earlier Iron Age sites without Late Iron Age evidence

No	Name	Date	Evidence
1	'The Aubreys', Redbourn	EIA	Dated enclosure (Herts. SMR:25)
2	Arbury Banks, Ashwell	LBA/EIA	Dated enclosure (Bedlam 1859; Herts SMR:26)
3	Aldwick, Barley	EIA	Substantial Habitation (Cra'ster 1961)
4	Cock Lane, Hoddesdon	LBA	Occupation (Herts. SMR:183)
5	Jack's Hill Garage, Willian	EIA	Habitation (Herts. SMR:193)
6	Bishop's Stortford	LBA	Occupation (Herts. SMR:1090)
7	Ware By-Pass, Hertford	LBA	Habitation (Kiln 1973)
8	Thundridge, Ware	LBA	Occupation (Kiln 1970)
9	Whiteley Hill, Royston	LBA	Dated enclosure (Bryant 1994)
10	Thorley Hill, Bishop's Stortford	LBA	Occupation (Elcock 1968)
11	Rush Green, Little Amwell	LBA	Occupation; single pit containing pottery and loomweights (Day 1980b)
12	Wood End, Ardeley	LBA/EIA	Occupation (Herts. SMR:6174)
13	Portmill Lane, Hitchin	EIA	Habitation (Herts. SMR:6455)
14	Bragbury End, Datchworth	LBA/EIA	Occupation (Herts. SMR:6478)
15	Halfhide Lane, Turnford	LBA	Habitation (Herts. SMR:6484)
16	Canada Field, Turnford, Broxbourne	LBA	Occupation (Herts. SMR:6816)
17	Gadebridge Road, Hemel Hempstead	LBA	Substantial habitation (Herts. SMR:7981)
18	Buncefield Lane, Hemel Hempstead	LBA	Habitation (McDonald Forthcoming b)
19	Thorley Village	LBA EIA	Substantial habitation (McDonald 1995b;Herts. SMR:9277)
20	North of Thorley Wood	EIA	Substantial habitation (McDonald 1995b; Herts. SMR:9278)
21	John Warner School, Hoddesdon	LBA	Habitation (Herts. SMR:9619)
22	Rucklers Lane, Kings Langley	LBA	Habitation (McDonald 1994)
23	Ring Hill, Essex	EIA	probable Iron Age enclosure (Fox 1923:139-41)
24	Rickneys, Hertford	LBA	Habitation (Percival and Richmond 1997)
25	Cole Green	LBA EIA	Substantial habitation (McDonald forthcoming a)
26	Lea Valley Site A, Stansted	LBA	Substantial habitation (Havis and Brooks forthcoming)
27	Lea Valley Site B, Stansted	LBA	Substantial habitation (Havis and Brooks forthcoming)
28	Apsley, Herts	LBA EIA	Substantial habitation (McDonald 1994; 1995a)
29	Oakwood, Herts	LBA.EIA	Habitation; few finds (Mcdonald 1994; 1995a)
30	Pea Lane, Herts	EIA	Habitation; date unclear (McDonald 1994; 1995a)

31	Bottom House Lane	LBA.EIA	Habitation (McDonald 1994; 1995a)
32	Ivinghoe Beacon	LBA.EIA	Habitation (Cotton and Frere 1968)

5.5.4 Late Iron Age Sites with Earlier Iron Age Evidence

This category represents Late Iron Age sites which are in the same general location (within c500 metres) of dated earlier Iron Age occupation. The distribution of sites is shown in Figure 5.7. This also serves to identify those sites which may have earlier Iron Age origins, although in only a few cases can continuity of occupation from the earlier Iron Age be reasonably be inferred.

The Late Bronze Age/earlier Iron Age evidence has been divided into two classes on the basis of its context: sites with *in situ* evidence and sites which are known from artifacts only which have been found in Late Iron Age deposits. The division has been made because the date and status of the evidence in the latter category is much less certain than the former. The sites in both classes are listed in Tables 5.10 and 5.11 below which also include a brief summary of the evidence.

1. Sites which have in situ Evidence

This is represented by Late Iron Age sites with deposits or features which can be archaeologically dated to the Late Bronze Age or earlier Iron Age including evidence which is discontinuous spatially and/or temporally with the site. It could therefore include evidence, which for example, had an end date several hundred years before the Late Iron Age and was several hundred metres from the site. Table 5.10 lists the sites within this class including a summary of the nature of the evidence based on the categorisation in Table 5.8 above.

Table 5.10, Late Iron Age Sites with *in situ* Earlier Iron Age Evidence

No	Site Name	Date	Evidence
127	Blackhorse Road, Letchworth	LBA EIA	Substantial habitation and enclosures covering several hectares (Moss Eccardt 1988)
206	Wilbury Hill, Letchworth	LBA EIA	Dated enclosure and interior occupation of hillfort (Applebaum 1949; Moss Eccardt 1964)
1	Ravensburgh Castle	EIA	Dated enclosure and interior occupation (Dyer 1976)
24	Hadham Hall School,	EIA	Substantial habitation and enclosures (Walker

			1994; Herts. SMR:2838)
107	Raffin Green	LBA	Occupation: pottery and metalwork (Rook et al. 1982)
28	Foxholes	LBA EIA	Substantial habitation including enclosures (Partridge 1989)
33	Harlow	EIA	Occupation including a building (France and Gobel 1985)
34	Wendens Ambo	EIA	Substantial habitation including enclosures (Hodder 1982)
64	Wards Coombe, Ivinghoe	EIA	Dated enclosure and habitation (Dunnett 1973)
37	Puddlehill	LBA EIA	Substantial habitation with shifting foci covering several hectares including enclosures (Matthews 1976)
154	Lobbs Hole, Stevenage	EIA	Substantial habitation including enclosure (Hunn 1997)
57	Thorley	LBA EIA	Substantial habitation with shifting foci covering several hectares including enclosures and field system (McDonald 1995b)
216	Wallbury Hillfort	EIA	Dated enclosure (Essex SMR:16)
169	Weston Hills, Baldock	LBA	Occupation: pits (Hutchings and Richmond 1994)
171	Holwell	LBA EIA	Substantial habitation with shifting foci covering several hectares (Beds. Co. 1998b)
172	Leavesden Aerodrome	EIA	Substantial habitation including enclosure (Brossler 1999; Herts. SMR:10048)
204	Cholesbury	EIA	Dated hillfort defences (Kimble 1933)
205	Birchanger	LBA/EIA	(Medlycott 1994)
61	Long Border A, Stansted	LBA/EIA	Occupation (Brooks and Bedwin 1989)
78	Social Club Site, Stansted	LBA/EIA	Substantial habitation (Brooks and Bedwin 1989)
63	Duckend Farm, Stansted	LBA/EIA	(Brooks and Bedwin 1989)
65	Bury Lodge, Stansted	LBA/EIA	(Brooks and Bedwin 1989)
141	King Harry Lane, St. Albans	LBA	Occupation evidence from three shallow features (Longworth 1989:53)
140	Folly Lane St. Albans	LBA	Occupation evidence (Niblett 1999)
209	Crawleys Lane	?EIA	Habitation; evidence including six post structure and burial (McDonald 1994:52-65)
84	Grim's Ditch, Hamberlins Wood	EIA	Occupation: Late Iron Age pottery mixed with Early Iron Age forms in ditch filling (McDonald 1994:69-70)
44	Prior's Wood, Hertford Heath	LBA/EIA	Occupation; Early Iron Age pottery found on site. Also, Late Bronze Age metalwork and associated pits found c200 metres from Late Iron Age burial (Partridge 1980b)

2. Sites Defined by Artifacts Only

This class includes those sites which have produced artifacts which are, or appear to be, typologically Late Bronze Age or earlier Iron Age in date but which are contained within Late Iron Age deposits. The objective is to identify instances where there may be Late Bronze Age/earlier Iron Age occupation present in the vicinity although no dated deposits have been identified. The evidence is generally in the form of hand-made pottery in forms and fabrics which are characteristic of the earlier Iron Age and which

are assumed to be residual in the Late Iron Age contexts. However, as the details of the chronology of production of such pottery is not known for the Study Area, it is possible that some types continued to be used in the Late Iron Age. Table 5.11 lists the sites which fall within this category including a summary of the artifactual evidence.

Table 5.11, Late Iron Age sites with earlier Iron Age artifacts

No	Site Name	Evidence
16	Park Street.	Coarse hand-made jar (O'Neil 1945:Fig. 15,10)
88	Grubs Barn, Welwyn Garden City	A shell-tempered bead rim jar. It looks hand made, but this is not mentioned in the pottery report (Rook 1970a:34 & fig III no. 1).
89	Crookhams	A hand-made, shell-tempered bead rim jar securely stratified in a ditch dated to the late 1st century BC (Rook 1968a:60 & fig.VII, no 13).
90	Brickwall Hill	Surface finds of pottery paralleled at Hengistbury Head. Also earlier Iron Age pottery (Rook 1970b:30). A La Tène D1b brooch in stratified 1st century BC deposit (Haselgrove 1997:69). Pottery includes non-grog tempered, in what appears to be hand-made forms (Rook 1970b:25).
105	Welches Farm	Pottery includes 'gritty earlier Iron Age sherds' (Thompson 1982:850).
114	Gatesbury Track	Hand-made vessels in EIA forms with some grog tempering and some wheel-thrown vessels which are not grog-tempered. Almost all in the earliest features are hand made. (Partridge 1980a:116-30; Thompson 1982:640; Hill forthcoming b).
113	Stead Area A & B, Baldock	Approximately 25% of the published 1st century BC and AD forms are hand-made. This proportion increases to 50% in features dated to the 1st century BC. The fabrics are mainly grog, but include sand and shell temper. Pottery and presence of two probable La Tène D1b brooches leads Haselgrove to classify ditch as Middle/Late Iron Age (Haselgrove 1997:57; Stead & Rigby 1986).
122	Gatesbury, Henderson Collection	Unstratified group includes non-grog tempered EIA forms (Partridge 1981).
133	Station Road, Puckeridge	A hand-made saucepan pot in sand tempered fabric in 1st century AD deposit (Partridge 1979:55, fig 14 no. 43).
142	Mayne Avenue, St. Albans	Numerous earlier Iron Age forms (I Thompson pers comm.).
150	White Swan Yard, Ware	Straight-sided saucepan-type pot with grog and vegetable tempered fabric (Partridge and Day 1980:155).
151	Wheathamstead Bypass	72 sherds of pre-Late Iron Age flint-gritted pottery (Saunders and Havercroft 1982:29).
199	Hudnall Common	Surface finds of earlier Iron Age pottery (Morris and Wainwright 1995).
208	Stoney Lane, Herts.	handmade jars and saucepan style vessels in undefined Late Iron Age deposits (McDonald 1994:119).

5.5.5 The Williamson Survey

The 36 concentrations of Iron Age pottery which Williamson categorised as sites are also shown in Figure 5.7 (see Williamson 1984 & Chapter 4 above). The precise dating of the sites within the general later prehistoric - Late Bronze Age to Roman period (c1000 BC to cAD 100) is not known, nor is their nature or character. However, the sites have been included as they represent evidence of occupation and are the result of one of the few examples of a systematic survey in the Study Area. They therefore demonstrate the extent of later Prehistoric occupation of the Boulder Clay areas and indicate the potential of the remainder of these areas for settlement of these periods.

5.5.6 Analysis of the Evidence

1. General Patterns in the Evidence

Table 5.12 lists the total number of sites within the chronological categories. Analysis of the figures reveals two significant points.

1 Comparisons between earlier and Late Iron Age sites reveals that there are twice as many Late Iron Age sites, even though all of the sites which might conceivably have been later Bronze Age or earlier Iron Age have been included in the calculation. The figures in themselves would therefore suggest that a substantial increase in the number of sites occurred during the Late Iron Age.

2. The combination of the small proportion of the total number of Late Iron Age sites with evidence for earlier occupation (37=16%) and the high proportion of the total number of earlier sites with no Late Iron Age evidence (31=45%), would suggest a substantial discontinuity of settlement occurred between the earlier and Late Iron Age. The proportion of Late Iron Age sites with earlier evidence is further reduced to 15% if those which lack earlier Iron Age evidence are removed, and to 10 % if the sites without direct evidence are also removed.

Table 5.12, categories of later prehistoric sites

Category	Number
Late Bronze Age & earlier Iron Age Only (Table 5.9)	31
Unspecified later prehistoric (Williamson Survey)	36
Late Bronze Age and/or earlier Iron Age and Late Iron Age (Table 5.10)	26
Late Iron Age with earlier Iron Age artifacts (Table 5.11)	11
Total Late Bronze Age & earlier Iron Age	104
Total Late Iron Age (Table 2.3)	226

However, although there are reasons for supposing that localised increases in the number and changes in the location of sites did occur (see below), there are several important inherent biases which need to be taken into account before accepting the overall figures at face value.

1. Changes in artifact production and deposition practices that occurred in the Late Iron Age resulted in much greater quantities of artifacts, especially pottery and brooches, being circulated and deposited in the ground (Willis 1997:209). Therefore, it is likely that the large quantities of Late Iron Age pottery in particular may in some cases have obscured the presence of any earlier Iron Age occupation present in the same area. Examples of possible slight evidence for earlier Iron Age occupation on Late Iron Age sites has been presented in Table 5.11. This data is taken from published pottery reports; of which the examples represent the majority. Although this evidence does not provide direct evidence of occupation, it would seem likely that a significant proportion of the remaining unpublished Late Iron Age sites could have contained similar earlier Iron Age evidence which has been masked or destroyed by Late Iron Age features.

2. The results of several systematic surveys in Eastern England have shown that Late Iron Age pottery fabrics survive better in the topsoil than those of the earlier Iron Age (Willis 1997:209). Late Iron Age sites are therefore more likely to be discovered from fieldwalking surveys. However, as relatively few of the Late Iron Age sites from the Study Area have been discovered in this way, its effect in terms of the proportion of Early and Late Iron Age sites is unlikely to be significant.

3. Un-enclosed settlement appear to be more typical in the earlier Iron Age than the Late Iron Age (Willis 1997:209; Bryant 1997). The large enclosure ditches of Late Iron

Age sites are therefore more likely to be detected from aerial survey than the more ephemeral pits and ditches of earlier Iron Age sites. However, as with the pottery visibility bias, the relatively low number of Late Iron Age sites in the Study Area which have been detected from aerial photographic evidence means that its effect is minimal in terms of the relative numbers of early and later sites.

Summary

The evidence as presented in Table 5.12 suggests both a discontinuity between earlier and Late Iron Age settlement, and a substantial increase in the number of settlements in the Late Iron Age. However for the following reasons, it is likely that this impression is exaggerated.

1. The proportion of Late Iron Age sites which were occupied in the Late Bronze Age or earlier Iron Age is likely to be higher than the evidence currently suggests, due to the relatively small quantities of earlier pottery being obscured by large quantities of Late Iron Age artifacts. However, it is not possible to quantify this affect.

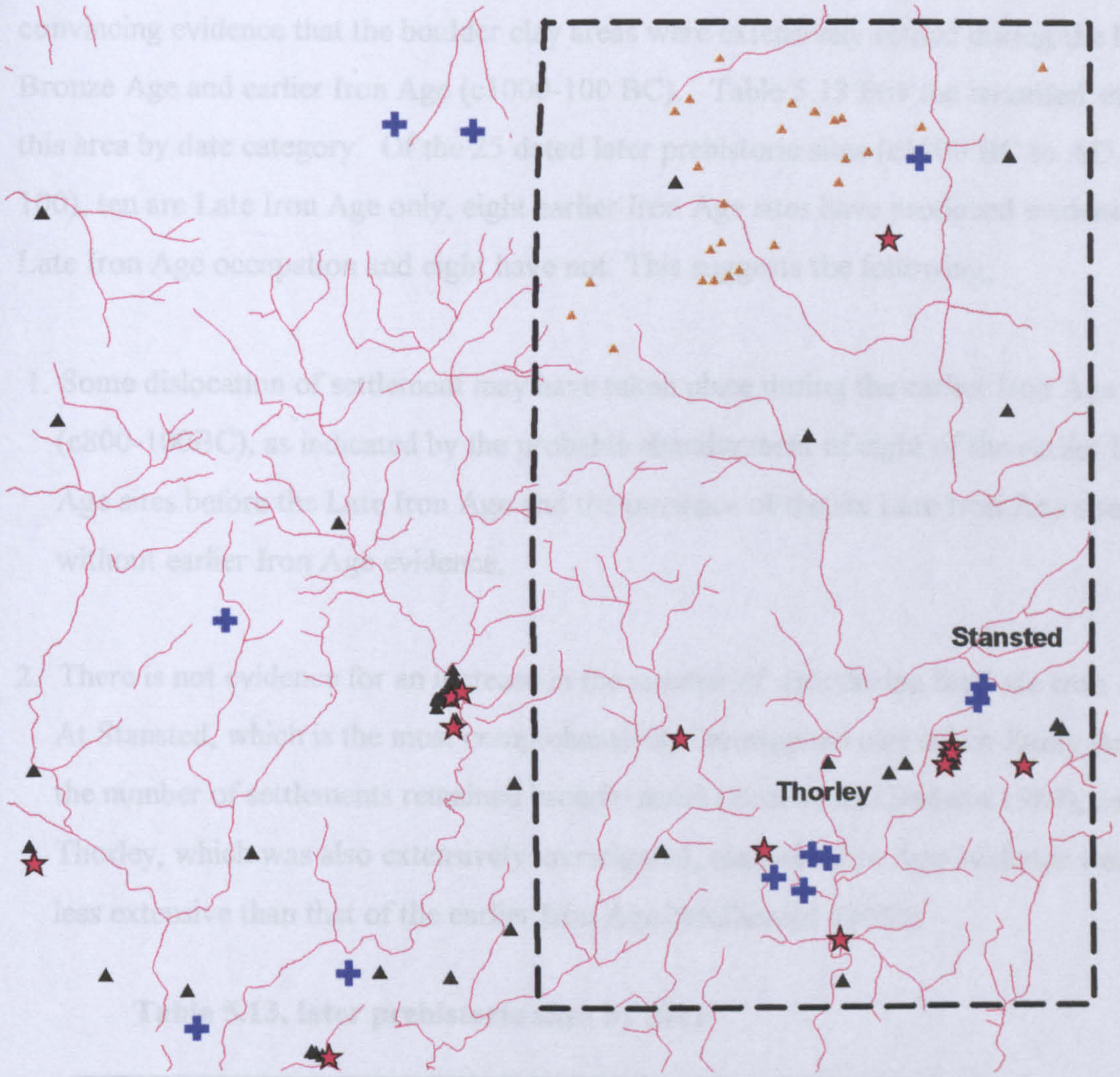
2. The relative proportion of the total number of Late Bronze Age and earlier Iron Age sites in comparison to Late Iron Age sites is likely to be greatly under-represented due to the generally much lower archaeological visibility of later Bronze Age and earlier Iron Age sites in comparison with those of the Late Iron Age.

