5 A case study in South Norfolk

5.1 Topographical analysis

5.1.1 The cadastral framework - *limites*

In the case of South Norfolk the study of topography starts with recent small scale maps and proceeds to larger scales and older examples[94]. If we look at the current OS 1:50,000 Sheet 156, Saxmundham and Aldburgh, we see two patches of rectilinear road layout - North of Harleston and to East and West of Dickleburgh. A transparent overlay ruled with 20 *actus*[95] squares at the scale of the map can be moved about until a good visual fit is obtained with roads, tracks and footpaths in both patches. In the area as a whole there appear to be possible remnants of 10 out of 16 *kardines* and 5 out of 10 *decumani*[96] *(figure 5.1)*. This figure also shows the main A140 road based on Roman road Margary (1973) No. 3d running North-east through Dickleburgh.

Turning next to the OS 1:25,000 sheets, a linear feature can be observed on the neighbouring sheet to the north (TM29) which has the same orientation as the features already observed. This is a length of parish boundary followed by two lengths of road, from TM 2737 9610 to TM 2681 9900 *(figure 5.2. X-X)*. This feature is included in the Norfolk County SMR, County Number 10160, as a possible Roman road[97].

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94 Note the method. No attempt is made to consult older maps before advancing a hypothetical cadastre. Modern maps provide the survey base, the accuracy and the consistency which allow an unique hypothesis to be advanced. Older material can then be used as independent evidence to strengthen or weaken the hypothesis.

95 For the purpose of this investigation a grid square size of 709.5 metres was assumed. This is the metric equivalent, to the nearest half metre, of the 776 yards given by Bradford (1957).

96 By the usual convention the *kardines* are oriented nearer to North.

97 See also Robinson and Rose (1983: 21).

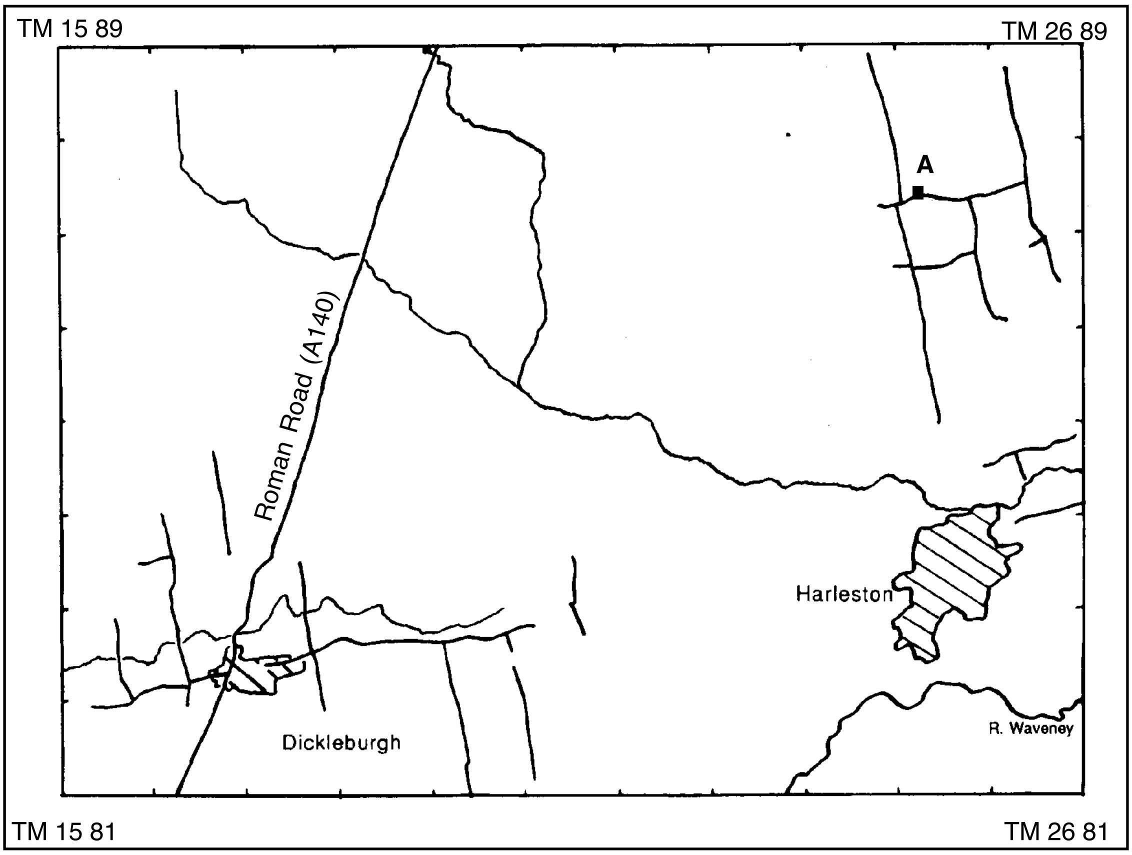

Figure 5.1 Possible traces of South Norfolk 'A' centuriated cadastre observed on modern 1:50,000 topographic maps.

This linear feature and the largest remnant *cardo* in the Harleston area - Norwich Broadway and its continuation, from TM 2445 8518 to TM 2377 8866 *(figure 5.2. Y-Y)* - could be 7 squares of 20 actus apart. So method three described above (3.1.1) can be used to obtain an orientation for the cadastre based upon this hypothesis.

The two chosen initial points are at TM 2417 8658 and TM 2704 9777 and the calculated orientation of the hypothetical kardines is N 11.077° W.

Then by fitting a transparent overlay to the orthogonal features north of Harleston it can be postulated that TM 2417 8658 is an intersection. From this origin and orientation, 1400 potential intersection grid references were printed using CADCOORD.

