6 Other potential areas for study

6.1 The Eastern A cadastre

An introductory account of the Eastern A cadastre (Peterson 1990a) drew attention to the multiple observations over the past 70 years of patches of planned landscape in the area around London north of the Thames. These have identical or very similar orientations and it was suggested that they could all fit into one large centuriated Roman cadastre

The orientation and position of the cadastre was originally determined by two possibilities. The first was that the South Essex landscape north of Grays was not as Rodwell saw it (1978: fig. 11.3), a system whose distinctive elements are "long, slightly sinuous tracks and roads which tend to run across the contours", but part of a degraded centuriation. The second possibility was that two segments of the major Roman road from London to Colchester had been constructed[149] in trigonometrical relationship with this cadastre.

The hypothetical cadastral grid could be related to the segments of Roman road, one at 1:2 and the other at 1:5, and simultaneously be made to coincide with two straight elements of the South Essex system, one of them called (perhaps significantly) Baker Street.

This determined the position of the cadastre unambiguously before the author was aware of any other earlier work. Thus the presence of the cadastre was a hypothesis which could be tested by the same means as employed in South Norfolk. One would expect to see significantly associated roads and sites. One would also expect a search of the literature to reveal descriptions of fragments of field systems which could be interpreted as part of the hypothetical system.

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149 Or more probably, the author now thinks, reconstructed.

As described above *(4.1.1)* this grid fell precisely onto the Ermine Street north of London at 11:4. Such an angular relationship made it possible to compare the orientation of Eastern 'A' to that of the systems proposed by Sir Montagu Sharpe (1918; 1932) in Middlesex. One of Sharpe's maps (Sharpe 1932: facing p. 90) includes the line of Ermine Street. It is straight-forward to place a computer-ruled grid over his map in such a way that it fits his line for this road at 11:4. This shows that, although the positions of the *limites* of the two hypothetical systems are not generally coincident, the orientations are identical.

Thus the Eastern 'A' hypothesis tends to resurrect an old and discredited idea. Although his theoretical knowledge of the likely form of a centuriation was defective, Sharpe's eye for landscape led him to select an orientation which was determined on a quite different basis 70 years later.

The hypothesis also provides a new interpretation of more recent work. The cadastral grid coincides, this time in position as well as orientation, with a proposed Romano-British field system (Bassett 1982: fig. 4a) which is visible in the layout of medieval fields at Saffron Walden. This system of lanes and other boundaries parallel and at right angles to a section of a Roman road has major subdivisions which, according to Basset and Drury, "tend to occur at 300-400 m intervals in one direction". There is also an intermediate division. This give the system the appearance of a small fragment of a degraded centuriation subdivided into strips 5 *actus* in width (Peterson 1990a: fig. 8). The same 5 *actus* subdivision is also to be seen elsewhere in the area considered, at Wickford (Peterson 1990a: 243).

This preliminary study also revealed, in addition to Ermine Street, another 8 possible examples of Roman roads trigonometrically related to the cadastral grid, but the most important observation remains the 5 *actus* subdivision, which, as we have seen, is typical of many centuriations.

This investigation could be pursued by more detailed and more widespread studies.

Detailed studies could include the area north of Grays, with its problematic rectilinear field system. Rescue archaeology has provided some more evidence for that part of the system near Baker Street. In particular there are two ditches close together and at right angles to the road which are "probably late or post-Roman" (Wilkinson 1988: 17). More detailed topographic study could be undertaken, and the SMR data could also be reconsidered in the light of the cadastral hypothesis. However, this latter activity may run into the same problems as were encountered with the South Norfolk data *(4.2.3)*.

More widespread investigations could also prove rewarding. Possible traces have been recorded over a very large area, including all of Essex and the southern part of Suffolk. In Essex the Tendring peninsula, east of Colchester, shows a fair number of traces, as do some other more peripheral areas. The centre of the county is relatively free of them.

It has long been recognised that two Roman roads, running south east from Dunmow and Braintree respectively, are parallel. This may be because they are at the same angle to a cadastre. However, neither of them is related to Eastern 'A', so it is possible that there is another cadastre, later than Eastern 'A', which has expunged many of its traces in the central zone.

All this might be thought rather fanciful, were it not for one striking coincidence. When the cadastral grid is extended to Camulodunum it falls more or less onto a road with a definite Roman origin *(figure 6.1)*. The road is evidently distorted, but in principle it links Camulodunum with a crossing of the River Stour, and it appears to do so along a *limes*. The main deviation is round an area of low ground associated with the place-name "Spratt's Marsh" on the 1:50,000 OS map.

One of the segments of the deviation is labelled "Roman Road", as shown; so it appears that this deviation is original. If so it may also be related to the cadastre since it is roughly symmetrical with respect to the grid and it approximates to two trigonometrically related lines, both at 4:1 through grid points. This is a hypothesis which could be subjected to further testing, but even if the idea of this symmetrical diversion turns out to be illusory, the fact remains that a major Roman road appears strongly linked to a *limes*. This situation may be compared to that of the main road which follows DDVII immediately to the south east of Saint-Paul-Trois-Châteaux in the Orange B cadastre (Bel and Benoit 1986: 89-100).

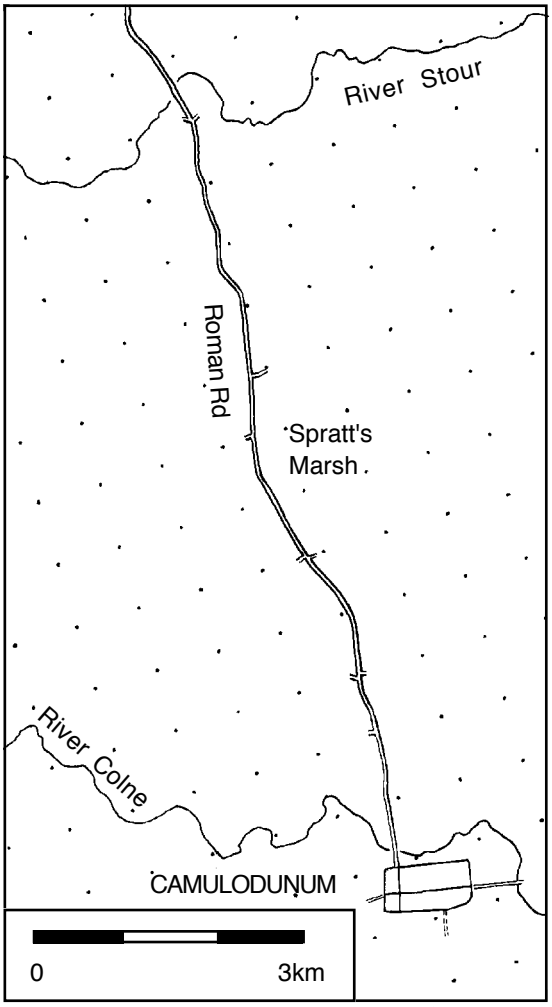

Figure 6.1 Roman road north of Camulodunum.

This comparison may be valid in more ways than one. The Orange B main road is not one of the two principal axes, nor is it even a *quintarius*. Thus there is no reason to see the road north from Camulodunum as the *kardo maximus* of the Eastern 'A' system. It has been argued (Peterson 1990a: 254) that the system was very early, intended as a means of gaining control over a newly acquired area. It would thus have functioned in the same way as Béziers B, which served to standardise the progress of the conquest (Clavel-Lévêque 1989: 266). It also shares with Béziers B an orientation based upon the gross physiography of the territory, in this case the dip of the land surface to the south south east.