2. Localised Spatial Patterns in the Evidence

The Boulder Clay Plateau (Figure 5.8)

There is a clustering of sites both with and without evidence for Late Iron Age occupation in the eastern half of the Boulder Clay environmental zone. This is partly due to the presence in this part of the Study Area of two large development-related projects at Stansted and Thorley, Bishop's Stortford both of which have been the subject of intensive archaeological fieldwork and have produced substantial evidence of later prehistoric settlement (Brooks and Bedwin 1989; McDonald 1995b). The later prehistoric sites found from the Williamson Survey also lie within this area (Williamson 1984).

Boulder Clay Inset



LBA/EIA Sites Without LIA Evidence

LBA/EIA Sites with LIA Evidence

Late Iron Age Sites

Boundary of area considered

Williamson Survey

Rivers

Figure 5.8

Although not dated to a point within the later prehistoric period (c1000 BC to AD 100), they do demonstrate that the fieldwalked area was settled. Even if it is assumed that some of the sites (possibly as much as 50%) were not occupied at the same time or do not represent permanent habitation, the high density of pottery scatters does nonetheless indicate extensive settlement. Together, therefore, the three groups of sites provide convincing evidence that the boulder clay areas were extensively settled during the Late Bronze Age and earlier Iron Age (c1000-100 BC). Table 5.13 lists the recorded sites in this area by date category. Of the 25 dated later prehistoric sites (c1000 BC to AD 100), ten are Late Iron Age only, eight earlier Iron Age sites have produced evidence of Late Iron Age occupation and eight have not. This suggests the following;

1. Some dislocation of settlement may have taken place during the earlier Iron Age (c800-100BC), as indicated by the probable abandonment of eight of the earlier Iron Age sites before the Late Iron Age and the presence of the six Late Iron Age sites without earlier Iron Age evidence,

2. There is not evidence for an increase in the number of sites during the Late Iron Age. At Stansted, which is the most comprehensively investigated part of the Study Area, the number of settlements remained broadly static (Brooks and Bedwin 1989), and at Thorley, which was also extensively investigated, the Late Iron Age evidence was less extensive than that of the earlier Iron Age (McDonald 1995b).

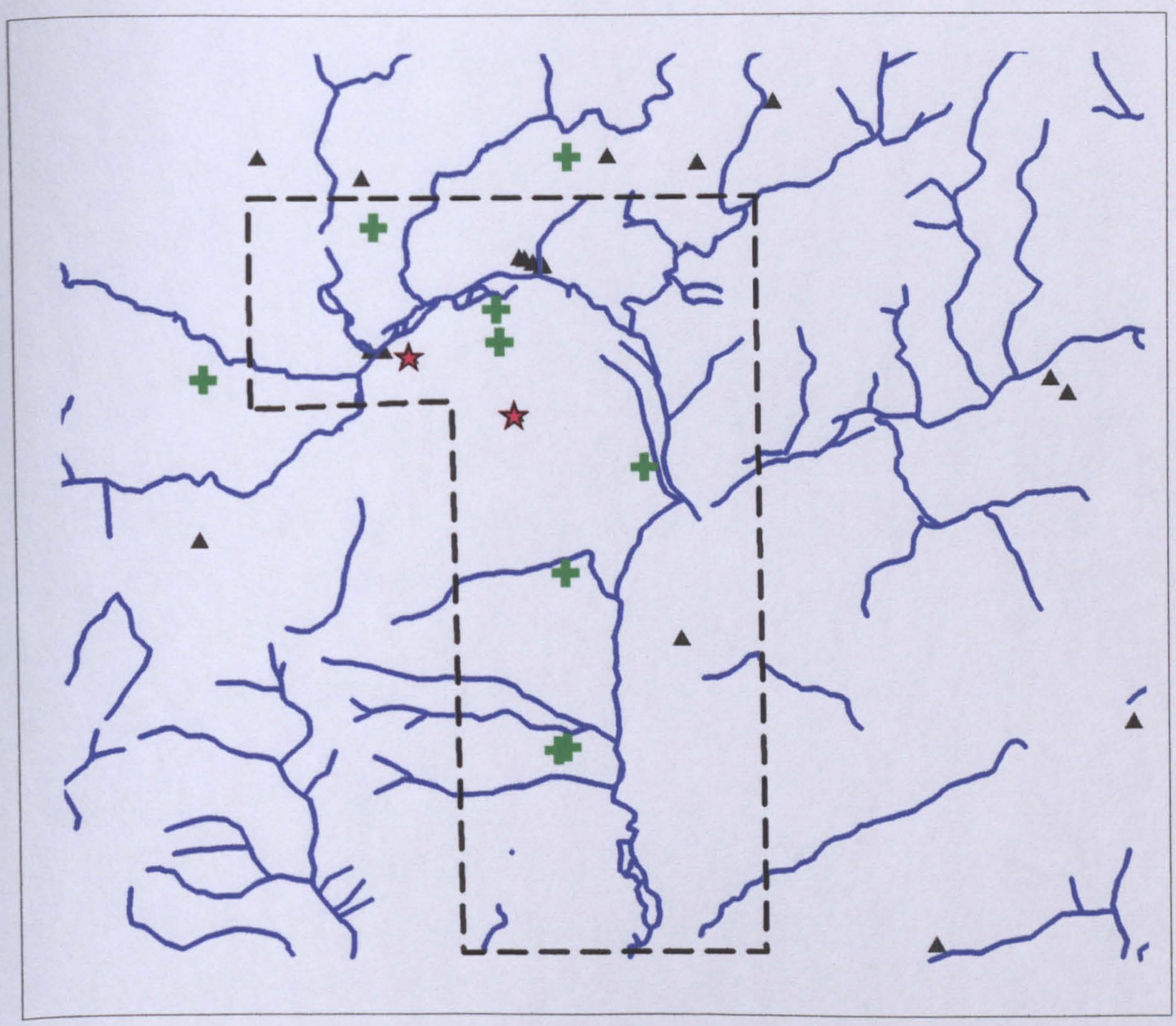
Table 5.13, later prehistoric sites by area

Zone	LBA/EIA	EIA/LIA	LIA
Boulder Clay	8	7	10
Lea Valley	7	2	8
Icknield Belt	0	8	32
River Valleys	0	10	75

The Lea Valley (Figure. 5.9)

The stretch of the Lea Valley between Welwyn and Enfield is approximately 26 kilometres in length. It runs in an east/west direction between Welwyn and Ware and gradually broadens from c700 metres to 1000 metres wide. The Valley then turns to

Lea Valley Inset



Area under consideration

Late Iron Age with earlier evidence

LBA/EIA Sites Without LIA Evidence

Late Iron Age Sites

Rivers

Figure 5.9

north/south direction between Ware and Broxbourne and from there until it leaves the Study Area at Enfield the Valley is much wider, averaging three kilometres.

Table 5.13 lists the numbers of sites within this part of the Valley for each of the three chronological categories. As with the boulder clay area referred to above, there is an absence of continuity in the observed evidence with only two of the seventeen dated sites having evidence of both earlier and Late Iron Age occupation (Foxholes Farm and Hertford Heath). The eight Late Iron Age sites also include the cluster of five at Ware, which has been identified as an area of detailed although unsystematic research. The lack of evidence for Late Iron Age sites along the wide north/south length of the Lea Valley, which has been heavily developed, is particularly notable. The extent of development especially gravel extraction within this area may have under-represented the extent of Late Iron Age settlement within the Valley and it is also possible that there is a number of as yet undiscovered Late Iron Age sites there. Nonetheless, the observed evidence suggests that there is no evidence of expansion of settlement or population increase during the Late Iron Age and there may have been some discontinuity of settlement between the earlier and Late Iron Age.

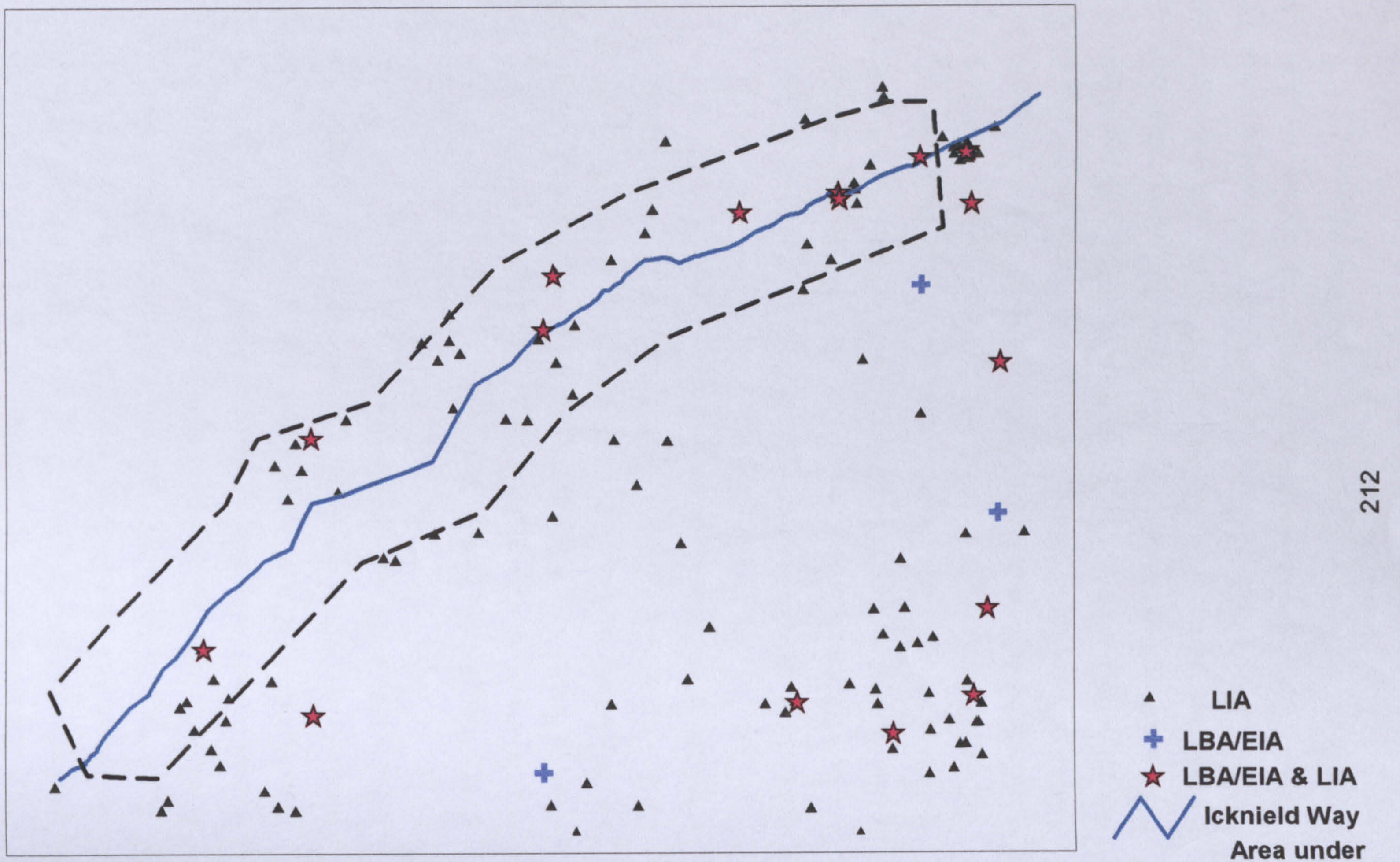
The Icknield Belt (Figure. 5.10)

The spatial relationship between Late Iron Age sites and the area within three kilometres of the Icknield Way to the west of Baldock (locally refered to as the Icknield Belt) has been refered to above. Table 5.13 reveals that of the forty sites within this area, eight have produced evidence for earlier Iron Age occupation and, in all but one case the evidence is from dated deposits or features. However no Late Bronze Age/earlier Iron Age settlements are known from this area that are not situated on or close to Late Iron Age sites. Therefore, observed evidence would suggest a possible expansion of settlement in the Late Iron Age, and unlike the Lea Valley and boulder clay areas, no significant discontinuity of settlement between the earlier Iron Age and Late Iron Age.

Although the usual caveats regarding the biases inherent in the observed evidence (from fieldwork, development and the greater archaeological visibility of Late Iron Age evidence) need to be taken into account before conclusions are made regarding the

Icknield Way Inset

Figure 5.10



significance of the evidence, the contrast between the Icknield Belt and the Lea Valley and boulder clay areas are clear and worthy of note.

Three Late Bronze/earlier Iron Age settlements without Late Iron Age evidence are known from the Icknield Belt to the east of Baldock and the absence of Late Iron Age evidence at two of these sites (Whiteley Hill and Barley) is well attested from excavation (Bryant 1994; Cra'ster 1961), although at the third (Arbury Banks hillfort) the absence of excavation means that the reliability of the negative evidence is less certain. The contrast between the Icknield Belt either side of Baldock has been noted above in terms of the number of Late Iron Age sites. This contrast is also apparent in terms of the later Bronze Age/earlier Iron Age evidence, which together with the Late Iron Age evidence indicates that the differences may be significant.

River Valleys and Late Iron Age Site Clusters

Four clusters of ten or more Late Iron Age sites have been identified within river valleys (Baldock, Braughing, Ashridge and St. Albans) and another large cluster is situated on and between the river valleys of the Lea and Mimram at Welwyn Garden City. Three of the clusters (Baldock, Braughing and St. Albans) are also statistically significant in terms of the settlement distribution model postulated in Chapter 4.

The Late Iron Age sites from these clusters which have produced evidence for earlier Iron Age occupation are listed in Table 5.13. For all of the identified sites, the evidence is from typologically early artifacts only, and indeed, all of the sites listed in Table 5.13 are located within the four site clusters (Crookhams, Grubs Barn, Brickwall Hill and Welches Farm from Welwyn; Station Road, Gatesbury and Gatesbury Track from Braughing; Mayne Avenue from St. Albans; Stead areas A & B from Baldock; and Hudnall Common from Ashridge). Conversely, all of the earlier Iron Age evidence from the site clusters is in the form of typologically early artifacts. The quantities of early artifacts at several of the sites is, however, very small, with only one pot represented in the published reports at each of Crookhams, Grubs Barn and Station Road, Puckeridge. The Stead site at Baldock, and the two sites at Gatesbury, Braughing contain larger amounts of published pottery which could represent evidence of more substantial early occupation although the pottery is not quantified in these reports.

In the case of Baldock the published report contains by far the largest number and highest proportion of hand-made vessels from the Study Area, although there are few pottery reports with which to compare it (Stead & Rigby 1986). As might be expected, the highest proportions of hand-made wares are found in the earliest features, dated to the early first century BC in the report. However, only a few sherds are of the sand, shell and flint tempered fabrics which are more typical of the pottery found on earlier Iron Age sites (Bryant 1995). The large number of hand-made wares from Baldock would therefore tend to support an early emphasis for the site within the Late Iron Age pottery sequence, which could perhaps date from sometime in the 2nd century BC – before wheel-thrown wares became dominant – but there is no published evidence for any substantial earlier Iron Age (800-200 BC) occupation. Also, variations in the chronology of the adoption of the potters wheel in the Late Iron Age have recently been suggested by Hill (Hill forthcoming b). Therefore, it is possible that the characteristic wheel-made 'Belgic' pottery was not in common use at Baldock until a period later than sites further south such as Braughing, which, if true, could indicate a later date for Baldock.

The evidence from Gatesbury Track is reviewed in chapter 7 below, where it is suggested that the site may date from the second century BC.

In summary, there is no significant stratified evidence of earlier Iron Age occupation within the areas of the five Late Iron Age site clusters. The evidence of typologically earlier Iron Age material also suggests that any earlier Iron Age occupation which this might represent is unlikely to have been extensive, apart from possibly Gatesbury Track. This may however be due in part to the taphonomic biases caused by Late Iron Age occupation and depositional practices refered to above. The pottery from Baldock and Gatesbury Track, Braughing does provide evidence that there was probably significant occupation of these sites early in the Late Iron Age. Estimating a likely calendar date for such occupation is problematic, although it could be as early as the second century BC.

Summary and Conclusions

The above assessment has shown that only a small proportion of Late Iron Age sites have produced evidence of Late Bronze Age or earlier Iron Age occupation. The location of earlier settlement does not, therefore, appear to have been a dominant or controlling factor in the location of Late Iron Age sites. Moreover, a comparison of the distribution of the evidence for earlier and Late Iron Age sites reveals evidence of a substantial discontinuity in location between the two periods. The following is a summary of the identified localised variations which provide the evidence for discontinuity;

1. a marked disparity in the lower Lea Valley between a relatively high concentration of later Bronze Age and earlier Iron Age settlement and an almost total absence of Late Iron Age sites,

2. evidence for extensive later Bronze Age and earlier Iron Age settlement of the eastern boulder clay areas which does not appear to increase significantly in the Late Iron Age,

3. evidence for continuity of settlement location between the earlier and Late Iron Age along the Icknield Belt of the Chilterns and an increase in the number of sites in the Late Iron Age,

4. evidence for a significant number of new Late Iron Age sites at several points along river valleys.

Some of these observed patterns are likely to be influenced by the effects of biases in the evidence. These include differences in the quality and location of archaeological fieldwork and development, and the changes in production and deposition of artifacts in the Late Iron Age, refered to above. Variations in the intensity of fieldwork does not appear to have had a marked affect on the patterns and some of the most marked differences occur between the areas which have been studied in detail, such as between Stansted Airport and the five identified site clusters. The only identified distorting factor is the presence of typologically early artifacts on some sites within the settlement

clusters in valleys, which could indicate that earlier sites are being masked by the later evidence, although the evidence does not indicate substantial former occupation.

5.6 Chronological Patterns in the Late Iron Age

The aim of this section of the thesis to assess the evidence for site chronology in terms of locational patterns and numerical frequency for the Late Iron Age and Early Roman Periods. In particular, a comparison between sites dated to the first century BC and sites dated later in the Late Iron Age and a consideration of the evidence for site continuity in the later first century AD.