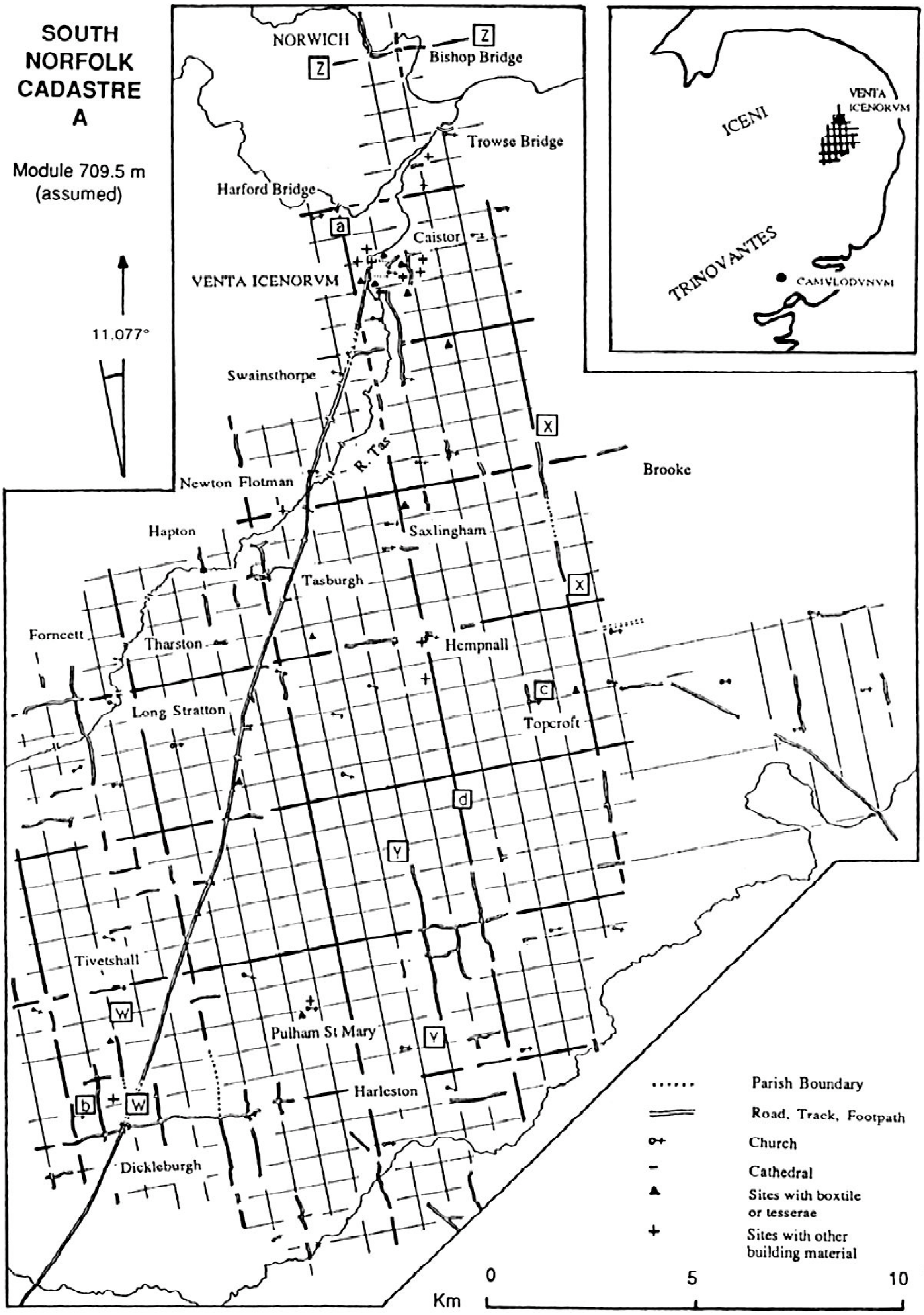

Figure 5.2 South Norfolk 'A' Cadastre, general view.

These calculated potential intersection coordinates are a close fit to the rectilinear road system at Dickleburgh[98], and when plotted onto adjoining 1:25,000 maps they reveal features nearly coincident with the *limites* over a wide area *(Figure 5.2)*. Each feature represents a road, track, footpath visible in the present day landscape. Nearly all these roads appear on an eighteenth century map of Norfolk (Faden 1973).

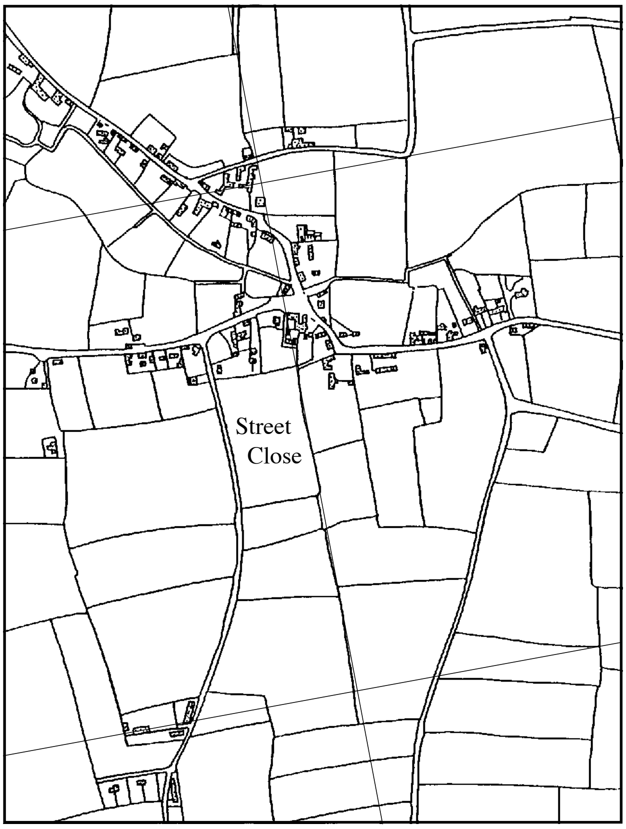

Figure 5.3 Hempnall 1841

Some of these *limites* are already identified as Roman roads. These include, apart from the feature X-X which was used to fix the position of the grid, two other Roman roads, Z-Z and W-W (Robinson and Rose 1983: 22, refs 13, 14), which could be slightly deformed *limites*. There is also reason to suggest that there may be another Roman road which conforms to a hypothetical *limes*. This is not visible as a road in the modern landscape, but can be seen as a field boundary on the 1:25,000 map of 1945.[99] It is also very clear on the Hempnall Tithe Apportionment map of 1841 *(figure 5.3)*[100], and the toponym "Street Close" may indicate that it represents part of the course of a

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[98] In fact it was better than had appeared from hand fitting of the transparent overlay.

[99] It is hardly visible on the modern map. Only a small remnant survives as the division between back gardens of a modern housing estate.

[100] Norfolk Record Office (NRO) TA 686.

Roman surfaced road[101]. Thus we have four potential *limites* for which a Roman origin has been, or reasonably may be, suggested.

There is also another indication that the *limites* may have actually existed: visual inspection of the points at which they would in theory intersect the main Roman road (A140) gives the impression that an unusually large number are coincident with existing junctions.[102] This coincidence can be tested for non-randomness using the Kolmogorov-Smirnov single sample test as described above *(3.2)*.

For the road junctions the observed cumulative distribution of observations with increasing distance from a *limes* (N-S and E-W) has a positive D value of 0.153431 which indicates that there is not more than a 2.5% chance that the distribution of the road junctions is random.

This was the result given earlier (Peterson 1988b)[103], but on further reflection one must ask if it is a fair test. We do not expect the junctions with N-S *limites*, the *kardines*, would stand much chance

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[101] *Street* comes from Latin *(uia) strata*, by way of Old English (OE) *stræt*. According to Cameron (Cameron 1961: 154), its normal sense in place names is "paved way".