For these reasons it is most likely that the survey of the cadastre came shortly after the conquest in AD 43, and that it predates the foundation of the *colonia* in AD 49. Thus the road in question would have been picking up the line of a convenient *limes* which, when initially surveyed, ran to the east of the early fort, through the future centre of the town. It follows from this that the road cannot be regarded as necessarily a particularly important axis, and that the *quintarii* of Eastern 'A' remain to be found.

6.2 A possible cadastre in eastern Kent

Work on the South Norfolk and Eastern 'A' systems arouses the suspicion that, if they exist, they are not unique in Britain. It also suggests that there are three principles which could guide further research.

The first principle, as suggested above *(4.1.1)*, is that oblique planning in Roman cadastres may lead to rational tangent relationships between straight features; and that we could use this theoretical outcome to aid the identification of potential cadastral systems. In other words, if we see linear features which are related by rational tangents such as 1:1, 1:2 etc., then we can propose one or more orientations for cadastres which could have produced such a relationship. We might call this the inverted oblique planning hypothesis.

The second principle is that, at least in lowland Britain, any supposed pre- or proto-historic "field system" could be the degraded remains of a Roman cadastre. The dating of such systems often relies on the dubious assertion that a linear feature oblique to a field system must post-date it. This "stratigraphic" principle, which will be examined further below *(7.2.1)*, is clearly violated constantly by Roman cadastres[150].

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150 In South Norfolk 'A' the southern part of the present A140, which is oblique to the grid, is very likely to be earlier than it; and in Eastern 'A' it is evident, again from their lack of relationship with the grid, that early major

So, rather than accepting the fact[151] that such systems are essentially pre-historic, we can adopt its antithesis. Using a different sense of the word "inversion", we can call this the inversion of the hypothesis of prehistoric landscape.

The third principle is that we should be guided by the physiography of the area under consideration. As we have seen, this is the main influence on orientation in both our British examples; and it is generally a potent factor *(figure 1.2)*. Thus we should look at the general "lie of the land" and question each apparently natural feature. Could it be part of a cultural landscape which has been inserted so subtly as to appear to be determined solely by natural constraints?

Those who hold the conventional views of English-speaking scholars, as described above *(1.2)*, have a vision of Roman cadastres as arbitrary and even necessarily discordant to natural features. To them a centuriated cadastre must appear as strange and alien as the famous chessboard landscape seen by Alice[152]. But this vision can be denied. The naturalist argument against the existence of the cadastre is that the cultural landscape does not appear sufficiently arbitrary and, in any case, environmental factors are an adequate explanation for any consistency of orientation. We can take this and stand it on its head. The more "natural" the pattern looks, the more we may suspect that it is partly artificial. This is the inversion of the conventional naturalist view.

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roads around Verulamium predate the establishment of the cadastre in that area (Peterson 1990a: 247).

151 See below *(7.2.2)*, and particularly the views of Courbin (1988), on the nature of a fact.

152 The reference is to the scene in chapter 2 of *Through the looking glass,* by Lewis Carrol (1939 [1872]).

These three inversions - of oblique planning, of the prehistoric hypothesis, and of the naturalist view - can be our tools to seek out further examples of cadastral systems[153].

The first task is to look for references to parallelism or the occurrence of rational tangent relationships between Roman roads. So far this has revealed two cases in which roads are parallel. One in Essex has already been mentioned. The other is on the border of Surrey and Kent where a Roman road has three segments, all with the same orientation (Margary 1973: 59). A grid of 710m can be made to fit these segments of this road, and also other Roman roads, but any possible cadastre has not been investigated further[154].

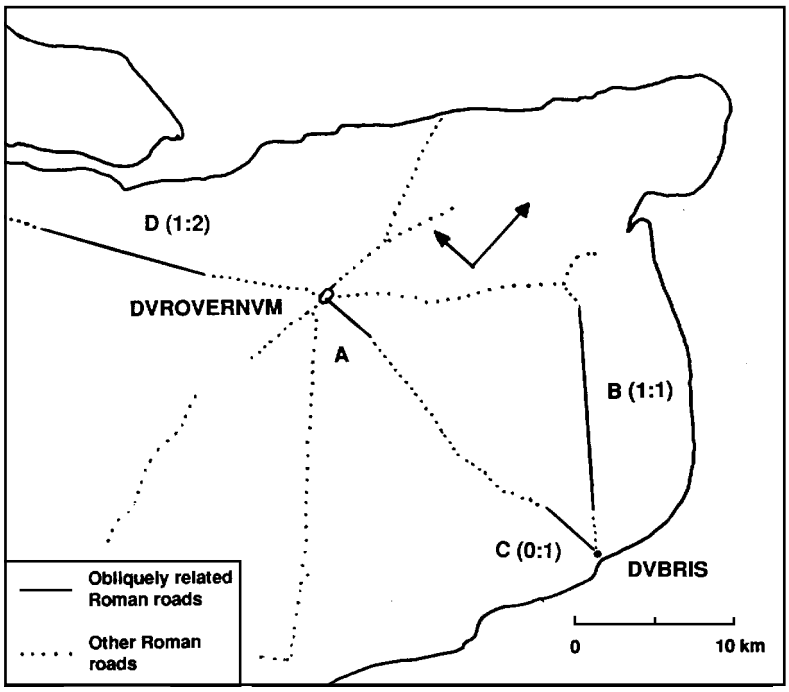

Figure 6.2 *Rational relationships of roads in the hypothetical Kent 'A' cadastre.*

Rational tangent relationships between Roman roads may also be seen on the OS map of Roman Britain. One example is in Kent *(figure 6.2)*. Here we have two roads, A and B, related at 1:1. There are

153 In the latter two inversions, we are, of course, proceeding counter-inductively (Feyerabend 1978: 29).

154 One point in this theoretical grid is the intersection of two Roman roads, one at 3:2, and the other at 5:2, at TQ 1227 3426. The angle is 0.81°, The module had to be 710m (not 709.5 which was tried first) in order for these roads and the road with the parallel segments to fit. The latter road's segments fit at 4:1.

also two other road segments whose orientation is related to that of segment A. Segment C has the same orientation (a 0:1 relationship), and segment D is at 1:2.

Given that these rational relationships exist, the other two principles can be employed. We can look for the supposedly prehistoric landscape and the supposedly natural influence of physical geography in the area to the north-east of the Canterbury-Dover road. Nobody yet seems to have suggested a prehistoric origin for the field pattern in this area, despite the fact that it appears to be overlaid by the Dover-Richborough road (road B), so our second principle cannot be used. However, the field orientation is very widespread, seemingly because it is the local direction of dip of the North Downs. Thus, according to our third principle, it is also most likely to be the orientation of the Roman cadastre.