A definition, which is primarily cultural and technological, has been used for the gazetteer of Late Iron Age sites: namely the presence of wheel-thrown, grog-tempered pottery. As a chronological indicator, this definition does not have a high degree of resolution, the approximate date-range being 150-50 BC for the beginning and AD50-100 for the end. As a consequence, the data from a large proportion of sites is insufficient for the purposes of asking any more detailed questions concerning chronology.

5.6.1 Gazetteer of Datable Sites

Presentation of the Evidence

Table 5.14 provides a summary of those Late Iron Age sites, extracted from the main gazetteer (Table 2.3) for which the available or published evidence enables some chronological resolution to be achieved within the adopted Late Iron Age definition.

The following fields of information is included in this and subsequent tables:

Number	The gazetteer reference number
Date summary	Abbreviation of date (see chapter 2 for an explanation)
Evidence	Published date and a brief summary of the evidence which has been used to arrive at the date.
Reference	References for dating evidence

The date entered in the *Evidence* field is as given in the available report or which is detailed in Thompson's corpus of 'Belgic' pottery (Thompson 1982). In those cases where either no date is given for the site in the report or it is particularly ambiguous, a calendar date has been entered in the table from the evidence of dated artifacts in the report. However, no re-interpretation has been undertaken of the dating evidence for the sites or the artifacts which form the basis of the dating. Likewise, the reason given for the dating is a summary of the interpretation presented in the report. For the sake of brevity this has been summarised to one or two sentences in which only the main reasons are presented. For those sites for which the dating issues are particularly complex, such a summary will inevitably oversimplify the evidence and arguments used for dating in the report. However, in terms of the objectives of the study which are concerned with assessing only broad chronological patterns, the identification of the date and key evidence are the main priorities. In addition, the finer and more complex aspects of the dating of the site clusters will be examined individually and in greater detail in Chapter 7 below.

Sites which could not be closely dated

Table 5.14 lists 87 (38%) of the total of 226 sites in the gazetteer for which there is sufficient evidence from available sources to assign a date with reasonable confidence to a calendar range or sub-period within the Late Iron Age. This includes those sites for which there is evidence for occupation throughout the estimated calendar period of the Late Iron Age (c150 BC to AD 50/100). Some of the remaining 140 sites which could not be dated within the defined Late Iron Age fall within the Source of Evidence classification as *casual find* or *fieldwalking survey*. These sites therefore invariably either have poor records or are represented by generally undiagnostic artifacts. There is, however, a significant proportion of the total which are more extensively investigated sites and for which the evidence is either unavailable or is still in the process of analysis.

Table 5.14, sites with evidence for dating

No	Name		Dating Evidence	Reference
7	Norton Road, Stotfold	EIA.RB	EIA pottery, pedestal urn, butt beakers and Early Roman pottery suggest occupation from EIA to Roman.	Steadman 1995; Turner and Ashworth 1997; Beds Co. 1995.
16	Park Street 1	AD.RB	1st century AD. Late Iron Age forms mixed with Early Roman material	O'Neil 1945; Thompson 1982:795-7

17	Park Street 2	AD.RB	As above: no. 16	Saunders 1963
23	Little Wymonley	AD.RB	Five ditches containing early 1st century AD pottery	Went 1992:11; Herts. SMR:2606
24	Hadham Hall	EIA.RB	Earlier Iron Age to Early Roman occupation. Late Iron Age represented by Belgic pottery; no imports or import copies	Herts. SMR:2838
27	Black Boy	AD.RB	Scatter of 1st century AD, Late Iron Age pottery. Presumably dated by typology	Herts SMR 4541
28	Foxholes	EIA. RB	70-20 BC on the absence of imports and similarities to Wheathampstead	Partridge 1989:14-15
33	Harlow	EIA.RB	Occupation and votive deposits from earlier Iron Age to Roman period	France and Gobel 1985: Bartlett 1987
34	Wendens Ambo	EIA.RB	Absence of 'Belgic' pottery; could indicate no Late Iron Age phase	Hull 1963; Hodder 1982
35	Saffron Walden	EIA.RB	Small quantities of pottery dating from earlier Iron Age to Roman including a rim dated 50-0 BC	Bassett 1982
37	Puddlehill	EIA.RB	Occupation from earlier Iron Age to Roman including typologically early Belgic and later Belgic import copies.	Matthews 1976: 163-79
40	Luton, Rosslyn Crescent	AD.RB	Cremation cemetery. Pottery & associated Colchester brooches indicates AD date	Thompson 1982:776-8
44	Hertford Heath	BC.RB	Main burial is 1st century BC. Early Roman satellite burial	Hussen 1983; Thompson 1982:727-9
45	Grove Mill, Hitchin	BC	1st century BC burial group dated from absence of imports and typology of burial urns	Herts. SMR:107 Birchall 1965:fig.13, 1140
52	Millbridge, Hertford	? AD.RB	Single burial with copy of import and samian bowl, probably early Roman	Herts SMR:9881: Murray 1996
55	Panshanger Burial	BC.RB	Imported metalwork and import copies of pottery. Dated to c10 BC by Stead	Stead 1967
60	Airport Catering Site, Stansted	BC.AD	Phase 1 75-25 BC, pottery comparable to Gatesbury track and Foxholes. Phase II 40-60 AD	Brooks & Bedwin 1989; Havis and Brooks forthcoming
61	Long Border A, Stansted	AD.RB	3 1st century AD/early Roman burials plus a scatter of similarly dated pits and ditches. Dated from pottery import copies and brooches	Brooks & Bedwin 1989; Havis and Brooks forthcoming
62	Duckend Car Park, Stansted	AD.RB	Cremations ditches and post-hole dated to 1st century AD on the presence of imports and copies	Brooks & Bedwin 1989; Havis and Brooks forthcoming
63	Duckend Farm, Stansted	AD.RB	6 cremations dated to 1st century AD on the presence of copies of imported pottery and brooches. Also early Roman (Flavian) cremations	Brooks & Bedwin 1989; Havis and Brooks forthcoming
64	Wards Coombe, Ivinghoe	EIA.RB	Occupation and burials from later 1st century BC to early Roman period from pottery and brooches	Dunnett 1973
68	Essenden	BC.RB	La Tène D metalwork hoard dated to later 1st century BC	Herts SMR: 6821
71	Orchard Site	BC.RB	Single urned cremation dated c30 BC. Other undated Late Iron Age features and extensive Roman occupation	Morris & Wainwright 1995; Zeepvat 1995b:21-2
72	Dellfield	BC	Later 1st century BC cremations. Dated on typology and absence of imports	Thompson & Holland 1982:143-8
78	Social Club, Stansted	AD.RB	1st century AD and early Roman cremations, dated from pottery	Brooks & Bedwin 1989; Havis and Brooks forthcoming

79	Gorhambury	AD.RB	cAD 20 onwards on the basis of import copies in earliest features. Continues into Roman	Neal et al 1990: 13-14
86	Stanborough 1 School	AD.RB	1st century AD by presence of imported pottery and copies	Arnold 1954
87	Stanborough School 2	AD	Dated to cAD 60 from pottery	Hunn 1999
88	Panshanger School (Grub's Barn)	AD	Period 1 AD 0-30 on similarities of pottery to Verulamium and Panshanger Burial (see no. 55) but imports are absent so could be 1st century BC. Period 2 mid 1st century AD	Rook 1970b
89	Crookhams	AD.RB	AD 0-60 on comparisons of pottery with Verulamuim and Colchester. Copies of imports present. Roman kiln cut LIA feature but general lack of Roman occupation is reason for terminus at AD 60	Rook 1968a
93	Brickwall Hill	EIA.RB	Period 1: mid 1st century BC. Dated on basis of parallels with Wheathampstead pottery and La Tène Dab brooch Period 2: dated mid 1st century AD on the basis of comparisons with pottery from Colchester and Crookhams (see above no.89). Period 3: drainage ditch of late 1st/early 2nd century AD	Rook 1970a; Haselgrove 1997
98	Prospect Place, Welwyn	BC.RB	50-10 BC: dated by Stead from imports. Also possible 1st century AD finds from the site	Stead 1976; Thompson 1982: 853
103	Lockleys, Welwyn	AD.RB	Mid 1st century AD. Dated on the basis of imports and import copies. Most was mixed with Early Roman material	Ward-Perkins 1937; Thompson 1982:769
104	Panshanger Golf Course (Nutfield)	AD.RB	Mid 1st century AD and Early Roman. Dated from pottery	Rook 1970b; Thompson 1982:789
106	Hollards Farm, Codicote	AD	AD 0-70 on the basis of imports and import copies and absence of Flavian and later Roman materiel	Burleigh et al. 1990
107	Raffin Green	AD.RB	Mid 1st BC to mid 1st AD cremation. Belgic urns are undignostic	Herts. SMR:6309; Rook et al. 1982
109	Braughing Bath House	BC.AD	Main period of occupation 10 BC-AD 30 on the basis of imports	Partridge 1978
110	Ralph Sadlier School, Puckeridge	BC	30-10 BC. Dated from absence of imports	Partridge 1978
111	Wickham Hill Nursery, Braughing	AD	Mid 1st century AD continuing into early Roman. Import copies illustrated	Partridge 1978:90-97
113	Station Road, Puckeridge	AD	AD 0-60 from imports coins and brooches. End dated by absence of Neronian coins. Main period of occupation AD 30-45.	Partridge 1980a
114	Gatesbury Track 1979, Braughing	BC.AD	c100/30 BC to AD 20 on early imports and early Belgic pottery	Partridge 1980a; Hill forthcoming b)
115	Skeleton Green, Braughing	BC.AD	c10 BC to AD 60 with main period of occupation from 10 BC to AD 20.	Partridge 1981
116	Ermine Street 1971-2, Braughing	AD.RB	AD 30 onwards based on date of imports	Potter and Trow 1988
117	Wickham Kennels 1989, Braughing	BC.AD	30 BC to cAD 50 with main period of occupation 30-15 BC. Dated from imports and copies of imports.	Going 1990

119	11 Buntingford Road, Puckeridge	AD.RB	AD 60-100 Dated from pottery	Borell 1983
121	Wickham Kennels 1982, Braughing	AD	AD 25-75 continuing into Roman. Dated from Samian and Gallo-Belgic imports	Partridge 1982
122	Gatesbury 1936, Braughing	BC.AD	Mid 1st century BC. Dated on presence of earlier Iron Age forms and early 'Belgic' pottery	Partridge 1981
123	Wilbury Hill, Letchworth	EIA.RB	Earlier Iron Age and 'Belgic' pottery. 'Belgic' is mainly non-grog tempered and probably 1st century BC	Applebaum 1949; Moss Eccardt 1964; Thompson 1982:864-5
127	Blackhorse Road, Letchworth	EIA.RB	Earlier Iron Age and occupation probably during 1st centuries BC and AD. Pottery included 'Belgic' grog-tempered and 2 sherds of Gallic imports.	Moss Eccardt 1988; Birley 1988
130	1980-1 Site, Baldock	BC.RB	Burials and other ritual activity dating from mid 1st century BC to beginning of Roman period. Dating from pottery and brooches	Burleigh 1982; 1995a
132	Hartsfield School 1987, Baldock	BC.RB	Analysis of pottery not yet undertaken. a provision date of 50 BC-AD is given.	Burleigh 1995b
133	Baldock: Stead Areas A and B	BC.RB	From early 1st century BC to Roman. Dating from large assemblage of pottery, coins and brooches	Stead & Rigby 1986
139	The Tene, Baldock	BC.RB	Burial dated from imports to early 1st century BC.	Stead & Rigby 1986
140	Folly Lane, St Albans	AD.RB	Early 1st century AD occupation, ritual enclosure and shaft burial dated cAD 50 from imports. Continues into Roman period	Niblett 1999
141	King Harry Lane, St Albans	AD.RB	c15 BC to AD 60 cemetery Dated from imports and brooches.	Stead & Rigby 1989
142	Mayne Avenue, St Albans	EIA.AD	Earlier Iron Age to mid 1st century AD. Evidence from pottery.	I Thompson pers. comm.
143	Verulamium Insula XVII	AD.RB	AD 5-50. Dated from Belgic pottery, including possible amphora	Frere 1983:103-5: Thompson 1982: 939: Saunders 1982a:34
144	Great Chesterford	AD.RB	Roman and Late Iron Age occupation on the same site	Crossen et.al. 1990
145	St Albans Abbey	AD	First half of 1st century AD. Dated from Belgic pottery, including import copies	Saunders & Havercroft 1978:16-35; SMR:7354
146	Prae Wood 1933	AD	ditto	Wheeler & Wheeler 1936
147	Prae Wood 1931	AD	ditto	Wheeler & Wheeler 1936
148	Pond Field, St Albans 1932	AD	ditto	Wheeler and Wheeler 1936
149	Pond Field, St Albans 1960	AD	ditto	St. Albans UAD:26
151	Wheathampstead Bypass	AD	AD 5-50 based on similarities to Prae Wood pottery, especially copies of imports	Saunders & Havercroft 1982:30
152	Wheathampstead	BC	1st century BC based on absence of imports or copies	Wheeler & Wheeler 1936
154	Lobs Hole, Stevenage	EIA.RB	Earlier Iron Age and 1st century BC. Based on absence of imports or import copies	Hunn 1997
155	Old Parkbury, Radlett	BC	later 1st century BC, on the basis of the absence of imports or import copies	Niblett 1990
156	West Street, Ware	BC	Later 1st century BC on the basis of absence of imports or copies of imports	Gibson et al. 1982: 134-5; Partridge and Day 1980

159	Verulam Hill Fields, St Albans	AD.RB	AD 5-50 cemetery, dated from pottery import copies.	Anthony 1968
160	Bedmond Lane 1960	AD	Pottery dated AD 0-50	St. Albans UAD:200
161	Bedmond Lane 1967	AD	Ditto.	St. Albans UAD:201
162	Aston	AD.RB	1st century AD possible continuing into Roman. Dated from imports	Herts. SMR:7971
163	Pond Field 1933, St Albans	AD	First half of 1st century AD. Dated from Belgic pottery, including copies of imports	Wheeler & Wheeler 1936:15-21
164	Baldock Area 2,	BC.RB	later 1st century BC to Roman period. dated from pottery and coins	Burleigh 1995a
166	Stead Area D, Baldock	AD.RB	AD 25-50 continuing into Roman. dated from pottery (not illustrated)	Stead & Rigby 1986
171	Holwell Quarry	EIA.RB	Earlier Iron Age through to Early Roman period.	Beds. Co. 1998b
172	Leavesden Aerodrome	EIA.RB	Main period of occupation appears to be 1st century AD	Brossler 1999
173	Turners Hall Farm	BC.RB	Occupation from the early 1st century AD, although the presence of Dressel 1A amphora indicates earlier occupation	Herts. SMR:9913
180	Broomhill Farm	AD.RB	1st century AD 'native pottery including Trajanic and Flavian samian wares'	Rook 1982 et al.:21 no 4
181	Wick Avenue, Wheathampsted	AD	Burial sealed by pottery of 1st century dated cAD 60	Herts. SMR: 9795
183	Marford, Wheathampstead	AD	AD 5-50 based on similarities to Prae Wood pottery, especially copies of imports	Saunders & Havercroft 1982:11-12
184	Mardleybury	BC	Burial dated to 1st century BC based on imports	Stead 1967
185	Redbourn	AD	Pottery dated cAD 15-50	SMR: 9625
190	Verulamium Insula XXVII	AD.RB	AD 5-50 based on imports (stamped *Terra Nigra* plates)	Frere 1983:193-4
205	Birchanger	AD.RB	Pottery dated to the mid 1st century AD	Medlycott 1994
213	St. Stephen's	AD.RB	Cremation burials dating from the mid 1st century AD	Niblett 1999:399-401

Analysis of the sources for dating

Over 90% of the sites have been dated from 'Belgic' pottery by means of reference to the published assemblages from Prae Wood, Wheathampstead and Camlodunum and/or the presence or absence of imported wares or copies of imported wares. Indeed the presence or absence of imports was also used to date the periods of occupation at these three sites (Wheeler & Wheeler 1936:12,16; Hawkes & Hull 1947:28). A summary consideration of the evidence for the chronology of imports is therefore desirable.

5.6.2 Chronological Framework

The Chronology of Imported Pottery from Gaul and Italy and Local Copies of Imports

The earliest dated imports of known provenance in the Late Iron Age (from c150 BC) are Italian pottery and metalwork. All of the metalwork is known from a few richly furnished burials (Stead 1967) most of which lie within the Study Area. The chronology and significance of these burials will be discussed in more detail in Chapter 6 below. The pottery comprises Dressel 1A amphora and Arretine table wares which are known from a restricted number of burials and occupation sites.

Following the Roman conquest of Gaul in the first century BC, a number of centres for the commercial production of Romanised fine-ware pottery were set up in the central and northern parts of the province and parts of lower Germany. The pottery comprised standardized forms of beakers, cups flagons, bowls and plates (platters) for the serving and consumption of food and drink and also some specialised storage jars. Pottery from these centres was imported to a few sites in Southern England from c15 BC and spread more widely in the early first century AD (Tyers 1996).

The pottery report in Hawkes and Hull (1947) of the Sheepen site at Camulodunum provided the first detailed study of a large corpus of Gallic imported pottery from Britain which included comparisons with key Roman military sites close to the production centres in Gaul. In particular, comparisons of the potters stamps on Gallo Belgic fine-ware imports of *Terra Rubra* and *Terra Nigra*, between Sheepen and closely dated sites in the production area demonstrated that the earliest imports were probably arriving at Sheepen in the last quarter of the first century BC (Hawkes and Hull 1947:202-4). More recent analysis of a number of imported pottery assemblages from sites within the Study Area by Rigby has supported the general chronology of early fine-ware imports from Gaul, but has revealed a much more complex picture in terms of the geographical distribution of production and the chronology of the imports to Britain (Rigby 1980:104-13; Rigby 1981:159-65; Stead & Rigby 1986:226; Rigby 1989)

The most recent detailed assessment by Rigby of Gallic imports is from the King Harry Lane cemetery (Stead & Rigby 1989:117-45). Rigby identifies four regions which were

importing pottery to the cemetery from c10 BC. The following is a summary of Rigby's chronology:

Central Gaul (northern edge of the Massif Central)	Distinguished by the presence of micaceous clays. The earliest imported example is probably from the Panshanger Burial c10 BC.
Gallia Belgica (Marne-Vesrle and Moselle valleys)	Two main types of fine-ware, *Terra Rubra* (TR) and *Terra Nigra* (TN), distinguished by the colour of finish. TR was being produced - and imported - from c15 BC. Five main variants were identified. TN was imported from about the same time, but initially in much smaller quantities. By cAD 20 the output of TN was greater than TR and by cAD 40 very little TN was being produced.
Northern Gaul (North of Massif Central, excluding Armorica)	Exclusively butt-beakers in fine white fabrics. Source is not known for certain, but is likely to be northern Gaul. Imported from c10 BC. Only known from larger sites (Braughing, Camulodunum, Canterbury)
Northern Gaul and Lower Germany	Flagons in white fabric imported from c10 BC.