[102] This can be seen in other cadastres, for example that of Mirebeau (Chouquer and Favory 1980: fig 20); and there is every reason to expect that junction points within cadastres will be conservative. They may continue to function, even when some or all of the roads leading to them have vanished and been replaced by roads at a different orientation. This is particularly clearly demonstrated in the case of the origin of the Orange A cadastre (Chouquer 1983).
This process still goes on. An example of such an envisaged development within the South Norfolk 'A' cadastre will be described below *(5.5.2)*.

[103] In fact the diligent reader will notice that the value previously given was .15340. This is probably a typing error and makes no difference to the conclusion. The figure given here was produced by a spreadsheet calculation. It is reassuring to find that it is close to the figure produced by programs on the mainframe computer.

of preservation because the angle between them and the road is generally small. Furthermore the observable coincidences are with the predicted positions of junctions with *decumani* only. Thus it could be more appropriate to test the distribution of junction points within the intervals between this latter set of *limites*.

The Kolmogorov-Smirnov procedure is essentially the same except that the distance calculation involves *decumani* only, and the expected values are just d, rather than $1-(1-d)^2$, since, on the null hypothesis, the distribution is now uniform random in one dimension rather than two. These calculations were performed using an MS Works spreadsheet, the most appropriate method for a 'one-off'.

This test gives a D value of 0.135036, indicating deviation from randomness significant at the 5% level. This relatively low degree of significance seems to be brought about by the poor preservation of road junctions in the southern part of the cadastre.

5.1.2 The cadastral framework - *quintarii*

The *agrimensores* insist on the existence and importance of the *quintarii*. It is therefore natural to look for them within the hypothetical cadastre in the form of potential *limites* which seem to be particularly prominent.

If we consider first the east-west *limites*, the *decumani*, we can observe that the most prominent (as a line of communication) is an approximation to the existing road from Dickleburgh to Harleston *(figure 5.1)*. However, no other *decumanus* is nearly so long. It is thus not clear, from their relative physical importance, which of the *decumani* are candidate *quintarii*.

Another approach is to consider the function of *limites* as boundaries. There are a large number of possibly surviving *decumani* which join the main road and among them we can look for examples which are both parish boundaries and also relatively long. The two longest are the southern boundary of Long Stratton (a footpath now apparently disused) and the northern boundary of Swainsthorpe (a very minor road). They are 15 centuries apart.

If these *limites* are *quintarii*, the pattern can be projected. The Dickleburgh-Harleston road accords with the pattern, being 10 centuries south of the southern boundary of Long Stratton; and looking north we see that there is a prominent feature on a *limes* 10 centuries north of the Swainsthorpe boundary. This is the possible Roman road whose approximate course passes through the site of Norwich cathedral, and which still seems to be represented by a road crossing the river Wensum at Bishop Bridge, Norwich, which was for many years the lowest crossing point on this river.

Thus we have a possible set of east-west *quintarii* which includes the most obvious existing road, the two longest lengths of parish boundary joining the main road, and the only previously known east-west Roman road which coincides with a *limes*. Given that we could have proposed four other positions for this set of *quintarii*, this reconstruction, which includes all these four features, appears to be the most acceptable.

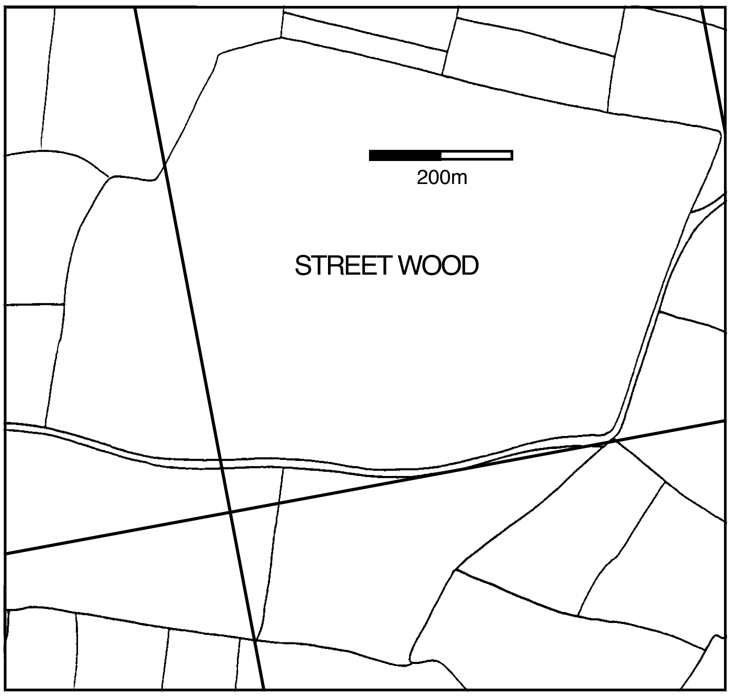

Figure 5.4 Street Wood, Hempnall 1841

This hypothesis may be supported by looking at another part of the Hempnall tithe map *(figure 5.4)*. The name "Street Wood" (a feature which no longer exists) has been held to indicate that the road passing down its east side is possibly Roman[104]. But we see also that, according to the above hypothesis, a *quintarius* passes along its south side. One is obliged to wonder if the "street" which may have given the wood its name is more likely to be this feature than the other "Roman road" which appears to be a very small fragment going nowhere.

So, if *quintarii* are to be identified, we can be reasonably confident that this is the most plausible reconstruction of those running east-west. By contrast, the possible position of the north-south *quintarii* is much less clear because the four *limites* upon which we might base our re-construction cannot be fitted in a single pattern.

	A	B	C
D	18	13	11
C	5	2	
B	7		

Figure 5.5 Distances between candidate north-south quintarii*, in centuries*

These four *limites* are defined as follows *(figure 5.5)*:

A - One of the two features by which the orientation of the cadastre was determined, the possible Roman road *(figure 5.2 X-X)*.
B - The other feature, Norwich Broadway *(figure 5.2 Y-Y)*.
C - The possible Roman road which may run through Hempnall.
D - The possible Roman road running north from Dickle-burgh*(figure 5.2 W-W)*.

Only one pair of these, A and C, could fit a quintarial framework. They are therefore the most plausible candidates. Furthermore,

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104 Norfolk SMR No 10199, "Possible Roman road". The Primary Record Card says that R R Clarke noted name Street Wood. However, Maureen Cubitt's (1988: 7) reconstruction of how the landscape may have looked circa 1767 shows that at that time the wood was called Asket Wood. It is not clear if this name is earlier, or merely an alternative.