Thus two of our principles converge on a single orientation, parallel and at right angles to Segment A; and it seems reasonable to suggest that this is the orientation of the cadastre. Furthermore, since the two similarly aligned segments of the Canterbury-Dover road are on parallels about 710m apart, we can propose that they lie on two *limites*, and that segment 'A' probably represents the *decumanus* (or *kardo*) *maximus*. Another Roman roads leaves Canterbury towards the north east, towards Sturry, at right angles to 'A'. This could be the other principal axis. Having settled on this position for the *limites*, we can then satisfy a third constraint, that road B is based on it obliquely, passing through grid points at 1:1. Under these constraints the grid's parameters are: (1) a module of 710 m, (2) an angle of N 41.411° E, (3) a starting point at TR 1514 5823, a point which lies on the road to Sturry, just outside the North Gate of the city[155]. The potential grid points were computer-calculated using these values, and a transparent overlay was used

[155] This point is not the proposed origin. This would be at the intersection of the lines of the two Roman roads in the forum. However, since the orientation of the town's street grid is different to that of the cadastre, that particular point is difficult to pin point on the map.

to extract traces on modern 1:50,000 topographic maps which nearly conform to the hypothetical *limites (figure 6.3).*

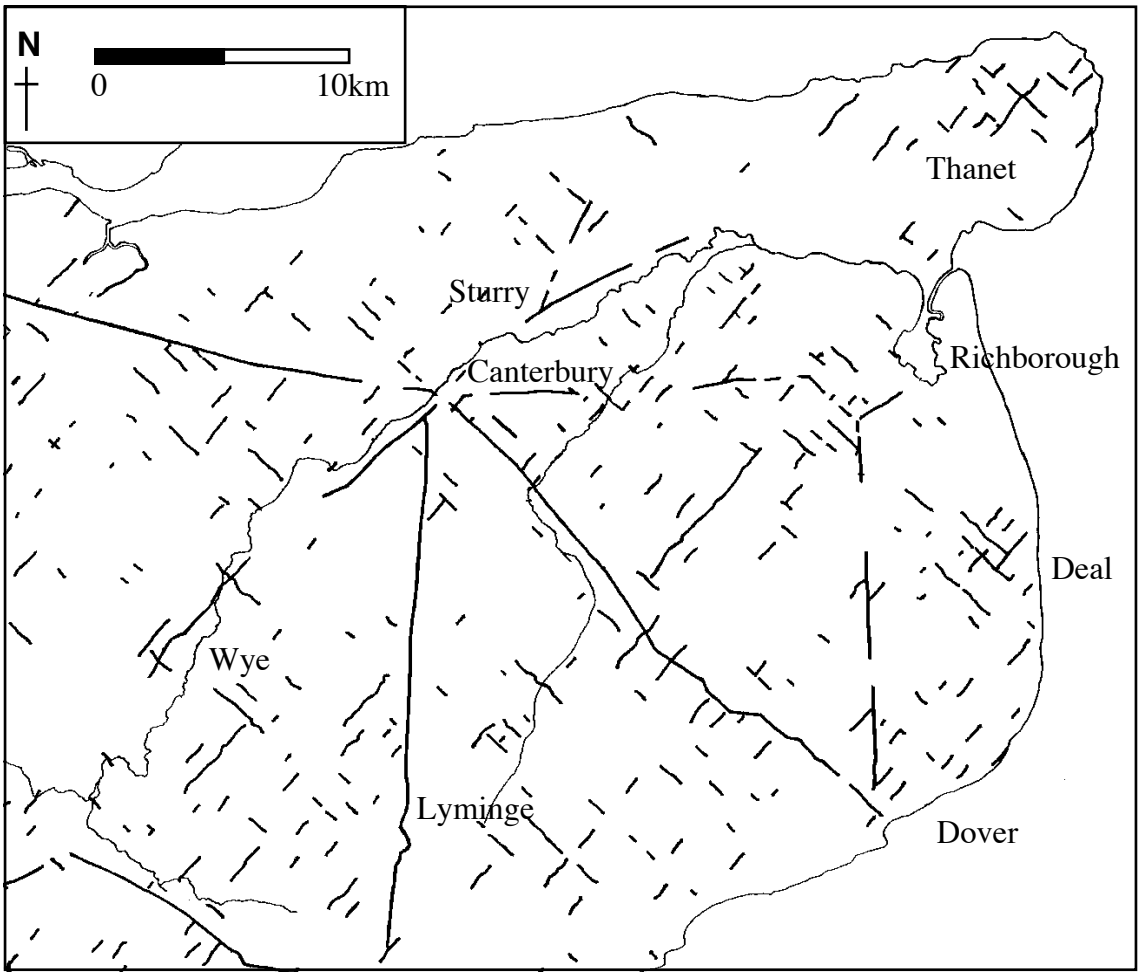

Figure 6.3 Features corresponding to hypothetical limites *of Kent 'A'.*

It can be seen that many *limites* of the hypothetical grid are followed by features of the generally rectilinear present day communications network to the north east of Canterbury-Dover road. Our naturalist would argue that, since the orientation of the cadastre was selected in order to conform to physiography, this is not particularly surprising. In reply one can point to those traces of which run across the dip slope, from south east to north west. They are just as prominent as those traces which conform to the "natural" orientation of the countryside. The area of Deal, where recent excavation has revealed Romano-British field boundaries

whose orientation is very close to that of the cadastre (Parfitt 1991: 219), is a good example of this.

Immediately south west of the Canterbury-Dover road there are fewer possible traces in a well wooded area, but they reappear again in the area of Wye and Lyminge. Near the latter settlement the 1:25,000 map shows that the *limites* coincide with portions of the parish boundary at Shuttlesfield. According to Everitt (1986: 20) this place-name, boundary field, indicates the existence of an ancient boundary. It was first recorded in 838.

In general there is a remarkably large number of traces observable even on the 1:50,000 topographic map, which shows neither field nor parish boundaries. They are more dense than those observed in South Norfolk on the same sort of map, and compare well with other degraded systems, for example parts of Béziers C (Clavel-Lévêque 1989: 268), which have been studied in much greater detail at 1:25,000. From this we can infer that, even if we disregard the evidence of the trigonometrically related Roman roads, the topographic traces give us a plausible candidate centuriated cadastre.

The area of potential traces extends further. As we have seen the centre of Romney Marsh appears to conform strongly to the cadastre *(figure 4.9)*, and to be derived from a quartering of the basic 710m grid. The antiquity of this pattern is also suggested by its association with Old, rather than New, Marsh *(4.2.2)*. Furthermore, we have seen *(3.3)* that a measurement of the degree of association of medieval church and court sites with this 355m grid strengthens the probability of the cadastre's existence.

We may consider the possible origin and status of one further feature of the Marsh, the *Rumenesea*.

According to Nicholas Brooks there were in the early medieval period two courses of what was then called the river Limen*(figure 6.4)*.

His view of the *Liminea* and the *Rumenesea*[156] is that "Their meandering courses establish that both are natural watercourses; ..." (Brooks 1988: 91). However, Jill Eddison's (1983: 56) view was that what Brooks shows as the *Rumenesea* is not a typical marshland river because "the Snargate end of (the) channel is extraordinarily narrow". However, she left the question of the origin of this feature open, and there is another view that the *Rumenesea* approached Old Romney from the south west (Tatton-Brown 1988: 109).