Copies of imported Gallic pottery in grog-tempered fabrics are present in significant quantities on a number of sites in southern England, including many from the Study Area, from the early first century AD. The production centres for this pottery are not known, but they are assumed to be locally produced in southern England (Thompson 1982). The earliest date for the production of such copies is probably from the Panshanger burial, dated c10 BC on the basis of the date of an imported silver Italian cup (Stead 1967). The pottery accompanying this burial is significant in providing evidence for the dating of indigenous pottery production, as it includes a single imported Central Gaulish flagon alongside over twenty local copies of the full range of Gallic table wares including three flagons of a different type to the import. Therefore, the pottery group provides evidence that the production of high-quality copies of Gallic table-wares may have been established by c10 BC. Tyers considers that these vessels were probably locally produced and are the products of a mature potting tradition (Tyers 1996:53). The wide range, high quality and possible copying of archaic forms therefore suggests that the importing and copying of Gallic fine-ware pottery may have been taking place from c25 BC.

In summary, imports of Gallic pottery and local copies were probably occurring from c25 BC, but are not present in significant quantities until c15-10 BC. Thereafter, they are common finds on the majority of occupation sites with in the Study Area.

Framework of Analysis

The composition of pottery assemblages with respect to the nature of imported pottery or local copies of imports has been used as the framework for the analysis of the chronology of occupation of Late Iron Age sites. Other dating evidence will also be used, such as coins, metalwork and other classes of pottery where this is available. The advantages of using imports and copies of imports for dating are that they are easily recognised and their presence or absence is consequently noted in the field, and the chronological resolution achieved can be relatively fine (10-30 years). The disadvantages are.

1. The lack of imported pottery or its copies on a site could have been due to social or economic factors. For instance, it may not have been available to, or demanded by' particular social groups. This was almost certainly the case with early imports during the first century BC which appear to have been restricted to burials and a few occupation sites (Hill forthcoming b). The penetration of imports and copies in the first century AD was much greater but there is some evidence that not all settlements used them (see below). Therefore, their absence can not, in most cases, be used as definitive evidence of early occupation or the lack of later occupation.

2. Gallic imports and copies often occur in Roman contexts, particularly on the more intensively occupied sites. For instance, at Baldock Gallic imports occurred frequently in second and third century AD contexts (Rigby 1986).

In the absence of other independent dating evidence the assumption has been made, for the purposes of this assessment, that the period in which imports and their copies began to be deposited on most Late Iron Age sites in the Study Area was c20 BC-AD 10. More specific dating within this range will be made where the evidence justifies this.

Evidence of Earlier Iron Age Contacts with Northern France and Belgium

The period between c550 and 150 BC - corresponding to La Tène B-C in Western Europe and the Middle Iron Age of Southern England - has traditionally been seen a time when cross-channel links were minimal and most developments were insula. There are, however, some reasons for suggesting that significant links may have been occurring between some parts of Study Area and northern France and Belgium during this period.

A strong connection between southern England and the Marne area of France during the fifth and fourth centuries BC was argued by Hawkes (1962) and developed by Harding (1974:157-73) based on the similarities between angular pottery from southern England and the distinctive angular *vase carenes* pottery from Marnian burials, and similarities between metal work from the Thames and the Marne. The closest parallels with the *vase carenes* is the decorated, angular pottery of the Chilterns named after two sites at Chinnor in Oxford and Wandlebury in Cambridge (Cunliffe 1978) and which is known from a number of sites in the north of the Study Area (Bryant 1995:21). The importance of any connection has, however, been largely dismissed on chronological grounds, with most of the English pottery and metalwork now shown to date from before the currency of the *vase carenés* pottery. However, in reviewing the evidence for the 'angular pottery horizon' of continental influence from the Marne, Barrett has said that pedestal bases and scoring as a means of decoration probably date from the fifth and fourth centuries BC (Barrett 1980:286-7). The high frequency of these two traits on Chinnor/Wandelbury pottery and *vase carenes* therefore suggests that the links between the Marne and Chilterns may still be valid. A connection between the Thames Valley/Chilterns and the Marne/Champagne area during this period is also supported by Collis who considers that the similarity between their pottery, brooches and daggers indicate that significant inter-regional contact was occurring between the two areas (Collis 1984b:118).

Possible evidence of slightly later contacts with northern France and Belgium has recently come from two examples of hand-made pedestal jars at Arbury Banks, near Ashwell in the Study Area and Broom in Bedfordshire (Hill forthcoming *b*). These are

of uncertain date, but are likely to be third or second century BC and demonstrate a familiarity with the continental wheel-made jars that, almost certainly, was acquired from formal contacts between the two areas. This, albeit slight, evidence therefore hints that the links with northern France and Belgium evident in Chinnor/Wandlebury pottery for the fifth and forth centuries BC, might have continued into the third and second centuries.

5.6.3 Analysis of the Evidence: First Century BC to AD 45

1. Occupation Beginning During the First century BC

Table 5.15 lists sites for which there is evidence that occupation began during the 1st century BC before the date-range c15 BC-20 AD. The aim is to identify sites for which there is evidence that occupation began during the earlier first century BC. All are dated on the basis of pottery assemblages, from deposits which do not contain Gallic pottery imports or copies of imports. The list excludes those sites for which there is evidence for first century BC occupation as well as earlier Iron Age occupation, dated to the third-first century BC, on or in the close vicinity to the Late Iron Age occupation. Although for these sites there is no direct evidence of continuity from the earlier to the Late Iron Age, for the purposes of this exercise, it is assumed that occupation began in the earlier Iron Age. The evidence for the status of the sites in Table 5.15 is presented in Table 15.14 above.

Table 5.15, sites with occupation beginning in first century BC

No	Site Name
44	Hertford Heath
53	Panshanger Burial, Welwyn Garden City
60	Airport Catering Site, Stansted
68	Essenden
71	Orchard Site, Cow Roast
88	Panshanger School (Grubs Barn)
93	Brickwall Hill, Welwyn Garden City
98	Prospect Place, Welwyn
110	Ralph Sadlier School, Puckeridge
114	Gatesbury Track, Braughing
117	Wickham Kennels 1989
130	Baldock 1980

133	Stead Areas A & B, Baldock
139	The Tene, Baldock
152	Wheathampstead
155	Old Parkbury
156	West St. Ware
184	Mardleybury

Eighteen sites have been identified which fall within the stated criteria which represents 8% of the total number of Late Iron Age sites and 20 % of the dated sites. In terms of probable function, seven of the eighteen are primarily ritual or burial sites. This is almost certainly due to the high incidence of early, dated imported artifacts from these sites. In terms of analysis of geographical distribution the sample is too small and biased by the dated artifacts from burials to derive any meaningful conclusions. However, the location of twelve of the sixteen sites within the five identified sites clusters indicates a possible expansion of activity in these areas in the 1st century BC, the significance of which will be explored in more detail below.

2. Late Iron Age Occupation Ending before 20 BC-AD 10

This category is intended to identify sites for which there is evidence of occupation in the first century BC but which had ceased before the period in which imports and their copies were deposited in significant number. It will also assess the evidence for periods of abandonment between the above date-range and later dated periods in the first century AD. Tables 5.16 and 5.17 shows the sites, extracted from Table 5.14 which possess these criteria.

Table 5.16, sites with 'Belgic' pottery but no imports

No	Site	Evidence, including for nearest later occupation
28	Foxholes, Hertford	Later 1st and 2nd century AD pottery in the upper fills of Late Iron Age ditches suggests gap in occupation from c20 BC to AD 70.
72	Dellfield, Berkhamsted	No evidence of 1st century AD or Roman occupation in the vicinity
151	Wheathampstead	Early 1st century AD occupation is known from several sites within 1000 metres
110	Ralph Sadlier School, Puckeridge	Early 1st century AD occupation known within 200 metres
155	Old Parkbury	No 1st century AD occupation known from the vicinity
156	West St. Ware	Early Roman occupation known 500m to the west.

Table 5.17, sites with evidence for gaps in occupation

No	Site	Evidence
24	Hadham Hall	Absence of imports and 'Belgic 'wares suggests possible undefined period of abandonment
34	Wendens Ambo	Ditto
60	Airport Catering Site Stansted, Period I	An identified gap between c20 BC and AD 40
154	Lobbs Hole, Stevenage	Absence of imports suggests a possible gap in occupation in the early 1st century AD

The most obvious points to make about the sites listed is their small number and the fact that all have been the subject of excavation, all but two of which (Wheathampstead and Dellfield) are recent and extensive. The low number of sites is therefore likely to have been due at least in part to the generally poor quality of the Late Iron Age evidence for the Study Area which has been identified in Chapter 4.

Of the six sites in Table 5.16 which were probably abandoned, two (Wheathampstead and Ralph Sadlier School) are within 500 metres of sites which were occupied in the early first century AD. Other first century AD sites are also known within one kilometre. Therefore, it is possible that the occupation/deposition focus of these sites was relocated to one or other of the nearby identified sites. However, the functional context of the two identified sites and their later neighbours is not clear, which indicates that the relationship between the sites could be more complex than a simple abandonment/relocation scenario.

Of the four sites listed in Table 5.17, only Stansted has well-attested evidence for a phase of abandonment. For the other three sites, social or economic reasons for the absence of imports are more likely, based on the available evidence (the significance of this is considered below).

3. Occupation Beginning Between c10 BC and 45 AD

This category is intended to identify those sites for which the earliest occupation occurs between c10 BC and cAD 45. The sites are dated on the basis of the presence of pottery assemblages containing Gallic or Italian pottery imports and/or local copies but which do not contain Roman pottery. Roman pottery is defined as Claudian or Flavian

samian ware and the local products of the Hadham and Verulamium Region kilns, which start from cAD 45 (Parminter 1989:185; Hartley 1989:191). The sites which fall within this category are listed in Table 19.

Table 5.18, sites with occupation beginning c10 BC to AD 45

No	Site Name
16	Park Street 1
17	Park Street 2
23	Little Wymondley
27	Black Boy, London Colney
52	Millbridge, Hertford
61	Long Border A, Stansted
62	Duckend Car Park, Stansted
63	Duckend Farm, Stansted
64	Ward's Coombe, Ivinghoe
78	Social Club, Stansted
79	Gorhambury
86	Stanborough School 1
87	Stanborough School 2
88	Panshanger school
89	Crookhams, Welwyn Garden City
103	Lockleys, Welwyn
104	Panshanger Golf Course, Welwyn Garden City
106	Hollards Farm, Codicote
109	Braughing Bathhouse
111	Wickham Hill Nursery, Braughing
113	Station Road, Puckeridge
115	Skeleton Green, Braughing
116	Ermine Street 1971-2, Braughing
121	Wickham Kennels 1982, Braughing
140	Folly Lane, St Albans
141	King Harry Lane, St Albans
142	Mayne Avenue, St Albans
143	Verulamium Insula XVII
145	St Albans Abbey
146	Prae Wood 1933, St. Albans
147	Prae Wood 1931, St. Albans
148	Pond Field 1932, St. Albans
149	Pond Field 1960, St. Albans
151	Wheathampstead Bypass
159	Verlam Hill Fields, St. Albans
160	Bedmond Lane 1960, St. Albans
161	Bedmond Lane 1967, St. Albans
162	Aston
163	Pond Field 1933, St. Albans
166	Stead Area D, Baldock
180	Broomhill Farm, Watton-at-Stone
181	Wick Avenue, Wheathampsted
183	Marford, Wheathampstead
185	Redbourn
190	Verulamium Insula XXVII
205	Birchanger, Bishop's Stortford
213	St. Stephen's, St Albans

Analysis

The beginning of occupation of 48 sites have been dated to the period c10 BC to AD 45 on the basis of the above criteria, representing 20% of the total number of sites and 52% of the dated sites in Table 5.14. In addition, a further eight sites have evidence of Gallic imports or copies mixed with Roman pottery in contexts which are therefore Roman in date. The Late Iron Age pottery from these sites is likely to be either residual or has remained in circulation into the Roman (post AD50) period.

In respect of the distribution of sites, 30 of the 46 are located within the five identified site clusters, made up of sixteen from St. Albans, six from Braughing, one from Baldock and seven from Welwyn. The reasons for this are likely to be mainly due to the following;

1. the relative concentration of the higher quality field work in these areas which has resulted in published evidence of datable deposits,

2. using the archaeological *event* as the basis for 'site' entries means that each investigation is entered separately. Excavation campaigns within large settlements, such as by the Wheelers at Prae Wood in the 1930s are therefore represented by several 'site' entries. Nonetheless, the apparent increase in the evidence of occupation in these areas is worthy of note and will be examined further below. Most of the remaining sites are also from well researched areas including three from Wheathampstead, and four from Stansted.

4. All Sites with Dated Occupation between c10 BC and AD 45

Table 5.19 lists the total number of Late Iron Age sites which have evidence for occupation dating between c10 BC and AD 45. This includes the sites where there is evidence occupation began during this period (as represented by the sites in Table 19) and those where occupation began at an earlier period and continued until cAD 45. 66 sites are listed in table, representing 75% of the total number of dated sites, which compares with 20% dated to the first century BC (Table 5.15). It should, however, be pointed out that many of the Late Iron Age sites for which dating evidence was not available may have been occupied during this period.

Table 5.19, sites occupied c10 BC to AD 45

No	Site Name
16	Park Street 1
17	Park Street 2
23	Little Wymondley
27	Black Boy
33	Harlow
37	Puddlehill
52	Millbridge, Hertford
60	Airport Catering Site, Stansted
61	Long Border A, Stansted
62	Duckend Car Park, Stansted
63	Duckend Farm, Stansted
78	Social Club, Stansted
79	Gorhambury
86	Stanborough School 1
87	Stanborough School 2
88	Panshanger School (Grub's Barn)
89	Crookhams, Welwyn Garden City
93	Brickwall Hill, Welwyn Garden City
103	Lockleys, Welwyn
104	Panshanger Golf Course
105	Welches Farm, Datchworth
106	Hollards Farm, Codicote
107	Raffin Green
109	Braughing Bath House
113	Station Road, Puckeridge
114	Gatesbury Track 1979, Braughing
115	Skeleton Green, Braughing
116	Ermine Street 1971-2, Braughing
117	Wickham Kennels 1989, Braughing
119	11 Buntingford Road, Puckeridge
121	Wickham Kennels 1982, Braughing
122	Gatesbury 1936, Braughing
124	Wilbury Hill, Letchworth
126	Archers Way, Letchworth
127	Blackhorse Road, Letchworth
133	Stead Areas A and B, Baldock
140	Folly Lane, St Albans
141	King Harry Lane, St Albans
143	Verulamium Insula XVII
145	St Albans Abbey
146	Prae Wood 1933, St. Albans
147	Prae Wood 1931, St. Albans
148	Pond Field, St Albans 1932
149	Pond Field, St Albans 1960
151	Wheathampstead Bypass
158	Salisbury Ave., St Albans
159	Verlam Hill Fields, St Albans
162	Aston
151	Wheathampstead Bypass
163	Pond Field 1933, St Albans
164	Baldock Area 2,
166	Stead Area D, Baldock

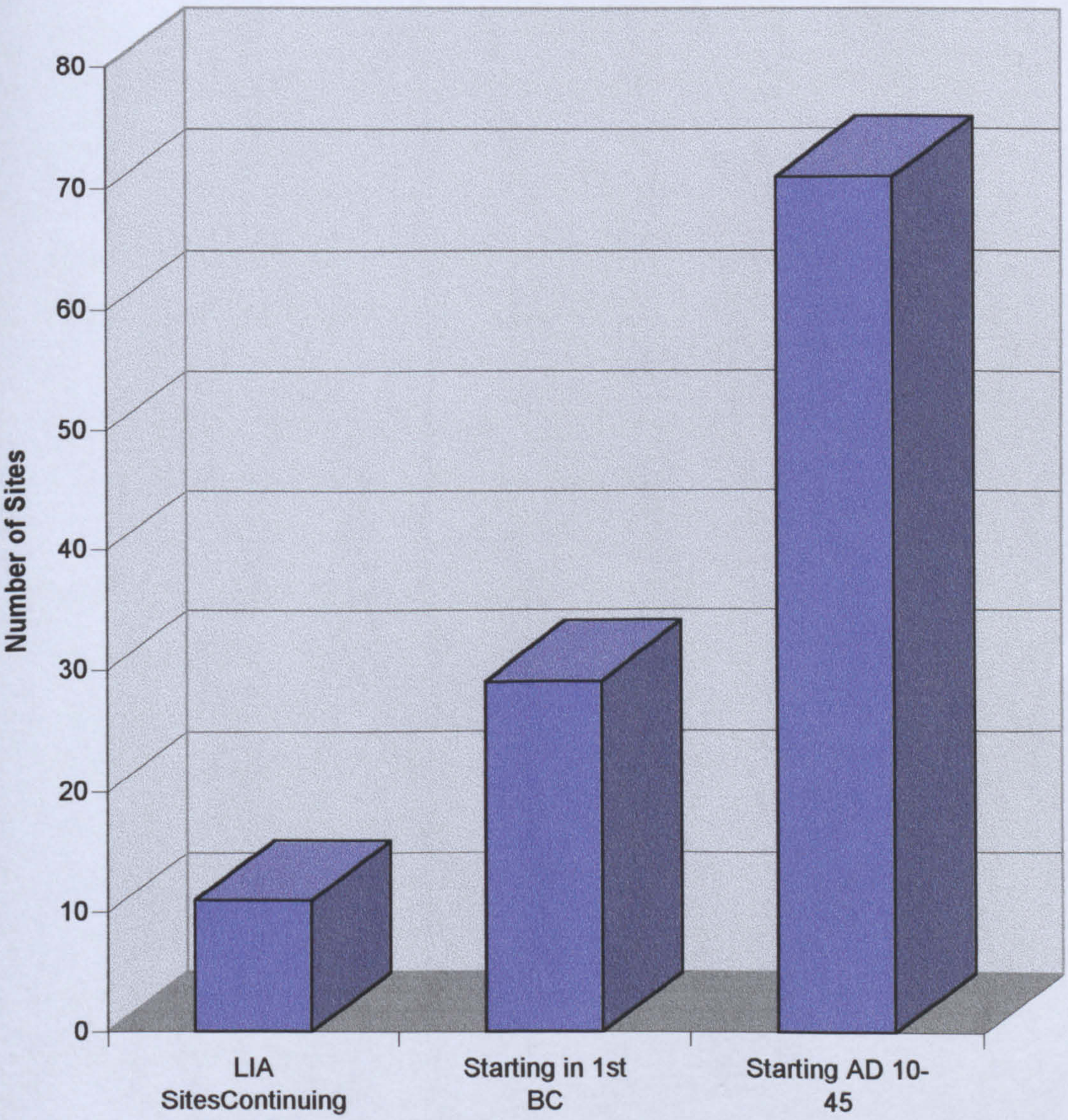
171	Holwell Quarry
172	Leavesden Aerodrome
173	Turners Hall Farm
180	Broomhill Farm
181	Wick Avenue, Wheathampsted
185	Redbourn
190	Verulamium Insula XXVII
191	Verulamium Insula XIX
192	Verulamium Insula XXI2
193	Verulamium Insula XXVIII
205	Birchanger, Bishop's Stortford
213	St. Stephen's, St. Albans

Chronological Development of Settlement, EIA to AD 45: Conclusions

Figure 5.11 shows the total cumulative figures for dated Late Iron Age settlements from those which have evidence of earlier Iron Age occupation until cAD 45. The figures need to be treated with caution because of the various caveats mentioned above including the biases caused by selective fieldwork, the problems with accurately dating sites, the fact they represent less than 35% of the total number of sites, and uncertainties over the nature of the occupation/settlement represented for most of the sites. It should also be noted that the figure in the left hand column includes only those sites from Table 5.10 for which occupation from the EIA to the LIA can reasonably be inferred. In addition, the cumulative total in the right-hand column, (71), is higher than the total in Table 5.19 (66), because it includes the Welwyn Type burials (Hertford Heath, The Tene, Prospect Place Welwyn and Panshanger) and the Essenden ritual site. These are dated to the first century BC and do not have dating evidence for the period 10 BC-AD 45, but all have evidence of Roman occupation nearby indicating probable continuity of their role to AD 45. Although these factors reduce the reliability of the figures, some clear patterns are nonetheless discernible which are worthy of note.