Norwich Broadway (feature B) has no immediate claim to be a Roman road, and the suggestion that feature D is one seems to be based solely on the fact that it passes close to a villa site. In fact D is unremarkable when compared to other north-south *limites* in the same area, the longest of which, the former parish boundary between Dickleburgh and Rushall, does indeed fit a proposed reconstruction of *quintarii* which includes features A and C. This layout gives particular significance to Hempnall, and we note that according to this reconstruction its church lies at the intersection of two *quintarii*, both marked by possible "street" placenames.[105]

5.1.3 The cadastral framework - *limites intercisiui*

Several parts of the South Norfolk 'A' cadastre show signs of possible regular subdivision of the centuries. In the parishes of Forncett and Moulton *(figure 5.6)* there a number of divisions at the common spacing of 5 *actus* (600 feet). This may be compared with similar structures near Beaune *(figure 3.10)*. However the traces are rather sparse and hence not very convincing, and it could also be argued that this width of field would be expected even in a non-Roman context because it is approximately equal to a furlong (660 English feet).

A rather more interesting result is obtained by conducting a Fourier analysis on all the boundaries in the Dickleburgh-Scole area. This is prompted by the work of Rita Compatangelo (1989) who applied the technique to a Roman cadastre in the Salentine peninsular, at the south-eastern extremity of Italy.

In certain parts of the Salentine cadastre, which is a typical centuriation with a module of 705m, there are also many other existing boundaries at the same orientation as the grid, which may be the remains of regular *limites intercisiui*. Compatangelo looked for signs of such regularity because this may give clues to this

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105 Hempnall has a remarkably large number of "street" names. There are others which may indicate the presence of an oblique Roman road; see below *(5.1.6)*.

cadastre's date and function, by allowing comparison with other better known Roman cadastres.

Figure 5.6 Topographic traces in the centre of the South Norfolk 'A' cadastre.

Compatangelo's approach is to generate periodograms - charts which show the relative importance of frequencies contributing to the observed pattern. Frequencies with large amplitude may reveal underlying regularities in the field pattern, even in the presence of "noise" arising from later modifications.

In the analysis of discrete data, periodograms are obtained by generating Fourier transforms of n values which represent the distribution of the data within some fundamental interval. In this case the numbers are derived from a figure proportional to the length of boundaries falling in a series of n equally spaced bands parallel to one orientation of the cadastral grid *(figure 5.7)*. In order to compensate for degradation of the traces, which may have become irregular or been wiped out, data is summed from the corresponding bands of several grid squares. Thus the fundamental interval is the module of the centuriation, and within this interval we have n values forming a real vector z.

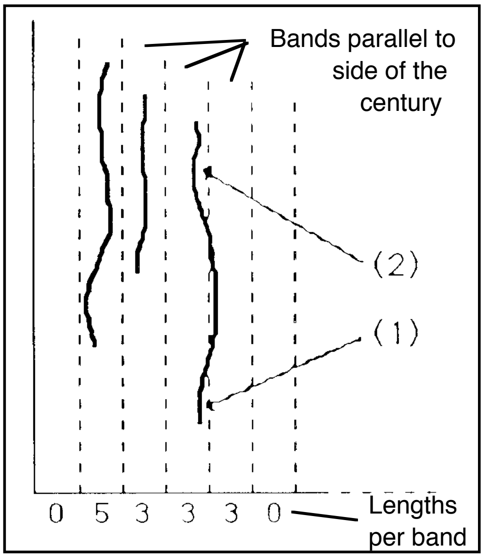

Figure 5.7 Generation of raw data from possible cadastral traces.

The Fast Fourier transform (FFT) takes this vector z and creates a vector c whose values are the complex coefficients of of the discrete Fourier transform of z. In the case of the MathCAD FFT routine used by the author, these coefficients satisfy

$$c_j = \frac{1}{\sqrt{n}} \sum_k v_k e^{2ijk/n}$$

FFT routines will produce $(n/2)+1$ values of c, and the periodogram is the set of $|c_j|$. The periodogram values are proportional to the amplitudes of cosine curves, with phase $\arg(c_j)$, which, when added together, generate the distribution represented by the vector z. A cosine curve with phase zero will have maxima at the ends of the fundamental interval.

This is equivalent to the form of representation, see Rayner (1971), in which any wave form is generated by the sum of a series of sinusoids with frequencies 0, 1, 2, 3 etc., which have suitably chosen amplitude and phase. The periodogram values show the relative importance of the frequencies, and the corresponding phases measure the degree to which the cosine wave at that frequency is "in step" with the fundamental interval.

Compatangelo's raw data took the form of possible *limites intercisiui* summed over 20 squares. She divided the fundamental interval of 705m into 44 bands and produced three measures for each band: the sum of the length of traces, the number of occurrences of a trace and the ratio of these two. The periodograms of these discrete distributions have peaks which may represent the sought-for original divisions. For example, one of her figures (Compatangelo 1989: fig 53) shows highest amplitudes at frequencies of 2, 6, and 20, and possibly at 7 and 11. She appears to consider all of these to be potentially meaningful.

There are problems with this approach. Do we need some form of "control"; what would we expect to see if we submitted a regularly divided cadastre to this process? Do we need to assess the statistical significance of a particular peak value, and how can we do so? What is the significance of phase?

It is possible to simulate the distribution of traces that we would expect to see in a regularly divided cadastre (Peterson 1992a). This shows that Fourier analysis of a simulated division by three, into intervals of 800 feet, generates a peak in the periodogram at frequency 3, as expected; but it also generates harmonics, 6, 9 ... etc., which are in phase, and thus wrongly seem to indicate other subdivisions of the cadastral squares. A distribution which simulates the pattern obtained by superimposing data from several squares, some divided in two and some in three, produces an even more misleading result. We obtain a periodogram whose highest value is 6. This indicates that the appearance of non-prime frequencies which are in phase and which have large amplitude values in the periodogram need not necessarily indicate the presence of corresponding divisions on the ground

Despite these concerns over the method and the way in which it has been used, it was considered potentially worthwhile to investigate the physical significance of high peaks in the periodogram, provided that we had a measure of their statistical significance. We would also need to check that a prominent peak in the periodogram had a phase angle which was not too far from zero, otherwise it could not possibly represent a genuine sub-division of the fundamental interval.

Shortly before the author began his study, the Scole-Dickleburgh area of the South Norfolk 'A' cadastre had attracted the attention of others (Fleming 1987; Williamson 1986; 1987). Tom Williamson's work has lead to the widely held belief that the pattern of boundaries derives from a coaxial field system which was certainly in existence in the Romano-British period, before the construction of the oblique main Roman road, and which could have had a prehistoric origin.

It is possible to attempt a different interpretation, using Fourier analysis; the area covered by the supposed coaxial field system is well defined and Williamson's source data, the Nineteenth Century 6 inch Ordnance Survey maps, can be used. It can also be claimed that this is one of our more objective studies since neither the survey area or the basic data have been specially selected.

The 6 inch maps were processed manually to include only those features which conform, in the author's judgement, to the orientation of the Roman cadastre *(figure 5.8)*.