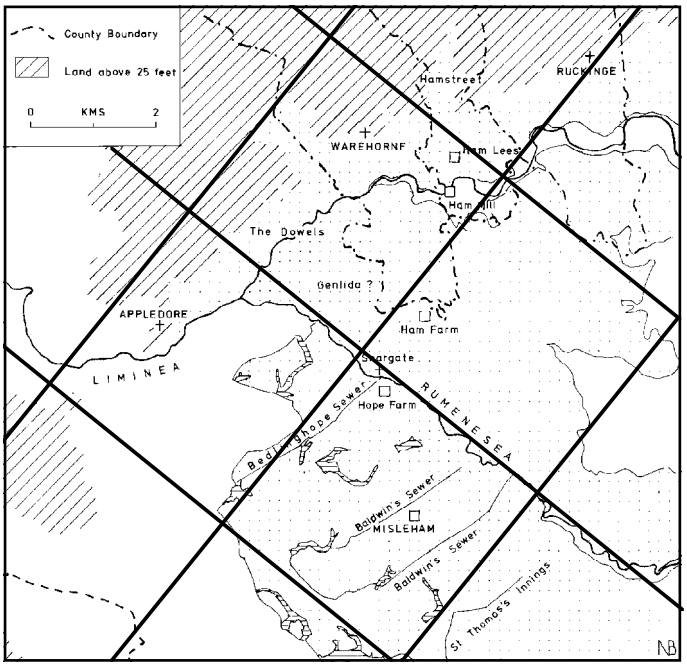

Figure 6.4 *Courses of the Liminea and Rumenesea (Brooks 1988) with* quintarii *superimposed.*

Brook's *Rumenesea* follows a linear inlet of New Marsh soils *(figure 4.11)*. This lies along a *limes* of the cadastre, parallel to the Roman road leaving Canterbury in the direction of Dover and 45 centuries from it. If this road is the *decumanus maximus*, as proposed above, then this *Rumenesea* would appear to be aligned on a *quintarius*. It is also clearly much less meandering than the *Liminea*, which enters the eastern section of New Marsh in a broad winding estuary. Thus it may be an adaptation of a previously existing minor watercourse, if it is not completely artificial[157]. So,

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156 This is, of course, the origin of the modern form Romney, a name which is now applied loosely to the whole Marsh.

157 Compare this with the adaptation of parts of river courses to the centuriation of Modena (Settis and Pasquinucci 1989: Fig. 38), in which case there is no suggestion that the modified rivers are on *quintarii*. Compare it also with Raymond Chevallier's (1960: 1081) theoretical reconstruction.

given its possible Roman origin and artificial nature, we may consider the significance of its name.

Brooks tells us that there are, in charters of 697 or 700 and of 741 relating to the Marsh, two uses of the personal name Rumen, one certain and one likely. He also tells us that Rumen is the Old English form of *romanus* i.e. Roman. Furthermore he feels that, in the case of *Rumenes-ea* "the genetival form of the first element would suggest that it should be taken as a personal name, were it not highly unusual for a river to be named after an individual." (Brooks 1988: 98).

Since he accepts that the river may be ascribed to someone called Roman, Brooks regards it as a remarkable coincidence that the priest Romanus should have been recorded in 741 as a former landowner in the Marsh; but a much less coincidental explanation can be suggested. Firstly, if the watercourse is wholly or partly artificial, it could very easily bear a personal name. Rivers are hardly ever called after people, but canals can be[158]. Secondly, the topography of this watercourse in relation to the cadastre makes it appear likely to have formed a major element of the Roman drainage system. Thus it is possible that the post-Roman inhabitants of the Marsh knew who was responsible for this prominent landscape feature, and that to them it was the Romans' river.

This small example shows how the cadastral hypothesis may throw a new light on the relatively abundant early documentary evidence which is available for Kent. Clearly, in addition to detailed topographic studies and locational analysis, this is a large field waiting to be explored.

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158 Someone or some group must have been responsible for financing, designing or creating them, So we have the *fossa Augusta* mentioned as taking up 8 2/3 *iugera* of century DD VII VK XXII of Orange C (Piganiol 1962: 297) or in more recent time the Bridgewater canal, (1760), pioneered by the Duke of Bridgewater.

6.3 A possible cadastre of Lincoln

Systematic search for trigonometrical relationships between Roman roads also reveals an example at Lincoln *(figure 6.5)*. Two roads, A and B, Margary (1973) numbers 27 and 2d respectively, are related at 2:1. Given this relationship, we need to select the most appropriate orientation for the cadastre which may have caused it.

According to our second principle (the inversion of the hypothesis of prehistoric landscape) we should also look for a local field system which is supposed to be prehistoric. Bassett's (1985) 'Goltho'' system fits this requirement. Using nineteenth century OS 6" maps he reveals (1985: map 3) a rectilinear field system on the western side of the Wolds whose elements in one direction are clearly at right angles to the orientation of the initial length of Roman road 27, within a few degrees (Peterson 1990b: fig. 1). Bassett's view is that it originated certainly before the Roman military roads, and possibly before the Roman period.

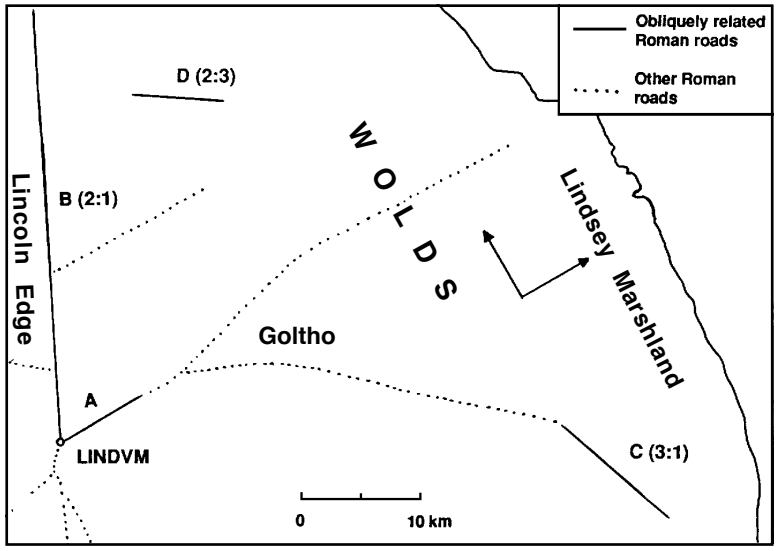


Figure 6.5 Trigonometrically related roads in Lindsey.

According to our third principle we also look for the strongest natural influence on the orientation of cultural landscape features, since this is the most likely influence on the orientation of the cadastre. Two of the most prominent physiographic features in this area are the Lincoln edge (running north) and the Wolds, which have a more north westerly orientation. Although there may possibly be some sort of cadastre based upon the former feature (and upon

Ermine Street), cultural topography over a much wider area appears to be influenced by the Wolds. Their orientation is also much closer to that of the 'Goltho' system. Thus we adopt, as a hypothesis, a cadastre based on the initial part of road 27, segment 'A', running at right angles to the Wolds and the Lindsey coast.

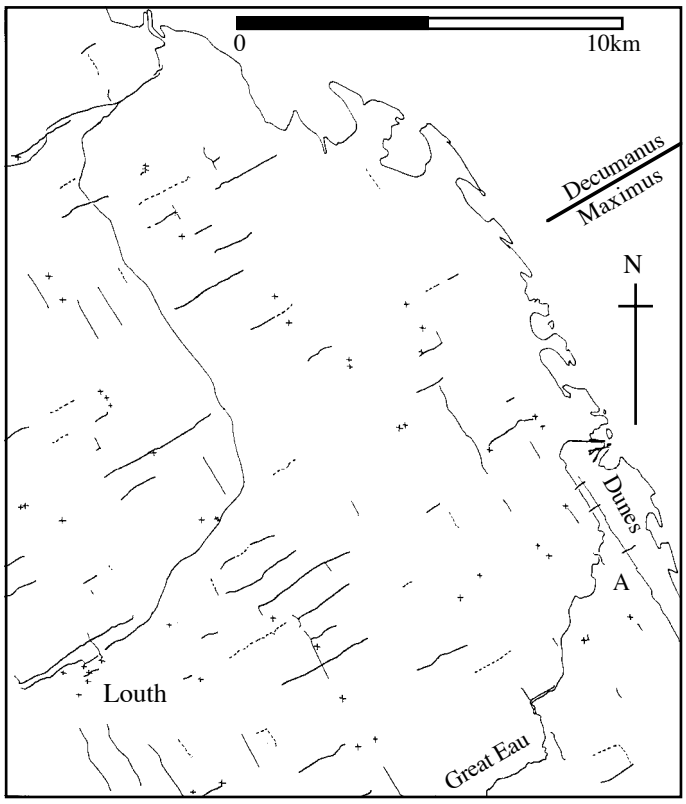
The orientation of this cadastre is Tan^{-1} 1/2 (26.565°) to the line of road 2d. This latter orientation was calculated by intercepts with national grid coordinate lines, in the segment from Lincoln to Broughton (37 km), as N 3.328° W. By addition, this gives a cadastral orientation of N 29.89° W.