The most obvious observation is that, given the uncertainties over dating, the rate of increase in numbers is relatively uniform over the period c100 BC to AD 45, with a notable but undramatic rise during the period c10 BC to AD 45. The second observation is that there is little evidence for discontinuity of settlement during the period. Again, the evidence that can be used to infer abandonment of settlement or phases of gaps in occupation is only present in a few sites. Nonetheless, the available

Figure 5.11: Cumulative Site Numbers from EIA to AD 45



evidence does not suggest substantial abandonment or movement of settlement during this period.

5.6.4 The Late Iron Age/Early Roman Transition: Analysis of the Evidence for Dating and Continuity

The aim of this section is to examine the relationship between Late Iron Age and Early Roman settlement. In particular, the influence of Early Roman settlement on pre-existing Late Iron Age settlement and visa-versa. In doing this, two related aspects of the evidence for dating will be examined;

1. the proportion of Late Iron Age sites which have produced evidence for Early Roman settlement on or close to the site,

2. the identified Late Iron Age sites where occupation can reasonably be inferred to be continuing onto the Early Roman period.

Only the evidence of Roman occupation on, or very close to, Late Iron Age sites, has been considered. The task of mapping the full extent of Early Roman settlement within the Study Area has not been undertaken as it was considered that the results, in terms of the added information about the development of Late Iron Age settlement (which is a primary objective of the thesis) would be unlikely to have justified the work involved. A analysis of the spatial relationship between Late Iron Age and known Early Roman settlement in total has therefore not been undertaken. However the distribution of all Roman sites, taken from the County SMRs, has been mapped on Figure 8, and this has been compared with the distribution of Late Iron Age sites.

The Late Iron Age Early Roman Transition: Dating

The dating of the transition within the Study Area from the Late Iron Age to the Roman period in terms of both cultural and political definitions is problematic. The process of assimilation of Roman cultural forms by the indigenous population, including new dress, methods of food consumption, burial and structural forms (houses and settlement enclosures) appears to have occurred gradually between c50 BC and AD 100, with a

rapid acceleration between AD50 and 100 following the Roman conquest. The recent dating of the royal burial at Folly Lane St. Albans to cAD 50-55 (Niblett 1999) also suggests that direct Roman political control probably did not occur until after that date. AD 70 has, therefore, been chosen as a notional date after which direct Roman political control was probably in place and Roman cultural forms were becoming dominant within at least the upper social levels of the native population. For the purposes of this assessment, the term 'occupation' is defined by human activity which results in the deposition of artifacts.

The Context of the Evidence

In order to address the above aims, the evidence for Roman occupation of Late Iron Age sites included in the gazetteer is presented at three levels in terms of the archaeological confidence of the association of the Late Iron Age and Roman remains. However, the assessment is based primarily upon the Roman rather then the Late Iron Age evidence.

1. Table 5.20 lists all those Late Iron Age sites in the gazetteer which have features or deposits that are dated to post AD 70 by means of pottery or coins. Therefore, it includes sites which have not been dated to a period or phase within the Late Iron Age as well as sites where the earliest dated Roman evidence is from the 2nd century AD. A summary of the nature of the evidence dating to post AD 70 and its context is provided in the table. 92 sites are included in the table.

It is likely that these sites are not particularly representative of the distribution of Late Iron Age sites with Early Roman evidence. An analysis of the circumstances of the discovered of the Late Iron Age remains represented reveals that 27 (29%) have been discovered only by chance during the investigation of known Roman sites and an analysis of the types of Roman remains represented also reveals that 41 (45%) of the total are Roman towns, villas or temples. These are the most archaeologically visible Roman sites, but it is unlikely that they represent any more than 20% (at most) of Roman sites, the majority of which were probably rural farmsteads. The concentration of archaeological excavation on the most visible Roman sites has, therefore, significantly distorted the distribution of the Late Iron Age sites which

have evidence for Roman occupation in favour of the higher status and urban settlements.

Table 5.20, Late Iron Age sites with evidence of Roman occupation

No	Site	Evidence
7	Norton Rd., Stotfold	Early Roman pottery on Late Iron Age settlement (Beds. Co. 1995)
15	Dane field, Pirton	Late Iron Age and Roman occupation found in the same excavation trench (Went and Burleigh 1990)
16	Park Street 1	Late Iron Age deposits found on site of Roman villa (O'Neil 1945)
17	Park Street 2	Ditto (Saunders 1963)
21	Buryfields, Ware	Roman burials found 50 metres from Late Iron Age ditch (Day 1980a)
22	St. Andrews St. Hertford	Roman pottery found together with Late Iron Age pottery in ditch. Also later Roman occupation on the same site (Cooper-Reade 1990a)
23	Little Wymondley	Extensive Roman occupation in the vicinity of Late Iron Age features (Went 1992)
24	Hadham Hall, Little Hadham	1st century AD Roman occupation on same site as Late Iron Age site (Walker 1994)
25	Walls Field, Baldock	Late Iron Age features found on Roman urban site (Applebaum 1932)
28	Foxholes, Hertford	Roman artifacts deposits in Late Iron Age ditches and extensive occupation in vicinity (Partridge 1989)
32	Rothampsted	Late Iron Age features found on site of Roman mausoleum (Lowther 1937)
33	Harlow	Late Iron Age structure and votive finds within Roman temple precinct. Roman votive finds also from excavation area (France and Gobel 1985; Bartlett 1987)
34	Wendens Ambo	Roman structural evidence present on the same site as Iron Age remains (Hodder 1982)
35	Saffron Walden	Roman pits and quarries present in the same area as Late Iron Age remains (Bassett 1982:31)
37	Puddlehill	Roman occupation in the same area as Late Iron Age settlement (Matthews and Warren 1992)
44	Hertford Heath	Roman satellite burials adjacent to Late Iron Age burial (Hussen 1983)
49	Exnalls Farm, Little Hadham	Extensive undefined area of Late Iron Age and Roman occupation (Cooper-Reade 1991)
52	Millbridge, Hertford	Single cremation of transitional Late Iron Age/Early Roman date. Also enclosure ditch and late Roman occupation (Murray 1996; Herts SMR:9881)
54	Glaxos, Ware	Late Iron Age ditches found on site of Roman urban occupation (Zeepvat 1997; Herts. SMR:9145)
55	Panshanger Burial, Welwyn Garden City	Roman satellite burial adjacent to Late Iron Age burial (Stead 1967)
57	Thorley.	Roman habitation adjacent to Late Iron Age burial enclosures (McDonald 1995b; Herts. SMR:9275)
61	Long Border A, Stansted	Ditches and pits of Roman date adjacent to three Late Iron Age/Early Roman cremation burials (Havis and Brooks forthcoming)
62	Duckend Car Park, Stansted	Later 1st century AD Roman burials in same cemetery as Late Iron Age burials (Havis and Brooks forthcoming)

63	Duckend Farm, Stansted	Later 1st century AD Roman burials in same cemetery as Late Iron Age burials (Havis and Brooks forthcoming)
64	Ward's Coombe, Ivinghoe	Roman occupation including cremation (Dunnett 1973)
65	Bury Lodge Lane, Stansted	Roman enclosure and field system adjacent to Late Iron Age enclosure (Brooks & Bedwin 1989:16; Havis and Brooks forthcoming)
68	Essenden	Roman coins indicate continuing deposition at Late Iron Age ritual site (Herts SMR: 6821)
70	Kingswoodbury Clothall	Concentration of Late Iron Age and Roman features on same site (Herts SMR:7360)
71	Orchard Site, Cow Roast	Late Iron Age burial on site of Roman urban settlement (Morris & Wainwright 1995; Zeepvat 1995b:21-2)
78	Social Club, Stansted	1st century AD and Early Roman cremations (Havis and Brooks forthcoming)
79	Gorhambury, St. Albans	Extensive Late Iron Age occupation of Roman villa site (Neal et al. 1990)
86	Stanborough 1 School, Welwyn Garden City	Three late 1st century AD burials adjacent to Late Iron Age enclosure (Arnold 1954)
89	Crookhams, Welwyn Garden City	2nd century AD Roman pottery kiln cut into Late Iron Age ditch (Rook 1968a)
92	Free Church Hall, Welwyn Garden City	Late Iron Age and Roman artifacts found in a ditch (Hughes 1938:144)
93	Brickwall Hill	Later 1st century AD Roman ditch 10 metres from Late Iron Age ditch (Rook 1970a)
98	Prospect Place, Welwyn	Later 1st century AD finds from site of Welwyn burials (Thompson 1982:853)
103	Lockleys, Welwyn	Late Iron Age remains found on the site of a Roman villa (Ward-Perkins 1937)
104	Panshanger Golf Course (Nutfield)	Early Roman pottery found in association with 'Belgic' sherds (Thompson 1982:789)
105	Welches Farm, Datchworth	Late Iron Age and Roman pottery found during pipeline construction (Rook 1974; Thompson 1982)
107	Raffin Green, Datchworth	Roman artifacts and features in upper filling of Late Iron Age ditch (Herts. SMR:6309; Rook et al. 1982)
109	Braughing Bath House	Late Iron Age remains found on the site of a Roman bathhouse (Partridge 1978)
112	Wickham Hill 1969	2nd century AD Roman burials found in area of undifferentiated Late Iron Age occupation (Stead 1970)
116	Ermine Street 1971-2, Braughing	Roman urban occupation in the same location as Late Iron Age remains (Potter and Trow 1988)
118	Braughing Station 1970	Late Iron Age pottery found on site of Roman masonry building (Partridge 1978:65-8)
119	11 Buntingford Road, Puckeridge	Transitional Late Iron Age/Early Roman occupation (Borell 1983)
120	Braughing Station 1949	Late Iron Age features found sealed by Roman building (Holmes 1949)
123	Wilbury Hill, Letchworth	Roman deposits in hillfort defences (Applebaum 1949)
124	Hawthorn Hill, Letchworth	Late Iron Age and Roman occupation evidence found at the sites (Westell 1936; Herts. SMR:1286)
125	Two Chimneys, Letchworth	Roman and Late Iron Age occupation recorded at the site (Moss-Eccardt 1988; Herts. SMR:134)
127	Blackhorse Road, Letchworth	Small scale Roman occupation at east end of site indicated by finds in filling of Late Iron Age ditches (Moss-Eccardt 1988:73-4)
128	Icknield Way East,	Cemetery with Roman and Late Iron Age burials (Burleigh

	Baldock	1995a:105)
129	Royston Road, Baldock	Cemetery with Roman and Late Iron Age burials (Burleigh 1995a:105)
130	1980-1 Site, Baldock	Roman occupation and burials 50 metres to the south (Burleigh 1982; 1995a:105)
132	Hartsfield School 1987, Baldock	Roman urban occupation on the same site as Late Iron Age occupation (Burleigh 1995b)
133	Stead Areas A and B, Baldock	Roman urban occupation including roads, pits, ditches on site of Late Iron Age occupation (Stead & Rigby 1986:85-6)
134	Blackhorse Farm, Baldock	Roman occupation in the form of pits and post-hole on the same site as Late Iron Age occupation (Fenton 1994; Herts. SMR:6826)
135	Suttons Farm, Hatfield	Excavated Roman occupation 250 metres to the east of Late Iron Age site (Guttmann 1998; Herts. SMR:9927-8)
136	Wallington Rd, Baldock	Cemetery with Late Iron Age and Roman burials (Burleigh 1995a)
137	Brewery Site, Baldock	M. Stevenson pers. comm.
139	The Tene, Baldock	Roman building found c60 metres from Late Iron Age burial (Stead & Rigby 1986:41)
140	Folly Lane, St. Albans	Roman temple situated within Late Iron Age ritual enclosure. Also Roman industrial activity adjacent (Niblett 1999)
141	King Harry Lane, St. Albans	Extensive Roman suburban occupation adjacent to Late Iron Age cemetery. Some Late Iron Age burials were sealed by Roman Road (Stead & Rigby 1989:4-11)
143	Verulamium Insula XVII	Late Iron Age features found on site of Roman urban occupation (Frere 1983:103-5)
144	Great Chesterford	Roman and Late Iron Age occupation on the same site (Crossen et.al. 1990)
153	Brocket Park, Welwyn	Evidence of Roman occupation found in vicinity of Late Iron Age occupation (Herts. SMR:9852)
154	Lobs Hole, Stevenage	Roman use of Late Iron Age structural features (Hunn 1997)
159	Verulam Hill Fields, St. Albans	Roman pottery kilns and inhumation cemetery in the vicinity of Late Iron Age cemetery (Anthony 1968)
162	Aston	Finds of Early Roman pottery from site (Herts. SMR:7971)
164	Area 2, Baldock	occupation from Late Iron Age to Early Roman (Burleigh 1995a)
166	Stead Area D, Baldock	Roman features found adjacent to Late Iron Age features (Stead & Rigby 1986:31)
169	Weston Hills, Baldock	Scatter of Roman and Late Iron Age features on same site (Hutchings & Richmond 1994)
170	Bishops Stortford	Late Iron Age pottery found in area of Roman urban occupation (Garfi 1979)
171	Holwell Quarry	Early Roman occupation site of Late Iron Age occupation including Roman dated filling of Late Iron Age features (Beds. Co. 1998b)
172	Leavesden Aerodrome, Watford	Roman occupation on site of Late Iron Age occupation including Roman dated filling of Late Iron Age features (Brossler 1999)
173	Turners Hall Farm, Harpenden	Roman occupation present on the same site as Late Iron Age occupation (Herts. SMR:9913)
180	Broomhill Farm, Watton-at-Stone	1st century AD 'native pottery including Trajanic and Flavian Samian wares' (Rook 1982 et al.:21 no 4)
190	Verulamium Insula XXVII	Roman urban occupation (Frere 1983:193-4)
191	Verulamium Insula XIX	Roman urban occupation (Frere 1983:127)
192	Verulamium Insula XXI2	Roman urban occupation (Frere 1983:157-8)

193	Verulamium Insula XXVIII	Roman urban occupation (Frere 1983:273)
204	Cholesbury	Roman and Late Iron Age pottery found from excavation (Thompson 1982:672-3; Kimble 1933)
205	Birchanger, Bishop's Stortford	Roman and Late Iron Age occupation on the same site (Medlycott 1994)
207	Slip End, Ashwell	Late Iron Age burial within area of Roman occupation (Burleigh 1995a)
208	Stoney Lane, Northcurch	Roman occupation in the same area as Late Iron Age occupation. Early 1st century AD and Roman occupation are not distinguished (McDonald 1994:120-1)
209	Crawleys Lane, Cow Roast	4th century Roman burial in the same area as Late Iron Age occupation (McDonald 1994)
210	Park St., Luton	Rubbish pit or ditch containing Roman and grog-tempered pottery and animal bone, Roman tile and metalwork (Huspith 1999:9)
213	St. Stephen's	Late Iron Age cremation cemetery continues into Roman (Niblett 1999)
214	Wood Land End, Hemel Hempstead	Roman sanctuary complex on site of Late Iron Age occupation (Neal 1984)
220	Crabtree Lane, Harpenden	1st century AD Roman pottery found with Late Iron Age pottery (Herts. SMR:1168)
227	Harlow Holbrooks	Roman masonry buildings on site of Late Iron Age occupation (Conlon 1973; Fitzpatrick 1985)
228	Engine PH, Baldock	Roman deposit in Late Iron Age ditch (Richmond 1992)

2. Table 5.21 lists those Late Iron Age sites which have produced artifacts only that are dated to post AD 70. For these sites there is not, therefore, any direct evidence for the nature and extent of the post AD 70 occupation or its relationship to the Late Iron Age site. 32 sites are listed in the table.