The traces running in the north-south direction are more numerous and regular, so they were used as input to the Fourier analysis. The Mathcad Fast Fourier Transform routine expects the number of input values to be a power of two, so the north-south traces in each hypothetical grid square were enlarged to fit a transparent overlay divided into 64 bands. The length of trace lying in each band was measured, by hand, to give 64 values for each square, giving a total of 808 non-zero values over approximately 100 squares.

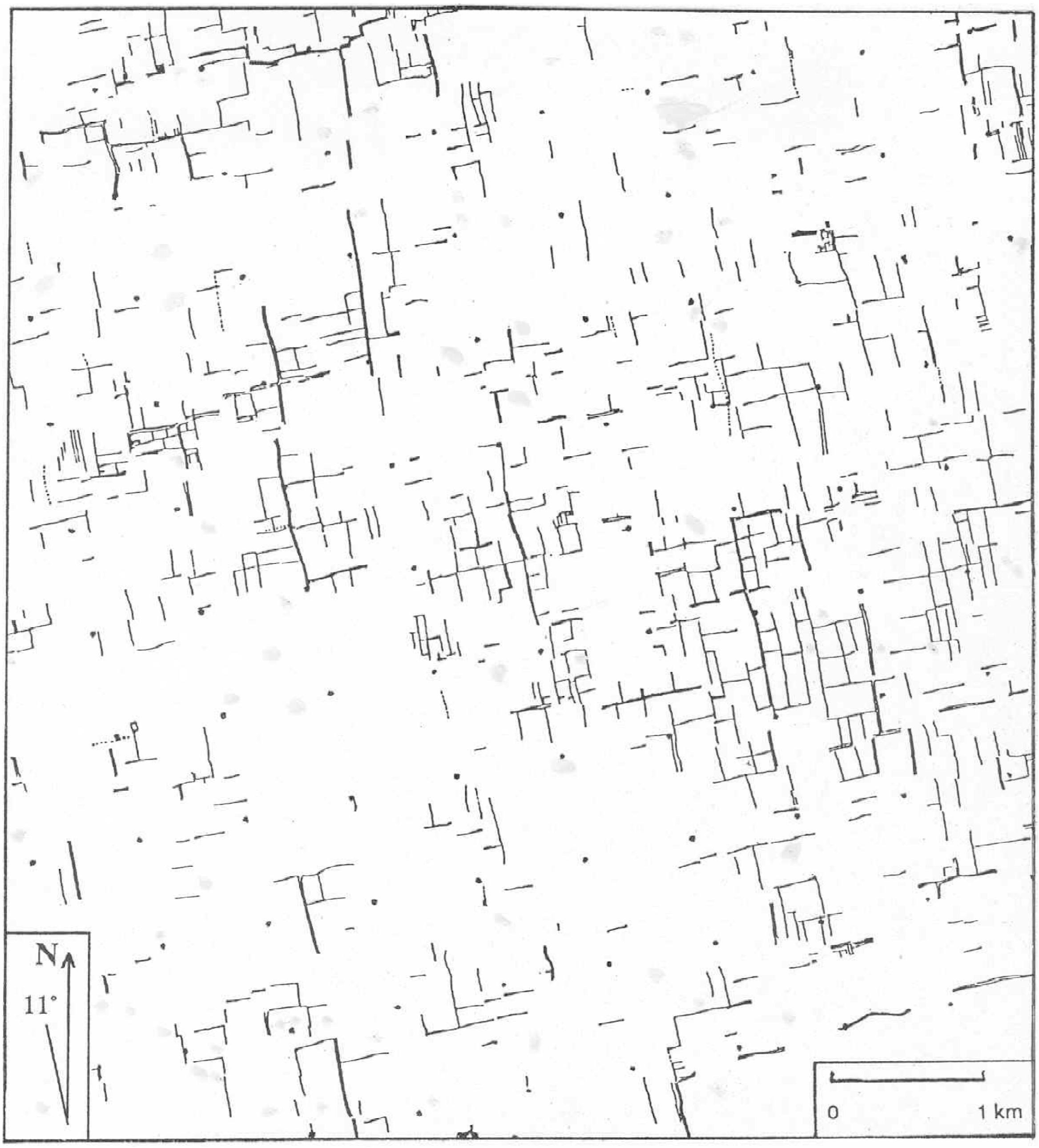

Figure 5.8 *Traces of the South Norfolk 'A' cadastre in the Scole-Dickleburgh area. The position of the* limites *is shown by dots at the corners of the centuries.*

The corresponding values for each east-west row of grid squares were then summed (in the north-south direction) to give an array of 1024 values representing the east-west distribution of the boundaries. Then the corresponding values in each of the 16 blocks of 64 cells in this array were summed to obtain the sum of all the data *(figure 5.9 upper chart)*. The periodogram *(figure 5.9 centre)* of this distribution has a high peak, of 3.1 times the mean amplitude, at frequency 1 and a next highest peak, of just over twice the mean, at frequency 3.