An origin for the purposes of calculating the position of the grid intersections was assumed to be at the point of intersection of the projection of the two roads, 2a and 27, at SK 9775 7177. It is also possible that segment 'A' lies on the *decumanus maximus*; the principal axis of the cadastre; certainly no other candidate presents itself. If this is the case then the point chosen, being on the wall of the Neronian fort which preceded the *colonia* (Webster 1988: 145-153), and having an excellent view, would be an appropriate position for the *locus gromae*. Thus it is tentatively suggested that the *kardo maximus* also passes through this point. It is naturally impossible to be sure of this proposed configuration of the principal axes, nor can we say which way the surveyor was initially looking; however, bearing in mind that the cadastre seems to cover virtually all the Corieltauvian territory, we assume that he was looking towards the south west. This direction is thus VK, behind him is CK, SD and DD lie to left and right respectively *(glossary, Appendix 3)*.

Intersection points were calculated using 710 m as the equivalent of 20 *actus*. Some of these were plotted on the modern 1:50,000 topographic map so that a transparent overlay could be used to select existing features which might represent traces of the *limites*.

There are not many possible traces in the area close to Lincoln, and, although some signs can be seen on the western side of the Wolds, it is only on reaching the edge of the marshland that they become abundant *(figure 6.6)*. There are also two extremely suggestive

points of detail within and on the edge of the Marsh. The Great Eau[159] has two right angled bends which conform approximately to the corners of centuries, and the footpath, at A, running along the line of division between the cultivated land and the dunes, conforms to a *limes*. There are also three possible traces of *limites* at right angles to it, passing through the dunes towards the sea.[160]



Based on the 1980 & 1987 Ordnance Survey 1:50,000 maps with the permission of the Controller of her Majesty's Stationary Office © Crown Copyright

Figure 6.6 Topographic traces corresponding to a hypothetical Lincoln 'A' cadastre in the Lindsey Marshland.

The *colonia* of Lincoln is generally held to have been founded in the period 90-96 AD (Millet 1990: 87). It would, however, be unwise to assume that the initiation of the cadastre is necessarily associated with this event. Such an assumption causes

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159 Eau is derived from the same OE root *ea* (river) as appears in *rumenesea* It is pronounced as in "tea".

160 Would the *agrimensores* have called these latter **limites maritimi*? In general, perhaps they would, but we cannot know in this particular case. However there is no doubt about the antiquity of the land surface in the coastal strip, both on the basis of finds of Roman material and documentary evidence of the existence of Hafdic, meaning Sea Bank in Danish (Owen 1975), which points to occupation during the Danish settlement period.

problems because it implies that all of road 27, two segments of which seem to fit the grid, must pre-date it. The problem of chronology is therefore unsolved, but it must almost certainly be the case that the cadastre postdates Ermine Street running northward from Lincoln, and away from Rome. This is evidently a major strategic route, and, in its course from London to the Humber, it is "the earliest and dominant road throughout" (Margary 1973: 498).

Thus it appears that the cadastre could have been placed oblique to an existing road, in such a way that the road passed through the corners of grid squares. Here is a most striking parallel with the situation at Béziers, where cadastre A was placed in precisely the same trigonometrical relationship to the existing Via Domitia (Clavel-Lévêque 1983b: 242). This coincidence of design makes it concievable that the two cadastres were designed by the same man.

Although Lindsey, an area cut off from the rest of England by low ground, is, perhaps as might be expected, the area where possible traces of the cadastre appear most strongly, there are further vestiges over a very large area *(figure 6.7)*. This is so huge that even those who know the capabilities of the *agrimensores* might be incredulous. We also have the problem of defining the outer boundary of the cadastre.

In response to this last point it must be said that an arbitrary grid will almost always pick up some features *(appendix 3)*. Thus it is possible that the very sparse traces to the west of the Trent are the product of pure chance, and that the cadastre stopped at the river, which is normally held to be the boundary of Corieltauvian territory.

Clearly, if possible cadastral traces can be picked up by chance, the sceptic has every right to ask if the whole proposed cadastre is not just as hazardous. This is an excellent question, and provides one reason for not over-relying on the *prima facie* evidence of topography. To verify the existence of the cadastre, we need to find