The low number in comparison to those listed in Table 5.20 is partly a reflection of the small amount of fieldwalking surveys that have been carried out in the Study Area. Although these sites are fewer in number and are less secure in terms of the archaeological relationship between the Late Iron Age and Roman evidence, they probably give a more representative picture of the distribution of such evidence than the excavated evidence listed in Table 5.20. Of the 32 sites, 21 have been first identified from fieldwalking cropmarks sites or earthworks, 9 from salvage recording during development and 2 from metal detecting. Although Roman pottery and building materials are more robust and consequently survive better than Late Iron Age artifacts from the effects of ploughing, the distribution of these sites is less likely to be the subject of distortion from the preferences of fieldworkers in the past.

Table 5.21, Late Iron Age sites with associated Roman artifacts

No	Site	Evidence
10	Marina Drive Tottenhoe	(Beds. SMR:152)
12	Stotfold	(Beds. SMR:74)
13	Dunstable	(Beds. SMR:1388)
41	Bygrave	Late Iron Age and Roman pottery found from fieldwalking (Ashworth and Burleigh 1994)
27	Black Boy, Bricket Wood	Late Iron Age and Roman pottery found during drainage operations in an arable field (Herts SMR:4541)
29	Childwickbury	Late Iron Age and Roman pottery found from fieldwalking (Hunn 1994:66-7)
30	Bladder Wood, Wheathampstead	Ditto
40	Luton, Rosslyn Crescent	Roman settlement on same site as Late Iron Age cemetery (Thompson 1982:776-8)
48	Ware Rural	Late Iron Age and Roman artifacts discovered from metal detecting (Herts. SMR:1517)
56	Bakers End, Ware	Ditto (Herts. SMR:108)
75	Ashridge Site 8	Late Iron Age and Roman pottery found from fieldwalking (Morris & Wainwright 1995:71; Hunn 1996)
82	Berkhamsted Golf. Course	Late Iron Age and Roman pottery found during construction of a golf tee (Herts SMR:1337)
88	Panshanger school (Grubs Barn), Welwyn Garden City	Surface finds of 1st century AD Roman pottery including Flavian samian in same area as Late Iron Age site (Rook 1970b)
101.	Digswell Water, Welwyn Garden City	Late Iron Age and Roman pottery found during excavation of a gravel pit (Arnold 1954:136)
137	Brewery Site, Baldock	Unstratified Late Iron Age and Roman pottery found in association (Stead & Rigby 1986)
167	Enclosure, St Michaels	Roman and Late Iron Age pottery found from fieldwalking on site (Herts. SMR:1446)
174	Sundon 2	Roman and Late Iron Age pottery found from fieldwalking on site (Hudspith 1995:134)
175	Caddington, Luton	Ditto (Hudspith 1995:134)
176	Gatehouse Field, Luton	Ditto (Huspith 1995:134)
194	Ashridge Site 7	Late Iron Age and Roman pottery found from surface collection (Morris and Wainwright 1995)
195	Ashridge Site 10	Ditto
196	Ashridge Site 11	Ditto
198	Ashridge Site 6	Ditto
199	Hudnall Common	Ditto
200	Old Jeromes East, St. Albans	Roman and Late Iron Age pottery found on site (Hunn 1996)
201	Old Jeromes West, St. Albans	Roman and Late Iron Age pottery found from fieldwalking on site (Hunn 1996)
210	Park St, Luton	Roman and Late Iron Age pottery found from fieldwalking on site (Hudspith 1999:9)
211	Knocking Knoll, Pirton	Ditto (Hudspith 1999:9
223	Cockenhoe	Ditto (Hudspith 1997)
224	Whitehill Farm, Stopsley	Ditto (Hudspith 1997)
225	Lilley	Ditto (Hudspith 1997)
226	Warden Hill, Luton	Ditto (Hudspith 1997)

3. Table 5.22 lists the sites (extracted from Table 5.20) which have evidence for dated occupation including deposits within the period c10 BC to AD 45 and which also have archaeological evidence for occupation post-dating AD 70 and before the 2nd century AD. These therefore are the sites for which there is some evidence for occupation throughout the 1st century AD and in which continuity of occupation between the first and second half of the first century AD might reasonably be inferred. Only the sites where the evidence is reasonably secure have been included. However, the ambiguities concerning the dating, stratigraphical relationships and the ability to characterise the archaeological deposits are such that in almost all cases the nature and extent of any continuity of occupation is unclear. 45 sites are listed in the table.

They have an even more overwhelming bias towards Roman towns, villas and cemeteries, than the sites listed in Table 22. Of the 45 sites, 20 are from the Roman towns of Verulamium, Braughing and Baldock and Ware or their suburbs/cemeteries, 3 from villas, and one from a Romano-Celtic temple. Therefore, it can be concluded that the archaeological evidence for continuous occupation during the first century AD is largely the product of the historic fieldwork bias in favour of the excavation of Roman towns villas and temples. 17 of the 20 sites which do not fall within these categories have been found fortuitously as the result of development proposals and, of these, 8 are recently excavated sites for which the evidence has not been published. The higher quality and large scale of the investigation of the recently discovered sites means that they are more likely to be representative of the range of sites occupied during the first century AD. It may therefore be significant that 12 of the 17 sites do not appear to be wealthy or high status sites in the Late Iron Age or Roman period (information from unpublished reports).

Table 5.22, sites with evidence of occupation c10 BC-AD 45 & Post AD 70

no	Site Name
17	Park Street
22	St. Andrew's St. Hertford
23	Little Wymondley
33	Harlow
35	Saffron Walden
37	Puddlehill

54	Glaxos, Ware
61	Long Border A, Stansted
63	Duckend Farm, Stansted
64	Wards Coombe, Ivinghoe
78	Social Club, Stansted
79	Gorhambury, St. Albans
86	Stanborough School, Welwyn Garden City
93	Brickwall Hill, Welwyn Garden City
103	Lockleys, Welwyn
107	Raffin Green
109	Braughing Bath House
116	Ermine Street 1971-2, Braughing
124	Wilbury Hill, Letchworth
127	Blackhorse Road, Letchworth
128	Icknield Way East, Baldock
129	Royston Road, Baldock
130	1980-1 Site, Baldock
133	Stead Areas A and B, Baldock
134	Blackhorse Farm, Baldock
135	Suttons Farm, Hatfield
136	Wallington Road, Baldock
140	Folly Lane, St Albans
141	King Harry Lane, St Albans
143	Verulamium Insula XVII
144	Great Chesterford
154	Lobbs Hole, Stevenage
159	Verlam Hill Fields, St Albans
166	Stead Area D, Baldock
171	Holwell Quarry,
172	Leavesden Aerodrome, Watford
173	Turners Hall Farm, Harpenden
180	Broomhill Farm, Watton-at-Stone
190	Verulamium Insula XXVII
191	Verulamium Insula XIX
192	Verulamium Insula XXI2
193	Verulamium Insula XXVIII
205	Birchanger, Bishop's Stortford
213	St. Stephen's, St. Albans
226	Engine PH, Baldock

Therefore, Tables 5.20-2 list all of the Late Iron Age sites which have produced evidence of Roman occupation, (postdating AD 70) including sites for which the date and duration of the Late Iron Age occupation is not known. The total figure is 121, representing 53% of the total number of Late Iron Age sites. In terms of the Late Iron Age sites with occupation which can be dated, the proportion of the total figure which have Roman evidence is significantly higher at 57 (61%).

Factors affecting the Distribution and Number of Recorded Sites

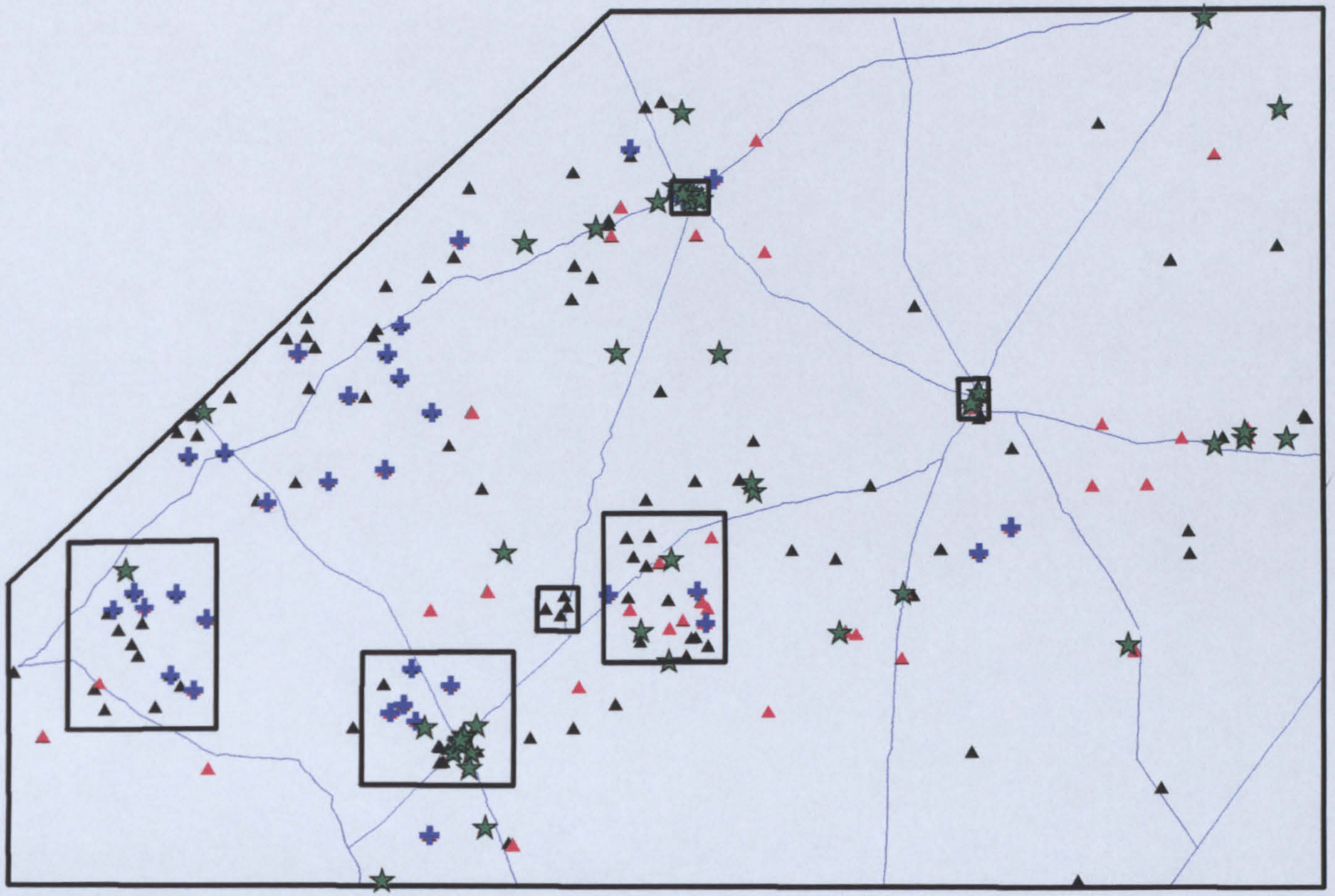
The Visibility of Roman Remains

There is likely to be a significant bias in favour of the discovery of the evidence of Roman occupation in comparison to the Late Iron Age due to the relatively high archaeological visibility of Early Roman artifacts and structural evidence. It is therefore unlikely that the presence of Roman (post AD 70) occupation has been overlooked for many of the recorded Late Iron Age sites. However, it is possible that the presence of Roman occupation could be overlooked in instances where the focus of occupation has moved from the area in which the Late Iron Age remains were found. The fact that only a small proportion of the sites have been found from the systematic investigation of landscapes means that such evidence of Early Roman settlement may therefore exist in the vicinity of a proportion of the Late Iron Age sites.

Conversely, it is also likely that the definition used for the Late Iron Age (the presence of 'Belgic' pottery) overstates the number of supposed early first century AD sites which continue to be occupied into the Early Roman period. The date of the ending of the production and use of grog-tempered pottery within the Study Area is unclear although it appears to have continued in the second half of the first century AD, albeit at a lower level. (I. Thompson pers. comm.). It is therefore possible that the start of occupation of some sites could be post AD 70.

Late Iron Age sites with evidence of Roman occupation

Figure 5.12



The Geographical Distribution of the Evidence

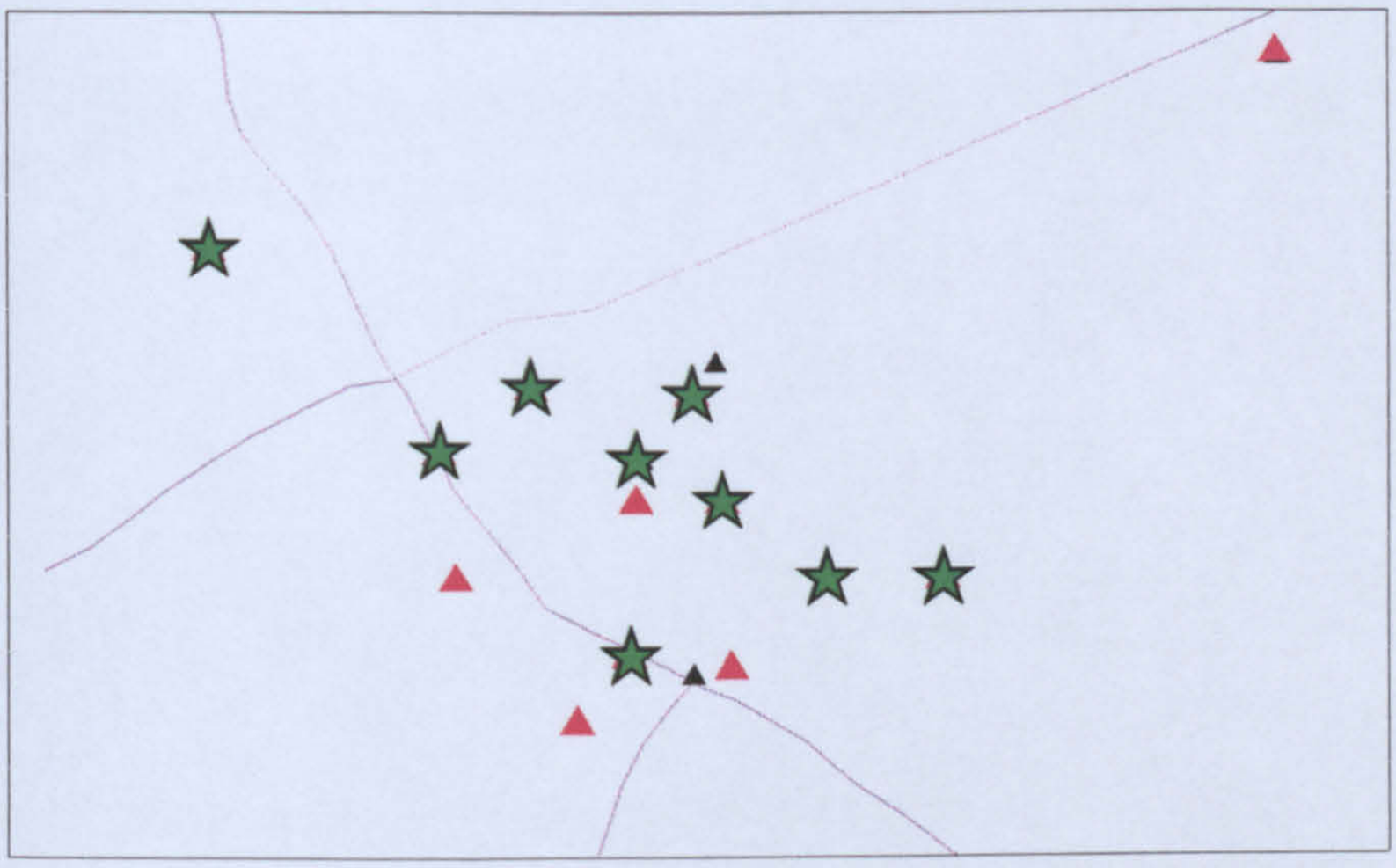
Figure 5.12 shows the superimposed distributions of the sites listed in Tables 5.20-4 together with the distribution of the Late Iron Age sites without evidence for Roman occupation. The most obvious observation is that the distribution of the Late Iron Age sites, with and without evidence of Roman occupation are broadly similar, with no significant concentrations of Late Iron Age sites without Roman evidence.

There is, however, a noticeable difference between the distribution of the evidence from excavated deposits (Tables 5.20 and 5.22) and the evidence of artifact association only (Table 5.21). The distribution of the former is similar to the overall distribution of Late Iron Age sites, with concentrations at St. Albans, Welwyn Garden City, Baldock and Braughing, providing graphic evidence for the bias, noted above, towards the most visible Roman sites. In contrast, the latter sites are more evenly distributed, with the majority (20 of 32) located along the Icknield Belt of the Chiltern Hills where most of the fieldwalking surveys have been undertaken. Although the context of the Roman occupation and its relationship to any Late Iron Age occupation for these sites is not known, their high frequency and regular distribution along the Chilterns would also tend to reinforce the impression that the excavated evidence is heavily biased towards the visible Roman sites.