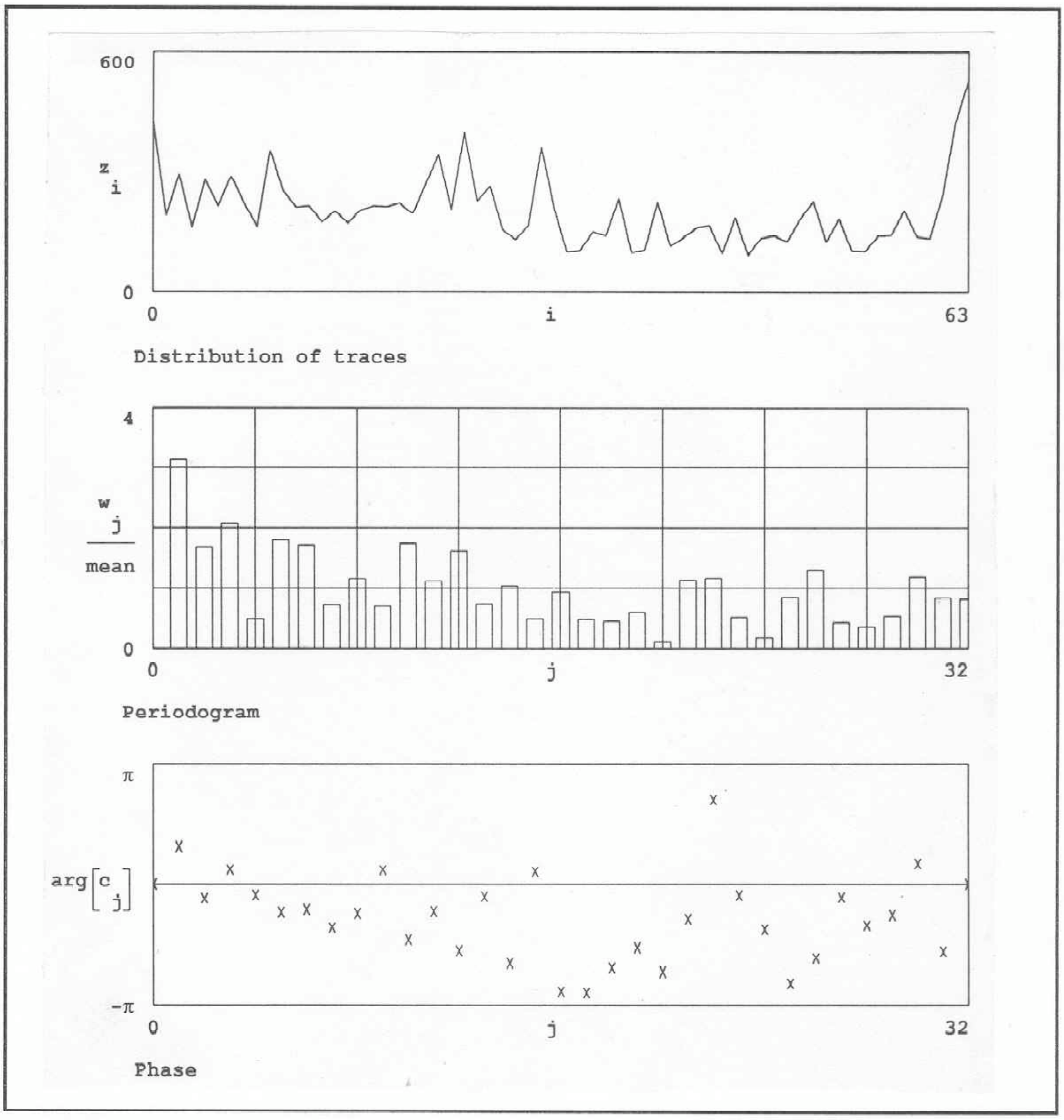

Figure 5.9 *Distribution of north-south traces in figure 5.8 and its Fourier transform.*

But what is the statistical significance of these peaks? How often would peaks this high be obtained by chance? In order to answer this question a new array of 1024 values was constructed by assigning, to each cell, a value taken from a randomly determined cell in the original array of 1024 values. This data set was then reduced to 64 values by the procedure described above. The aim was to produce a data set with approximately the same mean and variance as the original, but in which any sign of periodicity would have been destroyed.

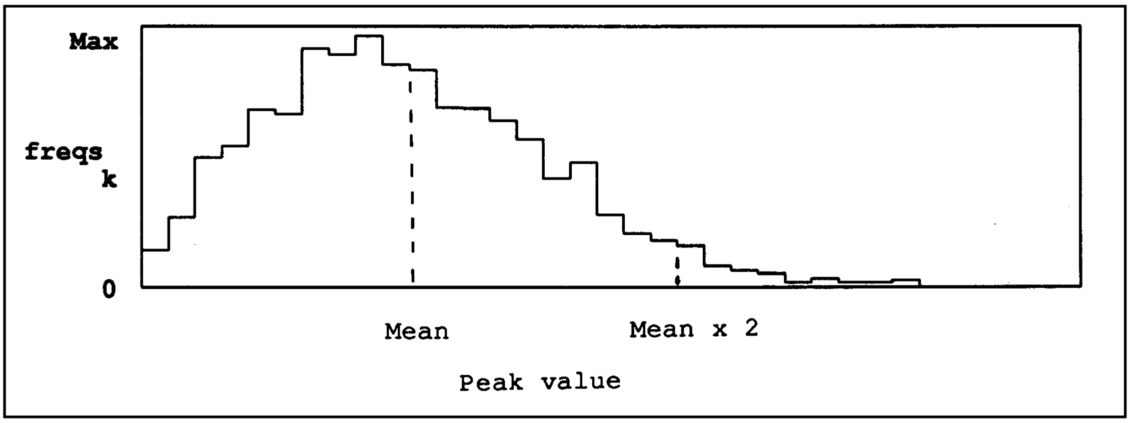

Figure 5.10 Histogram of periodogram values of randomised data.

This gives a new distribution and a different periodogram of 32 values (that for frequency zero not included). This randomisation process was repeated 100 times and the 3,200 periodogram values were plotted as a histogram *(figure 5.10)* and tabulated as a cumulative percentage distribution. This indicates that, in this case and for this sort of data, none of the randomly generated values exceeded three times the mean value, but 4% are higher than twice the mean value. At first glance 4% looks quite a low chance; but, given 32 values in each periodogram, it is likely that at least one will exceed this level. If we use the value of 4%, then the probability is $1 - 0.96^{32}$ i.e. 0.73.

Nevertheless, one might think that the chance that <u>two</u> values exceed twice the mean value would be considerably lower. But, again using the 4% figure, we can calculate that the chance of seeing exactly one value exceeding twice the mean value is ${}^{32}C_1 \times 0.04 \times 0.96^{31} = 0.36$. Thus the probability of seeing a periodogram with at least 2 such values is 0.73 - 0.36 = 0.37. One must conclude that the periodogram obtained in this case is not at all unusual and, furthermore, one prominent frequency could be a harmonic of the other. This makes it necessary to examine the phase of these two components.

The component with frequency 1 *(figure 5.9 bottom chart)* is more out of phase than that with frequency 3. The respective values are, in fact, 0.98 and 0.39. These numbers can be used to calculate the absolute displacement of the positions of the maxima of the respective Cosine curves from their "in phase" positions (the positions in which they coincide with the limits of the fundamental interval).

Any component frequency can have a phase with values from $-\pi$ to π. This range of 2π represents the wavelength of the component, which, of course, varies according to its frequency. For the component with frequency 1 the wavelength is 709.5m; thus a phase of 0.98 radians represents a spatial displacement, of the maxima of the Cosine curve from the "in phase" position, of

$$\frac{0.98}{2\pi} \times 709.5 = 111\text{m}$$

This displacement is large and it is perhaps explained by the way in which the traces tend to be most dense on the left hand side of the distribution.

The wavelength of the component with frequency 3 is
709.5/3 = 236.5m and its phase is 0.39. Thus its spatial displacement is

$$\frac{0.39}{2\pi} \times 236.5 = 15\text{m}$$

This component is much more nearly in phase, which suggests that it is unlikely to be solely a harmonic of the component with frequency 1, because there is 96m between their maxima. Despite the lack of statistical significance of its amplitude, it may indicate a genuine original subdivision of the cadastral squares into three.