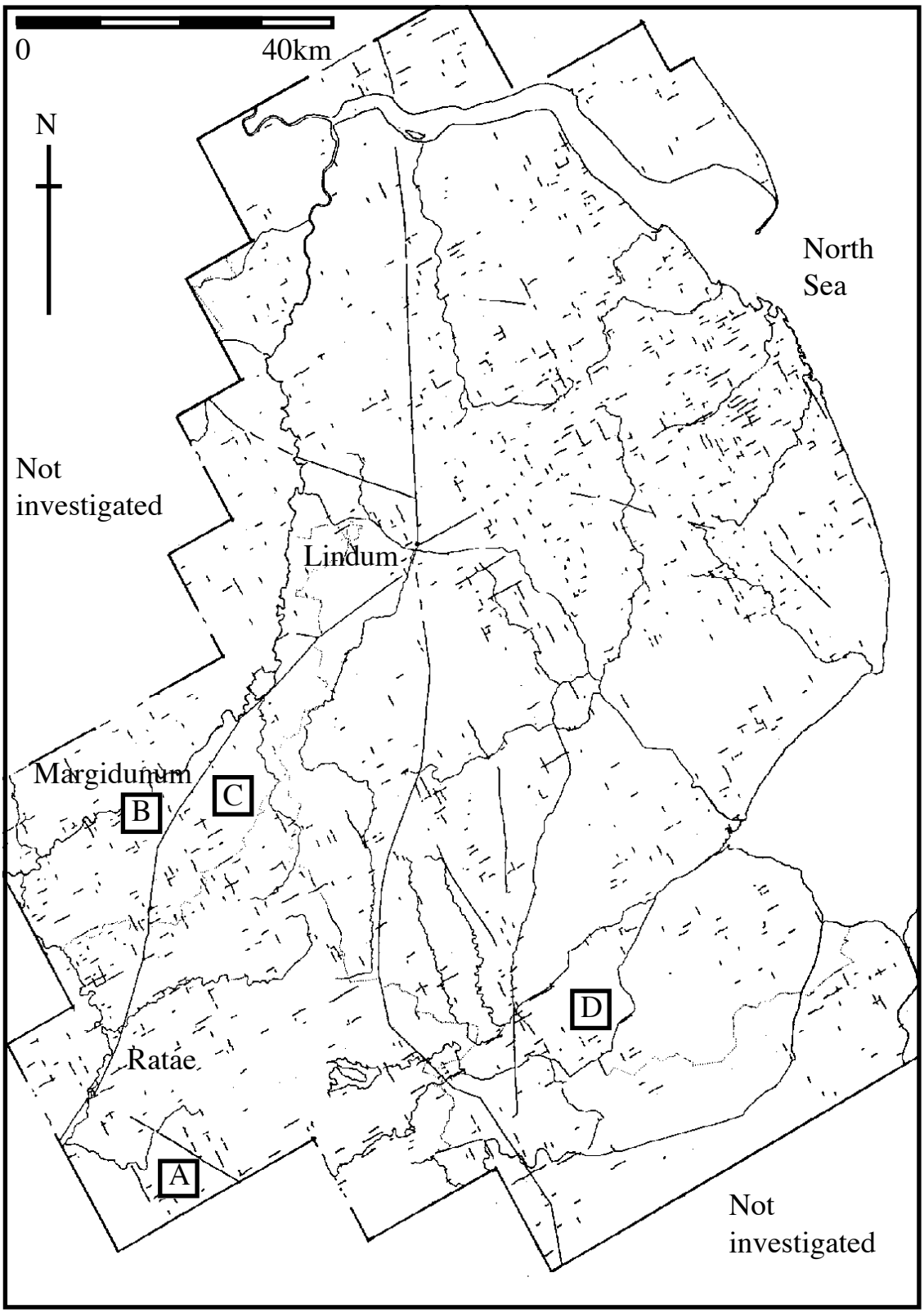

Figure 6.7 Lincolnshire and Leicestershire: traces on 1:50,000 topographic maps conforming to Lincoln 'A' cadastre.

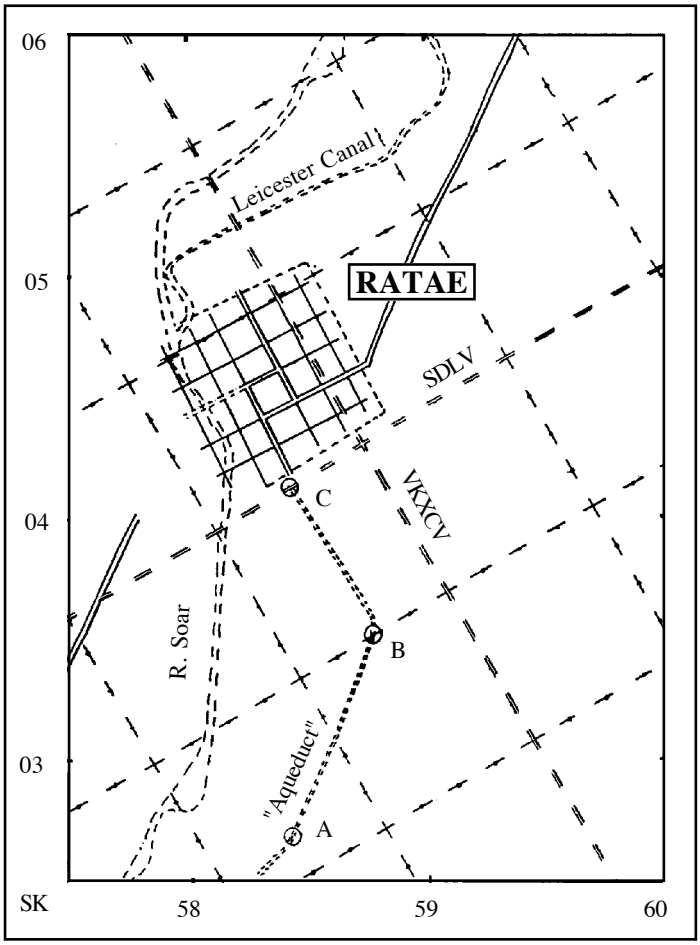

Figure 6.8 Lincoln 'A' cadastre, Ratae and its possible aqueduct.

undoubted Roman features clearly linked to the cadastre, coupled with trigonometrical and statistical observations.

This is not easy. The topography of Leicester *(figure 6.8)* raises a number of problems. Although the city is situated in the corner of a square formed by *quintarii*, the orientation of the street grid is not exactly the same as that of the cadastre. Its apparently significant positioning within the cadastre may therefore be fortuitous. However, the city had more than one phase of development, and we may not be looking at the original layout. As shown in Wacher's (Wacher 1974: 337) plan, there are two military ditches predating the street layout. The orientation of one is totally different to that of the cadastre, but the orientation of the other is the same. The distance of this ditch from the *limes* is, as accurately as can be measured from the 1:25,000 map and Wacher's plan, 300 feet of 0.296m, ± 10 feet, or 1/8 of the side of a century. Thus the topography of Roman features in Leicester is ambiguous.

The topography of the possible aqueduct (Wacher 1974: 344) is more clearly linked to the cadastre, whether by chance or not. This feature, which is evidently a water channel, passes through the three circled points, A-C. These point lie at intersections of subdivisions of the cadastre at distances of 1200 and 600 feet from the

limites. This gives the section AB an orientation of 3:4 with respect to the cadastre. The problem is that the Roman origin of this feature is not certain. So again the relationship is an interesting question rather than a fact.

To the south east of Leicester there is an exceptionally straight Roman road, Margary No. 57a *(figure 6.7'A')*, which, as we can see *(figure 6.9)*, passes through theoretical corners of centuries (circled) at 5:3. Although it cannot be seen at this scale, the fit, when studied on 1:25,000 maps is very good, and certainly within the margin of error used in the simulation studies described earlier. 20km of this straight segment survive.

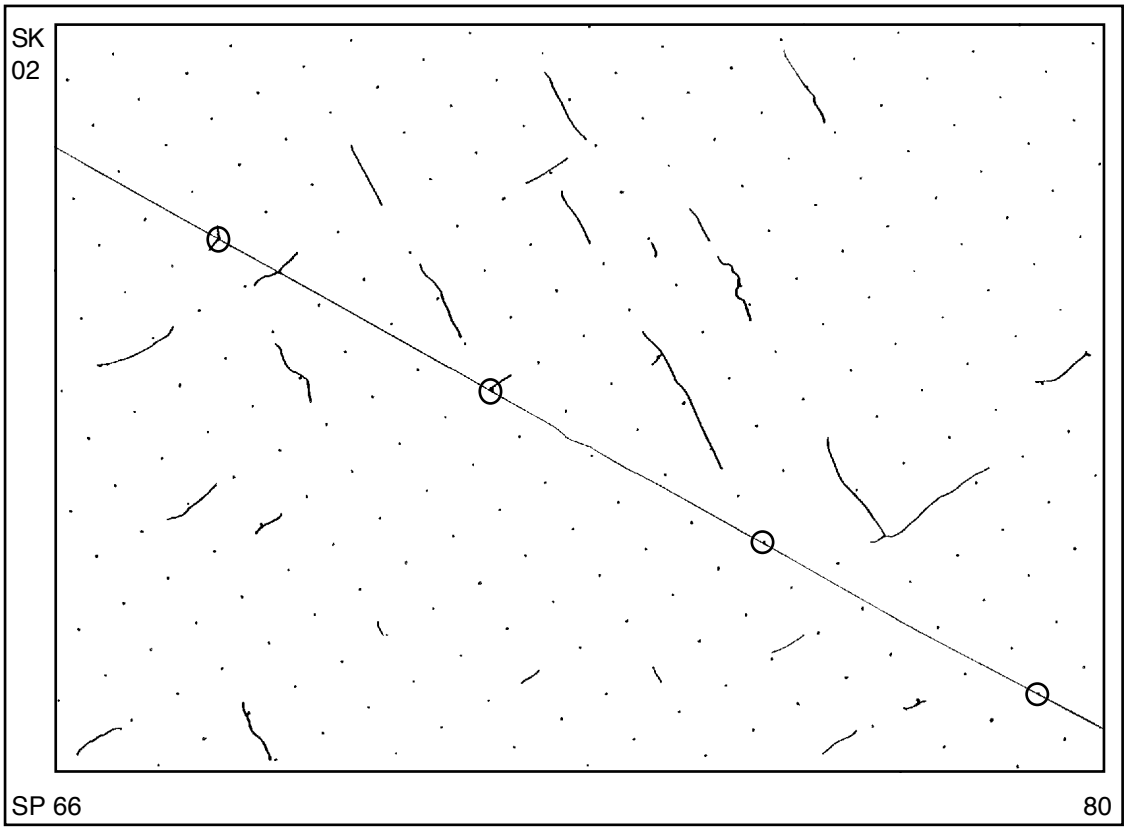

Figure 6.9 5:3 relationship of Roman road south east of Ratae

This road links the Foss Way at Ratae with Ermine Street and appears to be later than them. Thus we can accept the possibility that it was planned from the pre-existing cadastre, although, since Margary (1973) raises the possibility that this is another "road of

penetration" related to the conquest, the question of the date of the cadastre is again raised.