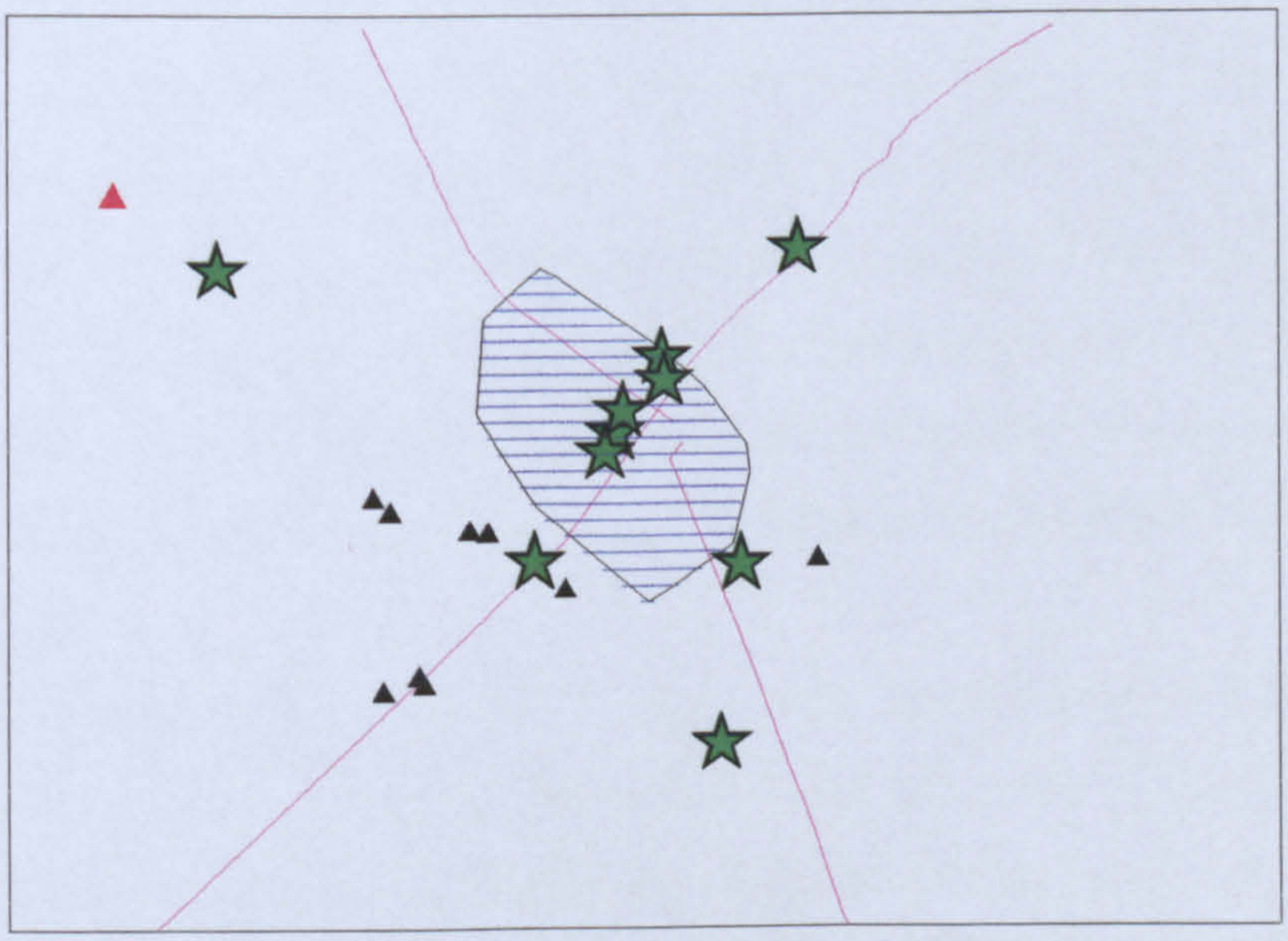
Area Analysis

Six notional areas have been selected from the Study Area in order to provide a broad geographical assessment of Late Iron Age sites with evidence for Roman occupation. The areas include all of the Late Iron Age site clusters identified in chapter 4. Table 2.23 provides a break down of the numbers of Late Iron Age sites with and without evidence of Roman occupation within each of the areas. The three dense concentrations of sites are also shown in more detail in Figure 5.13.

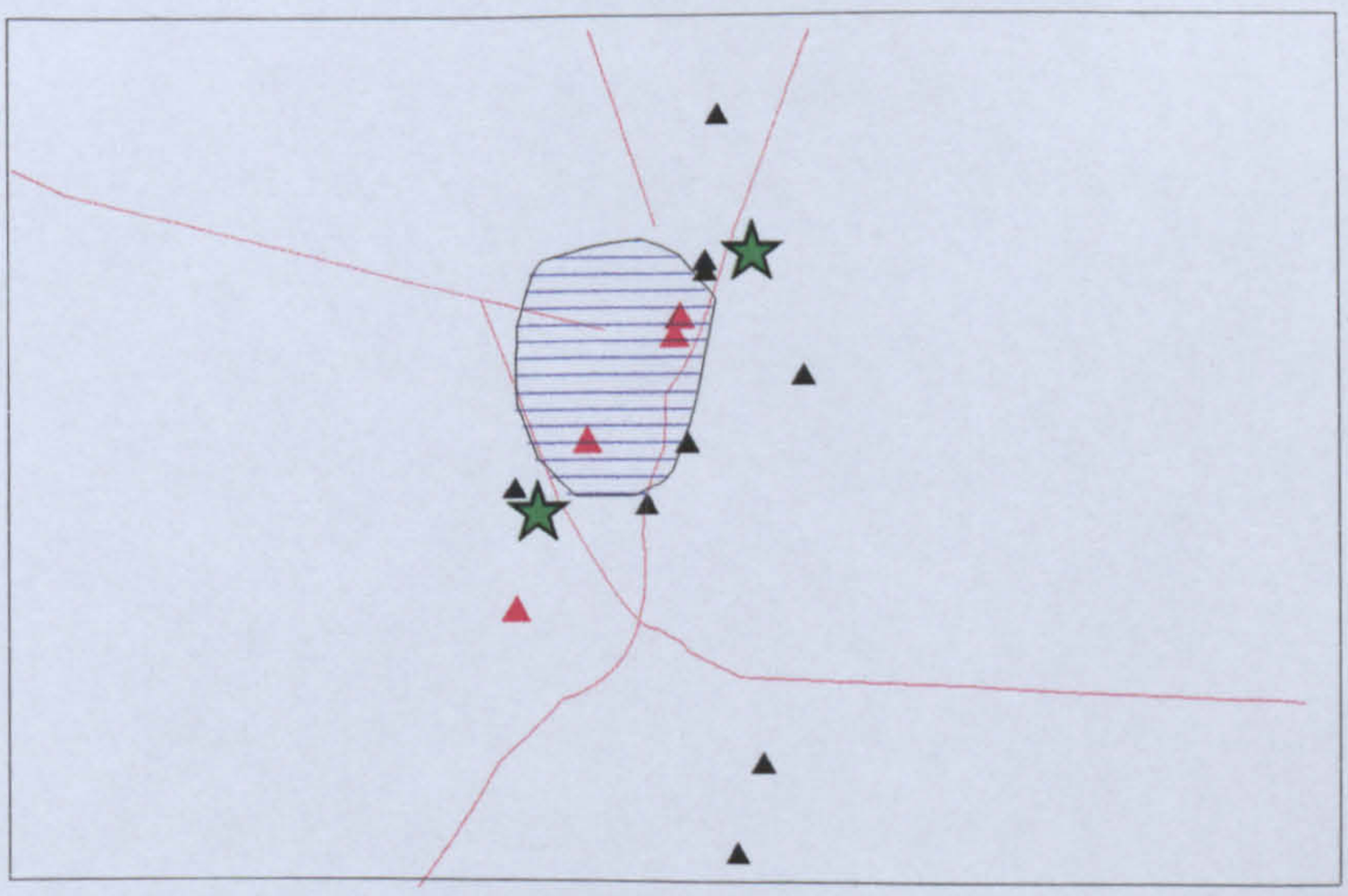
Late Iron Age/Roman sites: detail



Baldock



St. Albans



Braughing
246

Area of
Roman Town

See Fig. 5.12
for key to symbols

Figure 5.13

Table 5,23, Late Iron Age sites with Roman evidence: area analysis

Area	LIA Sites	With Roman Evidence	%
Ashridge and Bulbourne Valley	18	9	50
St. Albans and the Ver Valley	26	14	53
Welwyn	28	14	50
Baldock	17	13	76
Wheathampstead	4	0	0
Braughing	14	6	42

The following analysis of the figures can be made.

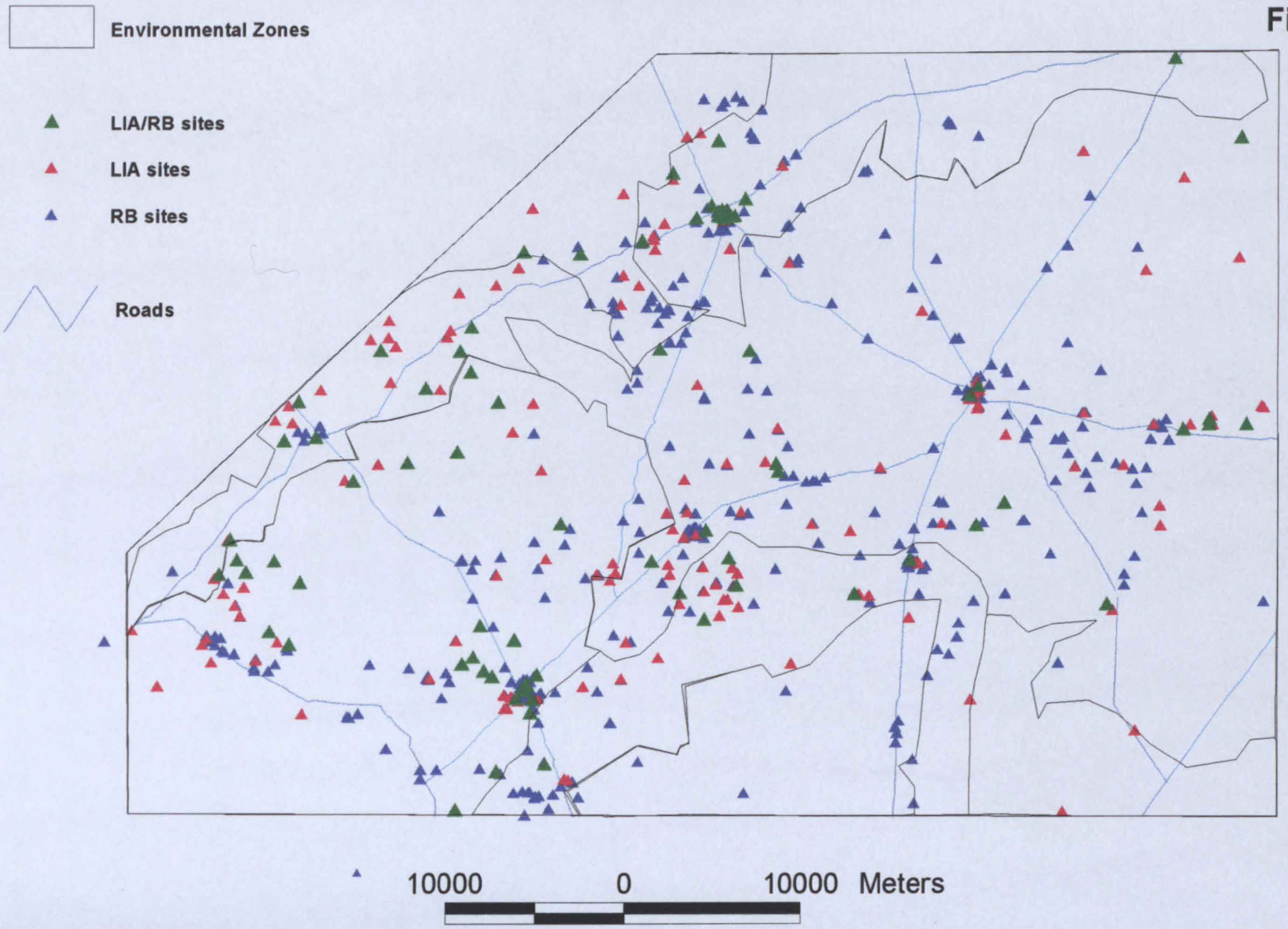
There is a high relatively degree of consistency, with four of the six areas having between 42% and 53 % of sites with evidence of Roman occupation. These areas (St. Albans, Welwyn, Braughing and Ashridge) are known to contain Roman nucleated settlements. Therefore, it is likely that some at least of the Late Iron Age sites without evidence of Roman occupation relocated to the nucleated settlements. This is most clearly illustrated in Figure 5.13, where the Roman settlements are shown for St. Albans and Braughing, and a number of Late Iron Age sites without evidence for Roman occupation can be seen to lie outside of, but close to, the Roman settlement.

Baldock, also shown on Figure 5.13, has a much higher proportion of sites with evidence of Roman occupation. Most of the Late Iron Age evidence has come from the area of the Roman nucleated settlement and the burials and cemeteries which surround it on most sides. Although proportionally less investigation has taken place at Baldock outside of the envelope of the Roman settlement and associated cemeteries than is the case with St. Albans and Braughing, the impression is of a greater degree of spatial continuity between the Late Iron Age and early Roman period at Baldock than the other two areas. Most investigations within the notional area of the Roman settlement appear to have produced Late Iron Age evidence and almost all of the Roman cemeteries have evidence for its Late Iron Age antecedents (Burleigh 1995a).

None of the four sites at Wheathampstead have produced evidence for Roman occupation. The quality of the evidence from the sites is relatively poor and the investigation small in scales which would suggest that they do not provide reliable

Distribution of Late Iron Age and Roman Sites

Figure 5.14



negative evidence. However, the absence of significant Roman occupation at Wheathampsted would indicate discontinuity in settlement between the Late Iron Age and Roman periods.

Comparison of Late Iron Age and Roman Evidence (Figure 5.14).

Figure 5.14 shows the distribution of Late Iron Age and Roman sites, including Late Iron Age sites with Roman evidence. The Roman sites are taken from the county Sites and Monuments Records. The different basis of the two distributions (sites for the Late Iron Age and all Roman evidence for the SMRs) means that limited and only very general comparisons can be made between the two sets of distributions. The pattern of Roman sites has also been subject to the same non-archaeological biases that have influenced the Late Iron Age distribution of sites. There are nonetheless several patterns which are worthy of note:

The distribution of the Late Iron Age and Roman sites is generally similar. Few sites of either period are present on the clay plateau areas, especially the London Clay zone at the southeast of the Study Area and the clay plateau areas of the Clay-with-Flints zone. There are, however, several areas of localised contrasts in the distribution pattern for the two periods.

1. There are few Roman sites without evidence for Late Iron Age occupation along the chalk downland area to the west of Baldock, known as the Icknield Belt, indicating that settlement and population were probably not expanding in this area during the Roman period.

2. There are several localised Roman nucleated settlements or clusters of Roman sites which do not have evidence for Late Iron Age sites;

- the lower Lea Valley, which is conspicuous for its lack of Late Iron Age evidence (see above 5.5.6),

- the Elstree, Brockley Hill area. This was a regionally important pottery production centre in the later first and second century AD (Swan 1984),

- a cluster of Roman sites including several villas along the St. Albans to Baldock Roman road to the south of Baldock.

Sites where First Century AD Occupation does not continue after cAD 60-70

Table 5.24 lists the Late Iron Age sites which have produced evidence of occupation dating from c10 BC to cAD 45 but which do not have evidence for occupation continuing after cAD 60-70. These, therefore, represent the Late Iron Age sites for which there is evidence for possible abandonment before the end of the first century AD. 18 sites are listed in Table 5.24 which compares with the 66 identified sites with evidence of occupation at cAD 45 (Table 20) representing 40% of the total. This figure is also much lower than the 45 sites which have evidence of occupation continuing until the end of the first century AD (Table 5.21). However, of the 18 sites, only two (Stansted and Skeleton Green) have been the subject of investigations sufficiently large for the date to be confident ascribed.

Table 5.24, Late Iron Age sites ending cAD 60-70

No	Site Name
60	Airport Catering Site, Stansted
87	Stanborough School 2
89	Crookhams, Welwyn Garden City
106	Hollards Farm, Codicote
113	Station Road, Puckeridge
115	Skeleton Green, Braughing
117	Wickham Kennels 1989, Braughing
121	Wickham Kennels 1982, Braughing
126	Archers Way, Letchworth
145	St Albans Abbey
146	Prae Wood 1933, St. Albans
147	Prae Wood 1931, St. Albans
148	Pond Field, St Albans 1932
149	Pond Field, St. Albans 1960
151	Wheathampstead Bypass
181	Wick Avenue, Wheathampsted
183	Marford, Wheathampstead
185	Redbourn

Nine of the 18 sites are from the two large Late Iron Age site complexes at St. Albans and Braughing, with five and four sites respectively. Large Early Roman nucleated settlements are known to lie close (within one kilometre) to all of these sites, and it can,

therefore, be reasonably assumed that the Roman settlement were influential in the abandonment of the Late Iron Age sites. Of the remaining sites, only Crookhams has evidence of significant Roman occupation within one kilometre of the site (Rook 1968a). Of the 66 Late Iron Age sites with evidence of occupation between c10 BC and AD 45 listed in Table 5.19, only eight have therefore not produced evidence of Roman settlement within one kilometre.

Late Iron Age/Early Roman settlement: conclusions

The following summary conclusions can be made regarding sites with evidence for Late Iron Age and Roman occupation.

1. of the recorded instances where Late Iron Age and Roman occupation occurs in the same area are the result of the deliberate investigation of known Roman urban deposits or villas. This has probably substantially biased the known sample of Late Iron Age sites

2. there are too few examples with the necessarily precision (within 20 years) and archaeologically verifiable dating of deposits to draw many meaningful conclusions concerning the relationship between Late Iron Age and Roman settlement. The most common method of dating archaeological deposits of the first century AD is from pottery. However for most sites it is not possible to distinguish between mid and later first century AD deposits from pottery alone.

3. Nonetheless, 53% of the Late Iron Age sites identified have produced some evidence for Roman occupation and 20% can this reasonably be interpreted as being continuous occupation in some form throughout the first century AD. In addition, for only 7 % of sites is there evidence for abandonment or movement of settlement focus in the second half of the first century AD, and in the majority of instances where this is so, relocation to nearby Roman nucleated settlements seems likely. The archaeological evidence, although representing a small and in most cases not securely dated sample of Late Iron Age sites, does not therefore indicate large-scale abandonment or dislocation of settlement during the later 1st century AD

4. The known distribution of Late Iron Age and Roman site evidence indicates that there was not a significant increase in site numbers along the Icknield Belt of the Chiltern Hills, but that significant increases in site numbers did occured in several localised areas on or adjacent to major routes (the Lea Valley, Brockley Hill and the Wymondley area).

5.7 Comparable Studies

Two recent and contrasting studies of Late Iron Age and Early Roman settlement have been selected for comparison with the evidence outlined above for locational and chronological patterns within the Study Area. They are: the interim report on the survey of the Aisne valley in northern France (Haselgrove 1996) and the review of the evidence for Iron Age and Roman settlement on the gravel soils of river Thames and Ouse valleys (Fulford 1992).