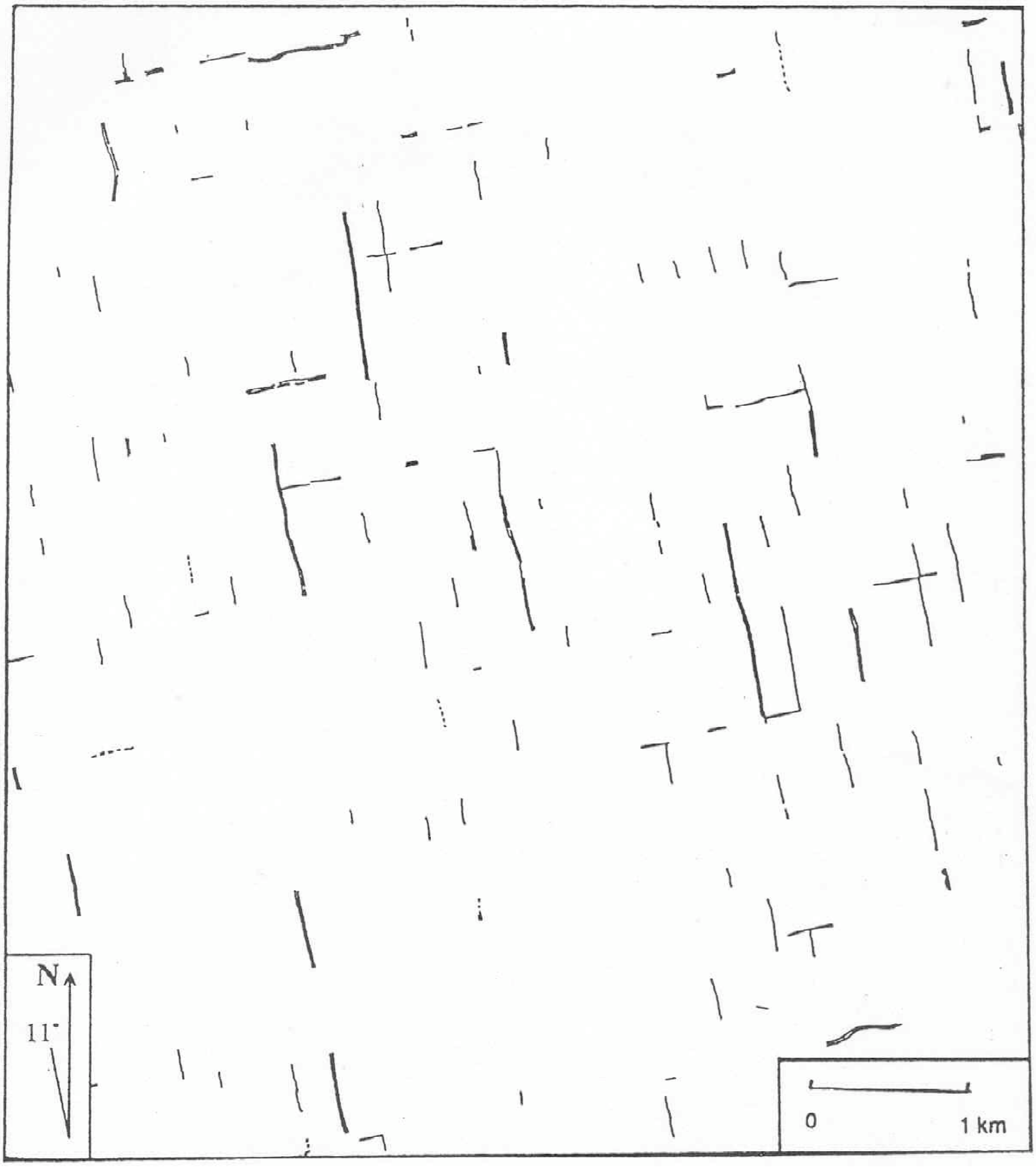

Figure 5.11 Traces from figure 5.8 representing a possible division of the centuries in three.

Using this clue we can select those supposed physical traces which would correspond to this form of division *(figure 5.11)* - and they do provide some evidence of it. It is also noticeable that these divisions are more uniformly distributed than the possible cadastral traces, considered as a whole. If they were part of the original substructure of the cadastre, then the variable density of the other traces could perhaps be attributed to different patterns of Roman and later land use.

This form of subdivision was not initially expected.[106] Nevertheless, two things argue for the idea that this pattern is the work of a Roman land surveyor. Firstly, since 3 is a factor of 2,400, one can accept that, in a Roman context, squares with sides of 2,400ft can easily be divided in this way. On the other hand, although subdivision by 2 occurs (rarely) in prehistoric cadastres (Fleming 1987: 65), other sorts of subdivision are not apparent, and not expected. Secondly the writings of the Roman *agrimensores* tell us that they did indeed divide land in this way. According to Hyginus, one square could be allocated to three men, and it has been suggested that in his time, around the end of the first century AD (Hinrichs 1988: 81), this area of land was considered to be the normal allocation for one man and his family (Chevallier 1983: 38, note 55).

Some intriguing questions are raised by the strong possibility that one part of the South Norfolk 'A' cadastre was divided in a way commonly used for allocation of holdings to veterans. These questions relate to the historical context, and to the possible chronology of the system. They will be discussed below *(5.5)*.

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106 As we have seen, a division by four is visible elsewhere and this is what was expected. Studies of other possible Roman cadastres elsewhere in Britain *(see below, part 6)* also seem to reveal this form of subdivision.

5.1.4 The relationship of the hypothetical cadastre to modern land use.

5.1.4.1 Church, hall, ford and *limes*.

The frequent association of church and hall in the modern landscape is widely recognised to be significant[107], and relationships of this type can be seen in South Norfolk. Some of them also seem to be related to a potential *limes*, in that it appears to be an axis linking church and hall. It is also noticeable that members of a fourth class of topographic feature, fords or other river crossings, may be involved in these relationships. This is to be expected because the materialisation of *limites* as lines of comunication would lead to the definition of new river crossing points.[108]

Before giving examples, a disclaimer must be made. We are talking here of visible relationships in the modern landscape. Further research, beyond the scope of this work, would be required to establish if, and how far, any particular relationship extends into the past, but if we follow Morris it is reasonable to assert continuity for a major proportion of the church-hall pairs.

The main area in which, judging by the apparent survival of its grid structure, the cadastre may have existed (and have survived) covers 57 parishes of South Norfolk *(figure 5 12)*. A possible

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[107] "The modern traveller through rural England can hardly fail to be impressed by the frequency with which parish churches are found next to buildings or monuments of lordly status. ... It is useful to ask what lies behind these juxtapositions. Do they reflect a variety of separate factors which operated at different times? Or could it be that church and hall have kept company from the outset, with some houses subsequently being rebuilt and enlarged while others dwindled in status or disappeared? There are several reasons for thinking that the latter possibility is the more likely." (Morris 1989: 249).

[108] In this area the natural environment need not have played a large part in the definition of the sites of river and stream crossings, because watercourses tend to no more difficult to cross at one point than another.

extension covering part of modern Norwich will not be discussed here because the major changes which have recently affected the area make it difficult to interpret without further research.