What seems much less acceptable is that two segments of the Foss Way are at "rational" angles to the grid. The first *(figure 6.7 'B')* is again at 3:5, starting on a *quintarius* (65 squares from the Lincoln axis) at about SK 6590 3455 and running to a point near Foss Farm at about SK 6840 3910. The second *(figure 6.7 'C')* is at 1:2. It runs for nearly 14 km from the end of the first section.

Not only is segment B at 3:5, and hence exactly at right angles to the 5:3 segment just described, but it also only just misses the intersections of *limites*, and in particular the quintarial intersection at SDXX VKLX. And, although segment C does not pass through *termini* it is very precisely parallel to the line which does. This is very worrying because such a simultaneous relationship of two end-on segments should, according to our simulations, occur extremely infrequently by chance, and would normally be used to support the idea that the road post-dated the cadastre. Thus the appearance of these relationships between the cadastre and a very early military road threatens the theory of oblique planning (and our simulation studies) with *reductio ad absurdum*.

It is therefore with some relief that we read Margary's (1973: 220) description of most of the segment C.

> "Foss Way can be clearly seen continuing in the same line, and indeed it does so for 6 1/2 miles farther till near Thorpe. Nevertheless, a most peculiar feature of its layout occurs here, for this is not the *original*[161] road, which has been traced upon an almost parallel course south-westward from near Syerston aerodrome up to the site of Margidunum.... the abandonment of a considerable length of it and its replacement by a parallel road such a short distance away is peculiar, and would seem to indicate a rigid adherence to alignments against common sense, which is in fact very foreign to the usual practice of Roman road engineers."

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[161] Margary's appears to be surprised and puzzled. His use of italics for emphasis is extremely unusual.

This piece of evidence saves the theory, since only a reorganisation of the road onto a new line, after the implementation of the cadastre, would provide a convincing explanation for the 1:2 section[162]. Furthermore, we need no longer accept that the road surveyors were necessarily displaying a lack of common sense. If the cadastre existed then clearly, because of the angular relationship, the reorganisation was planned in relation to it. The question is, why?

The answer may lie in the fact that here the road and the river Trent are parallel and there are topographic traces which would fit a 20 *actus* grid at the same orientation. This would provide an environmental reason for a partial reorganisation of the cadastre at 1:2, possibly to serve Margidunum. If this happened then the earlier course of the main road, not at quite the correct orientation, might have been sufficiently inconvenient to justify its reorganisation to conform more nearly to the new cadastre[163].

The evidence of road segments from this part of the area covered by potential cadastral traces seems to indicate its probable existence. The mean length of the three road segments, A-C, is 12km. This is 17 times the grid distance and hence in excess of the mean of 13 chosen in the Monte Carlo simulation. However, there are some ways in which the conditions of the simulation are not met.

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[162] Such reorganisation might also explain the 3:5 section, if it is not pure chance.

[163] One of the possible objections to this proposal is that, according to Martin Millet (1990: Table 3.4), there was a fort of the invasion period at Margidunum. This would seem to imply that Foss Way already existed on its present line to serve it. Since the present line of Foss Way should post-date the establishment of the cadastre, this might give Lincoln 'A" an unacceptably early date. However, this need not be so because the reference cited by Millet (Jones 1975) claims that there are "traces of two Roman military sites partly within the area of the town", in the form of sections of ditch. One of these "did not relate to the Fosse Way" and is presumably earlier than it. Clearly we need more precise dating evidence for these structures in order to judge the plausibility of the hypothesis presented here.

Firstly, the 1:2 segment does not pass through the grid points of Lincoln 'A'. There appears to be a reason for this, since the road may be integrated with a superimposed centuriated cadastre at 1:2, not all of whose *limites* could pass through *termini* of the earlier system

Secondly, two supposed Roman roads in this area were omitted because their irregular courses make them appear to be either romanizations of earlier track-ways, or medieval. However, even if they were included they would not decrease the proportion of observed segments which fit, since 8km of one of them, Margary no. 580, which forms part of the Lincolnshire-Leicestershire boundary, oscillates about VK XXXIV. Thus there would still be about 30% of the segments of certain or possible Roman roads in this area which fit. Despite the failure to fulfil the strict conditions of the simulation, this remains a most unlikely proportion to have occurred on a chance basis.

Further evidence comes from another area at a large distance from Lincoln *(figure 6.7, D)*. Surveys in this area by Peter Hayes for the Fenland Survey (Hayes and Lane 1992) has revealed Roman cultural landscape features in the parish of Deeping St James which seem relevant to the hypothetical cadastre. The micofiche gazeteer includes 11 RB settlements, possible settlements or uninterpreted scatters of material. There is also an entry which reads as follows:

" DEJ 15	1796	0974	RB?	Canal	Gravel to 3.5
	1960	1067			Mar Clay 2.5

Approx SW and NE locations and heights of a linear feature c30m wide and 1100m long, prob part of the course of the Roman river Welland from Deeping St James to Deeping Fen just E of Stowgate farm. There it prob joined the large rodden which crosses Crowland Common and continued into Cowbit Wash. Freshwater shells ... suggesting clean calcareous water running over gravel. Canal cuts into grey alluvial clay extending at least from Cranmore Drove to Cranmore Barn."

The orientation of the canal can be calculated from Hayes' results using the differences of the OS coordinates. From the figures as they

stand the angle is $Tan^{-1}(164/93)$, which is N 60.44° E. However, since the grid references are to 10 m, there is a possible tolerance of 5 m in either direction in the X and Y values of both. This means that the ratio can vary from 163/94 to 165/92, and the possible angles could be from N 60.03° E to N 60.86° E.