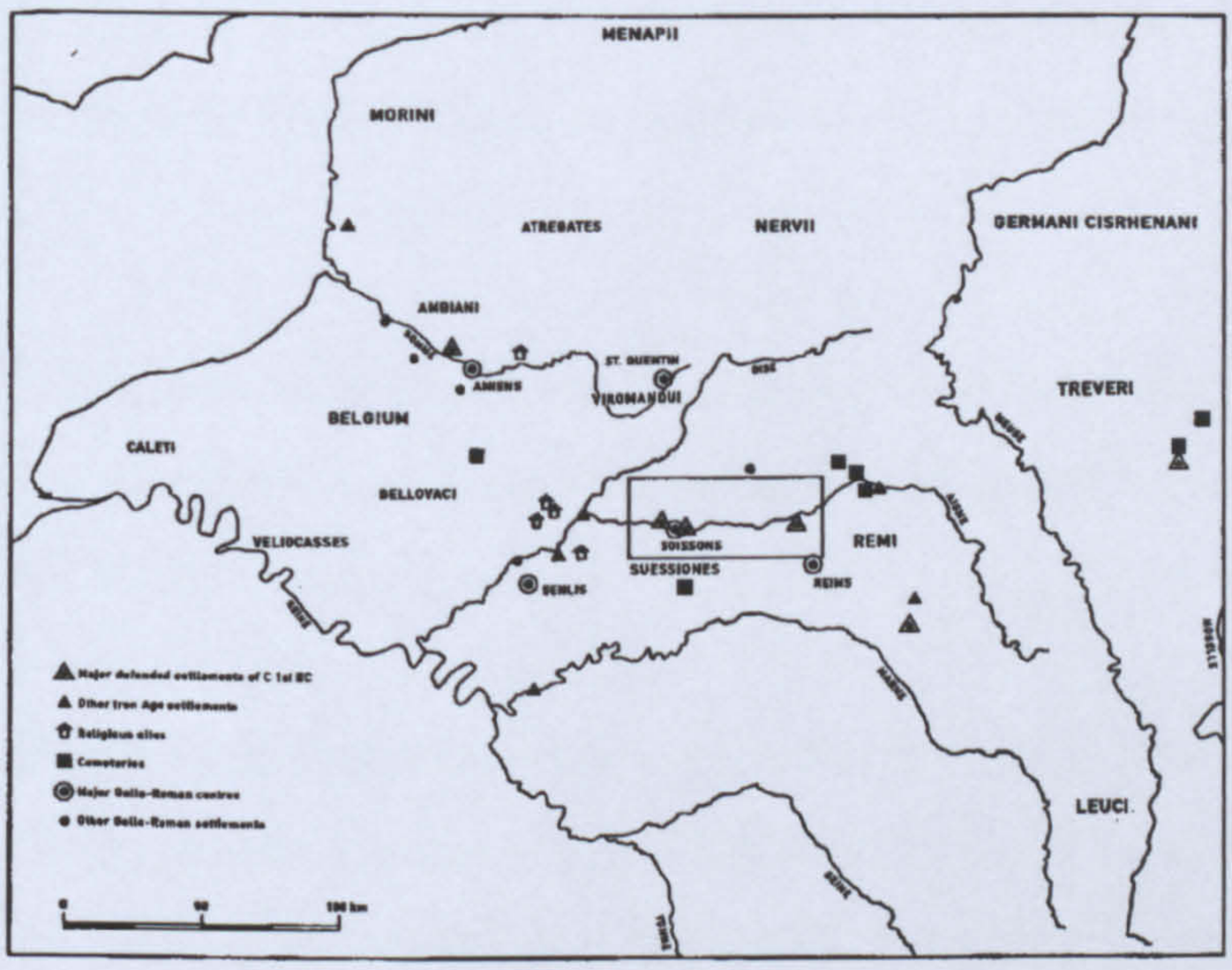
5.7.1 The Aisne Valley Survey (Figure 5.15)

This has been chosen for comparison with the Study Area for five reasons.

1. The total area covered by the survey is c900 square kilometres, which although smaller than the c2300 of the Study Area, is comparable in scale.

2. The landscape and climate of the Aisne Valley is broadly comparable with that of the Study Area. It comprises a major river valley and a tributary (the Vesle) containing gravel and alluvial soils. This is flanked by extensive limestone plateau areas that are capped with fertile loess soils. The Aisne valley is larger than any river valleys with the Study Area, but the proportions of valley and plateau are similar for the two areas. The limestone plateau (limon) is also comparable with the chalky boulder clay plateau of the Study Area in terms of its landscape and soils properties, although it has fewer sources of water than the boulder clay areas.

The Aisne Valley Survey



(Location of survey area. After Haselgrove 1996, Fig. 1.)

Fig. 9. Distribution of *fermes indigènes* in the Aisne Valley

(Distribution of *fermes indigines* 1st century BC enclosures. After Haselgrove 1996:Fig.9)

Figure 5.15

3. The main part of the survey was a systematic field survey of four representative 20 kilometre square transects across the valley and plateau areas. These, together with data from aerial survey, have provided relatively reliable information on site density and chronology which it should be possible to compare with the data from the Study Area.

4. Several problem-oriented research excavations were undertaken as a follow-up to the field survey in order to address issues of settlement development, chronology and Romanisation.

5. The survey area of the Aisne Valley appears to be subject to the similar biases in terms of the available archaeological data as the Study Area, with an overwhelming concentration of development and archaeological activities in the valley bottom areas (Haselgrove 1996:133).

The Survey Results

The following is a summary of the information in the interim report of the survey which is most relevant to the Study Area (Haselgrove 1996).

The archaeological record for the third century BC consists of a dispersed settlement pattern and small cemeteries. There is an increase in settlement and population in the second century and earlier first century BC within all of the three main landscape types within survey area (valley bottom, valley site and the chalk plateau). The settlement at Damary, discovered from the survey on the chalk plateau and sampled by excavation, appeared to be a rich agricultural or industrial nucleated settlement. Other sites on the plateau underlay Roman nucleated sites indicating that nucleation was a probably a general feature of settlement on the plateau by the later second century BC. In contrast, several sites excavated within the river valley area all appear to be smaller farming settlements.

The apparently rapid increase in population was probably largely due the intensification of agricultural production achieved from the more widespread use of iron agricultural

tools and the introduction of new crop species. Pollen evidence suggests that the landscape was largely open, with only the steeper slopes of the valley being heavily wooded.

A major discontinuity of settlement occurred in the later second and early first century BC with the temporary abandonment of some settlements and a move to large fortified sites, some of which were located in the Aisne valley. These settlements have a regular layout with zoning of storage, industry and habitation areas. The excavated evidence also suggest that they were not occupied for long periods. The three large defended settlements of Condè-sur-Suippe and Villenneuve-St Germain and Pommiers are located within a twenty kilometre length of the Aisne valley and all appear to have short, mutually exclusive periods of occupation from the later second to the later first century BC indicating possible abandonment and movement between the three sites. Some settlements were re-occupied at a later date but no settlements founded during the second or early first century BC can be shown to be continuously occupied into the Roman period.

A number of settlements were founded or re-occupied in the later first century BC, probably resulting from a gradual return to the countryside following the Roman conquest in the 50s BC. A feature of the first century BC is the appearance of rectilinear enclosed settlements known as *fermes indigènes* on the alluvial terraces of the valley and the edges of the plateau. Most of the sites continue to be occupied into the early Gallo-Roman period and one of the key points to emerge form the survey is that the Gallo-Roman settlements have a much longer duration of occupation than the Late Iron Age sites, indicating a more stable settlement pattern.

Comparisons with the Study Area

Several key points of similarity with the evidence from the Study Area are apparent from this summary.

1. The evidence for the marked discontinuity of settlement during the later second and early first century BC in the Aisne Valley, probably caused by movement to defended sites, is not paralleled within the Study Area. There is significant evidence within the Study Area for a rapid expansion of settlement within some river valleys from the

later first century BC. However, the absence of evidence for abandonment of rural sites in the first century BC (which occurs in the Asine Valley area) and the lack of defences within the river valley areas suggests that the motivations and origins of the population movement were different for the two areas, but the fluid nature of the settlement pattern in the first century BC does appear to be a common feature.

2. The continuity of settlement between the Late Iron Age and the early Roman period is a common feature of the two areas as is the relative stability of the Roman settlement pattern when compared with that of the preceding Late Iron Age. This might imply that the effects of Romanisation on the settlement patterns of the two areas was similar.

3. The preference for plateau-edge and river valley locations for settlement in the first century BC in the Aisne Valley has parallels with respect to the distribution of Late Iron Age sites within the Study Area. This could indicate that both areas were subject to similar social and economic processes caused by relatively rapid population growth within already populated regions. In such circumstances, settlement location is perhaps more likely to be influenced by economic considerations, including access to a range of agricultural resources and also possibly proximity to major rivers for transport and communications.

4. The appearance of nucleated settlements with evidence for industry on the plateau areas in the second century BC also has some parallels with the nucleated settlement at Stansted Airport Catering Site. Again this may suggest similar responses to social and economic forces in the two areas.

5. Lastly, the evidence for agricultural wealth as the main driver behind population increase can be clearly echoed within the Study Area.

In summary, therefore, whilst there are important differences between Study Area and the Aisne Valley during the second and first centuries BC, there are some aspects of the development of the settlement pattern which are similar, particularly the evidence for general population expansion and the effects of Romanisation.

5.7.2 Iron Age and Roman Settlement on the Gravels (Figure 5.16)

Fulford reviews the transition from the Late Iron Age to the Roman period by considering the evidence from the recent excavations on the extensive gravel soils of the Thames and Ouse river valleys, especially the large-scale excavation of six settlements (Fulford 1992).

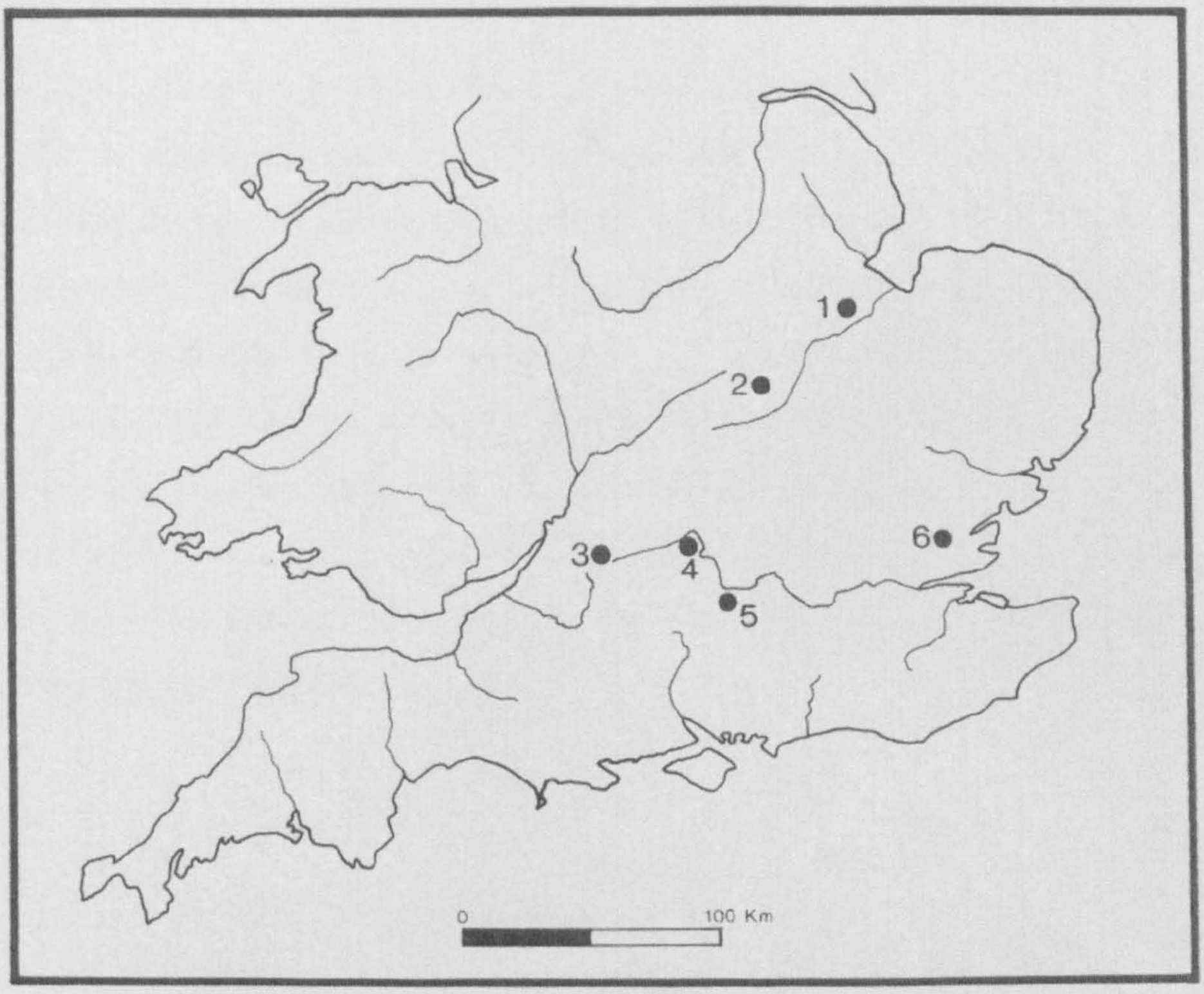
From this he concludes that the Late Iron Age (the first century BC to the mid first century AD) is the period in which the Roman settlement pattern is established on the gravels, with the sites founded during this time having a much longer period of occupation in the Roman period and a wider degree of Romanisation including structural evidence such as villa buildings. In contrast, sites which are founded in the earlier Iron Age do not continue beyond the late first or early second century AD and show only limited evidence of Romanisation. The pattern of settlement abandonment in the Early Roman period also appears to be a wider phenomena, including Essex and Hampshire (Fulford 1992:29).

The explanation for the abandonment of settlements founded in the earlier Iron Age are unclear although it is considered that a combination of a reorganisation of the countryside into larger farming units and a drift of population to towns and other nucleated settlements in the Early Roman period is the most likely reason. Why the earlier sites were more prone to failing is also unclear, although Fulford suggest that these may have been more conservative in terms of agricultural innovations and were also dependent upon smaller areas than the settlements founded in the Late Iron Age (Fulford 1992:35).

Comparisons with the Study Area

The evidence from Iron Age and Early Roman settlement of the Study Area would appear to be similar to that observed by Fulford for the gravel area, although apart from perhaps Gorhambury none of the evidence from the Study Area is of a comparable scale and quality to the six which form the basis of his conclusions. An analysis of the fortunes of the 27 Late Iron Age sites with earlier Iron Age occupation, listed in Table 11 above, reveals that 12 (Norton Road, Stotfold, Foxholes, Wendens Ambo, Lobbs

Sites Considered by Fulford



4. *Location map of principal sites mentioned in the text: 1. Peterborough region (Cambs.): Cat's Water, Fengate; Lynch Farm; Maxey; Werrington. 2. Nene Valley: Stanwick, Northants. 3. Upper Thames (a. Glos.): Claydon Pike, Fairford; Roughground Farm, Lechlade. 4. Upper Thames (b. Oxon.): Ashville; Barton Court Farm; Farmoor. 5. Kennet Valley (Berks.): Aldermaston; Pingewood. 6. Woodham Walter (Essex)*

(After Fulford 1992:fig 4)

Figure 5.16

Hole, Thorley, Holwell, Puddlehill, Weston Hills, Bury Lodge Lane, Stansted, Birchanger, Leavesden) have evidence of Roman occupation which is other than just burial or ritual activity. However, of those only four (Foxholes, Wendens Ambo, Thorley and Holwell) have evidence for significant post second century AD occupation (information from unpublished reports) and only Wendens Ambo can be regarded as a high-status Roman rural settlement with villa buildings. This evidence would, therefore, suggest a similar pattern to that observed from the gravels with few earlier Iron Age sites continuing into the later Roman period. An analysis of the evidence from the Study Area of the other observation from the gravel (that sites founded in the Late Iron Age continue into the later Roman period) is, however, hampered by the generally poor quality of the data for this type of analysis and the historical bias in favour of the excavation of villa sites. Therefore, whilst many of the high-status Late Roman rural settlements can be shown to have began occupation in the Late Iron Age (e.g. Gorhambury, Lockleys, Park Street, Little Wymondley) the sample is heavily biased in favour of these sites, with as yet no extensively excavated rural Late Iron Age sites that are not already known to be villas.

5.8 Chapter 5: Conclusions

Landscape

The assessment of the relationship between Late Iron Age sites, *physical* landscape and sources of running water has shown that there is a preference for sites to be located either within or close to river valleys. This observed relationship is partly the result of distortions in favour of these areas caused by the concentration of archaeological fieldwork in river valleys, but it is nonetheless considered as significant, particularly the preference for site location at the edges of valleys.

Communication

An assessment of the spatial relationship between Late Iron Age sites and the major prehistoric and Roman overland communication routes has also shown a preference for site location within two kilometres of two east-west overland communication routes (the

Icknield Way and Stane Street/Akeman Street). It is suggested that these routes may have been used for the transport of live animals to and between the major settlements, and also for general communications between these settlements. In addition, it is suggested that rivers were probably the most important means for the transport of heavy and bulk materials. Rivers and major local and regional communication routes are therefore considered to be significant influences upon the location of Late Iron Age sites.

Earlier settlement

An assessment of the evidence for earlier occupation evidence from and within the vicinity of Late Iron Age sites has concluded that there is little evidence that earlier settlement influenced the location of Late Iron Age sites but it did reveal the following substantial local variations within the Study Area;

1. little evidence for earlier settlement in the areas of the highest concentrations of Late Iron Age sites,

2. relatively few Late Iron Age sites in the boulder clay areas in the east of the Study Area, which have a number of later Bronze Age and earlier Iron Age sites,

3. a marked discontinuity in the lower Lea Valley between Late Bronze Age/earlier Iron Age settlement and Late Iron Age sites.

Dating Late Iron Age sites

A consideration of the evidence for dating Late Iron Age sites revealed that only 38 % can be usefully be used for analysis of chronology. From these sites several conclusions were made:

1. a steady increase in the numbers of sites in the first century BC which rises in the first half of the 1st century AD with little evidence for the abandonment of sites. This appears to contrast with the Aisne Valley (Haselgrove 1996). It also is at variance with an analysis of excavations generally in northern France up to the 1980s, which

showed a high proportion of sites abandoned between c70-25 BC (Haselgrove 1990:fig. 5.5).

2. half of Late Iron Age sites have some evidence for Roman occupation and 20% have evidence for probably continuity of occupation into the later first century AD

3. comparison of the distribution of Late Iron Age and Roman sites reveals a broadly similar pattern with several localised area of probable expansion in the Roman period and a static or possible contraction of settlement along the Icknield Belt of the Chiltern Hills.