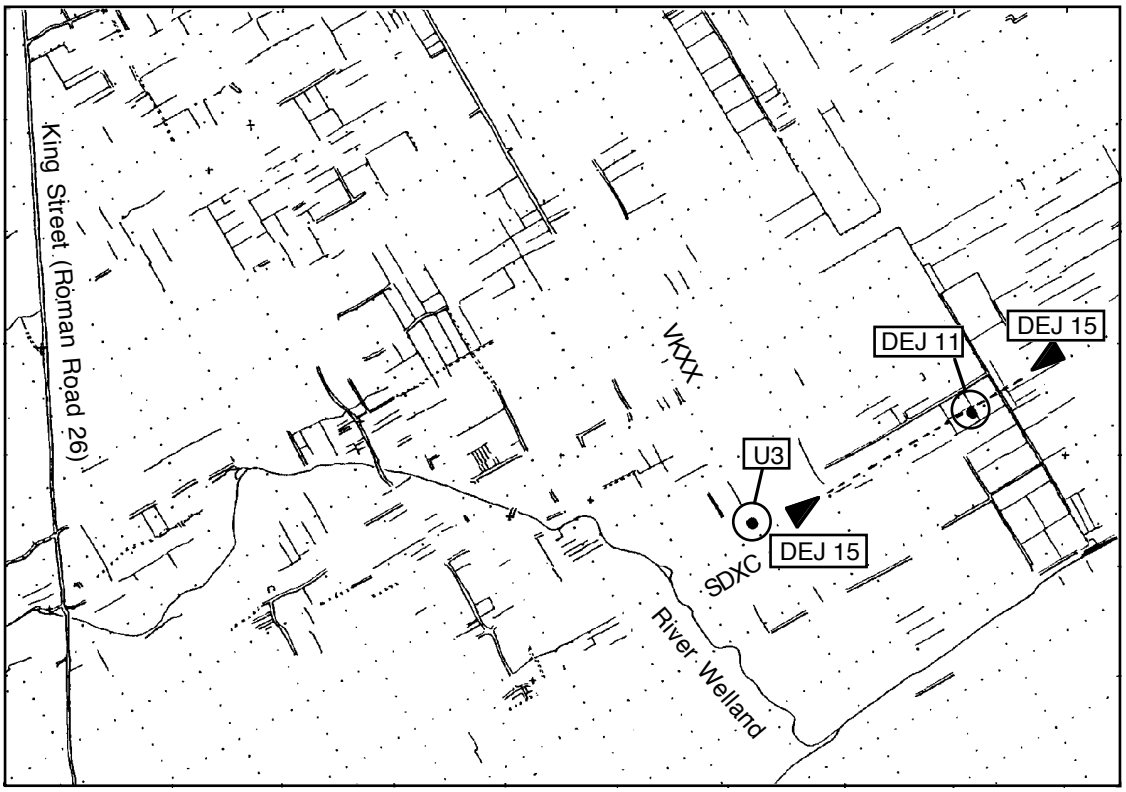

Figure 6.10 Roman and existing features topographically related to the Lincoln 'A' cadastre in the area of Deeping St James, Lincolnshire.

The orientation of *limites* in this direction is N 60.11° E, so, to the precision with which Hayes' coordinates determine its orientation, the canal and the cadastre are parallel.

The cadastral grid intersection points which lie nearest to the canal have coordinates:

a	b	c	d
1790 0965	1851 1000	1913 1035	1974 1071

Two of these, (a) and (d) Are quite close to Hayes' two references. The canal, if straight, would pass through 1842 1000, which is 90 m north of (b). Thus the perpendicular distance between the canal and the nearest *limes* is 90 x Cos 60.11° = 45m. Given that the canal is about 30m wide, it would appear that it ran beside a *limes (figure 6.10)*.

Furthermore, this *limes* is a *quintarius*, 90 south of Lincoln, Thus it is possible that, as may have been the case with *quintarii* in South Norfolk, it was followed by a surfaced road. This would explain why the canal is not on the *limes* itself.

The idea that *quintarii* may have been surfaced gains further support from another known Roman feature. We can see *(figure 6.10, extreme top left)* a road branching off King Street along SD LXXX. This is a Roman road, Margary No. 261, which runs along the *limes* for 2km before diverging from its line[164].

In this area , only two sites are associated with the canal. The first, U3, was known previously. The microfiche entry reads

> "U3 172 094 RB Sett
> ... Exceptionally large settlement (?) complex on projected line of artificial watercourse (Roman Welland? - DEJ 15) ... ."

This is near the intersection of two *quintarii* at 1728 0929.

The second site, an uninterpreted scatter (SS), is

> "DEJ 11 1915 1040 RB SS
> Highly unusual location: low, peaty, land beside or on the RB 'canal'. ... "

This is 55m ± 15m from another grid intersection.

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164 In a discussion of roads, it should be noted that King Street is not related to the grid, although at first glance it might appear to be so. The road diverges slightly from the line through grid points at 2:1, and this is enough to demonstrate its independence. This supports Margary's (1973: 232) assertion that it appears to have been constructed at an early date.

It can be suggested that the location of both of these sites, including one whose position is hard to explain in environmental terms, may have been influenced by a cultural and political factor, the presence and relative importance of *limites*. It may also have been guided by the physical presence of bridges, although, to judge by the frequency of modern bridges in this area, one would not expect every *limes* to generate one.

Investigation of this area could be pursued further. What is the relationship of medieval churches to the cadastre? What sequence of changes to the land surface has lead to the pattern of accordant field boundaries? Why do those to the west, on higher, less marshy, ground, appear less rigidly straight than those to the east?

Other areas could also be considered. Of those for which published details are readily available, Goltho is most interesting. Its present church, the redundant St George's chapel, next to the site of Beresford's excavation of the manor has an orientation of about 24° north of east (Beresford 1987: fig. 4). This is 5° away from that of the cadastre, which is 28.89. However, under the nave were found the stone foundations of the chancel of a very much larger medieval church whose orientation was noted to be "30 degrees off true E-W" (Everson 1988: 96). This is much closer to the orientation of the cadastre, and could be attributed to its influence[165]. Furthermore as represented on the 1:50,000 map, the church is on a *limes*. This site has clear evidence of Roman occupation. Beresford found traces of an earlier prosperous RB farmstead and signs of a later substantial building in Roman style lying outside the area of excavation.

The area surrounding Goltho has several manorial sites and churches coincident with the cadastre. The significance of this could be tested, and we could also use the Bayesian approach *(3.3)* to measure the change in probability introduced by new information about sites. One example of this has already occurred, since Everson's (1988) paper makes it clear that Bullington Hall could not

165 A similar phenomenon was observed by Legros (1970).

be the location of the medieval manorial site of Bullington. Since it is not "near" a *limes*, its removal from the list of medieval manorial sites increases the probability that the cadastre exists.

It would also be interesting to consider further the results of the recent RCHME survey of rural settlement in north west Lincolnshire, whose authors refer to a basic geographical determinism in the location of medieval settlement , but say that

> "... there are settlements whose siting seems to defy all logical explanation and certainly simple geographical determinants. The most notable of these are the hamlets of Risby and Otby (Walesby (2, 3)) as well as the E part of Walesby (1) itself, all of which are situated on the scarp face of the Wolds, on limestone benches which are and always have been subject to massive landslips and spring head sapping." (Everson, Taylor and Dunn 1991: 10)

This expression of bafflement, in the face of these "most notable" examples of environmentally anomalous siting, greatly enhances the (subjective) probability that the cadastre exists, since these settlements, considered as a group, have clear links with it. Risby and Otby are on *limites* and the eastern part of Walesby is at their intersection. Thus, like settlement DEJ 11, their unusual location can be explained by reference to the cultural and political landscape defined by the cadastre.

If it exists, the Lincoln 'A' cadastre, and possibly other cadastres in the same area, similar to that which may exist at Margidunum, will generate work for many years. In the meantime a study of the location of rural Romano-British temples might be an efficient test of the hypothesis. Temples seem to be closely associated with *limites*, they are normally symmetrical and thus have a well defined centre, and they form a clearly defined subset of the data. Even in this large area there are not likely to be a huge number, although there might be a slight problem in assembling the data, since 3 or 4 County SMRs would need to be consulted. This seems a project worth undertaking if it would shed light on the possible existence of the Lincoln 'A' cadastre.