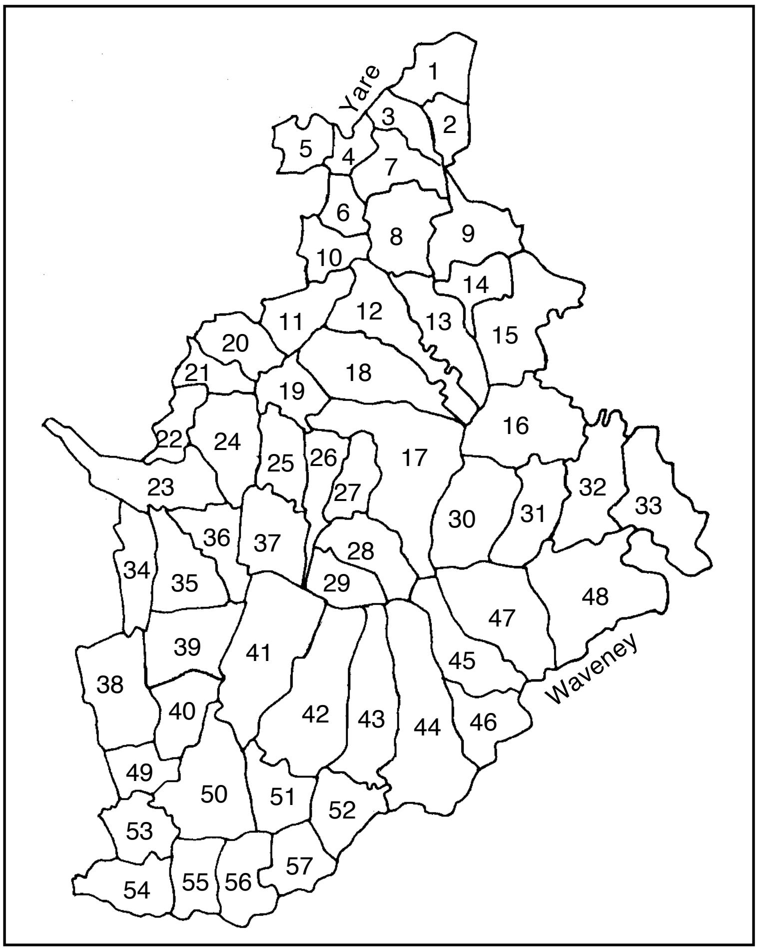


Figure 5.12 Parishes within the South Norfolk 'A' cadastre.

The relationships between churches (C), halls (H) and *limites* (L) can be tabulated *(figure 5. 13)*. The C or H entry is checked where the church or hall is near the theoretical line of the *limes*. The L entry is checked if a modern road, track or path corresponds to it. An additional column shows those cases in which the position of the *limes* associated with either the church or the hall (or both) is at a ford (F) or other river crossing.

No	Parish name	Church Location		C	H	L	F
		X	Y				
1	Trowse	62457	30683	√		√	√
2	Bixley	62586	30494	√		?	
3	Arminghall	62524	30431		√		
4	Markshall (disappeared)	62280	30480	√			

Figure 5.13a Churches, halls, limites *and fords.*

				C	H	L	F
5	Keswick	62135	30470	√			
6	Dunston	62274	30224	√			
7	Caistor St-Edmund	62322	30337		√	√	
8	Stoke Holy Cross	62357	30078	√		√	
8a	St' Holy X B (poss, disapp'd)	62520	30170				
9	Poringland	62708	30166	√			
9a	P'land, West (disappeared)	62628	30101				
10	Swainsthorpe	62187	30094		√	√	√
10a	S'thorpe St Mary (disapp'd)	62255	30045				
11	Newton Flotman	62130	29847				
12	Shotesham St. Mary	62378	29882	√	√		
12a	S'ham St Martin (ruin)	62382	29870				
12b	S'ham St Botolph (ruin)	62396	29932				
13	Shotesham All Saints	62468	29902	√		√	
14	Howe	62750	29996				
15	Brooke	62939	29954		√		
16	Woodton	62855	29462	√		√	
17	Hempnall	62412	29445	√		√	√
17a	H'nall St Andrew (disapp'd)	62131	29509				
18	Saxlingham	62314	29720	√			
18a	S'ham Thorpe (ruin)	62308	29660				
19	Tasburgh	62011	29588	√	?	√	
20	Flordon	61893	29727				
21	Hapton	61762	29667		√	√	√
22	Forncett St. Mary	61662	29384	√			
23	Forncett St. Peter	61649	29283	√			
24	Tharston	61903	29427	√	√	√	
25	Stratton St. Michael	62048	29362				
25a	S'ton St. Peter (disappeared)	62062	29356	√		√	
26	Morningthorpe	62184	29256				
27	Fritton	62275	29328				
28	Shelton	62211	29103				
29	Hardwick	62231	29009				

Figure 5.13b Churches, halls, limites *and fords (continued).*

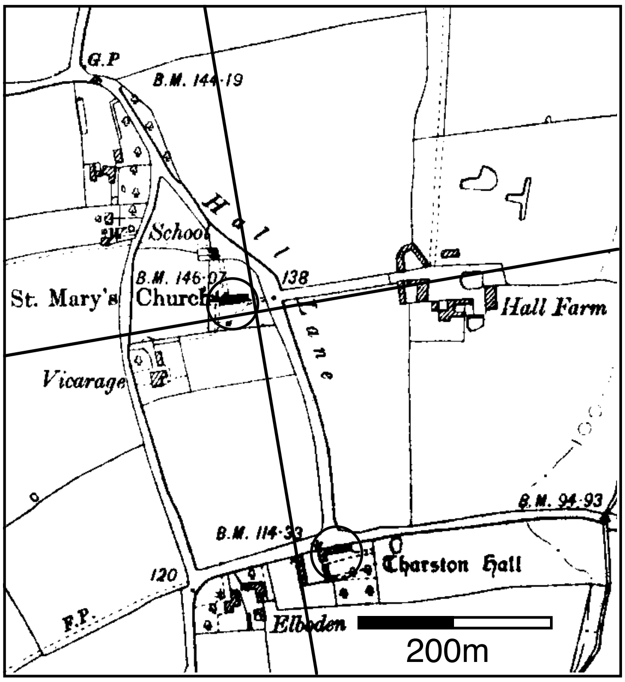
				C	H	L	F
30	Topcroft	62659	29289	√			
31	Bedingham	62850	29339				
31a	B'ham St. Mary (disapp'd)	62850	29340				
32	Hedenham	63121	29338				
33	Ditchingham	63298	29222				
34	Aslacton	61563	29109				
35	Great Moulton	61658	29079				
35a	Lit. M'n, All Saints (disapp'd)	61713	28885	√		√	
36	Wacton	61798	29175				
36a	Lit. W'n, St. Mary (disapp'd)	61739	29165	√			
37	Long Stratton	61968	29227	√	√	√	
38	Gissing	61462	28528		√		
39	Tivetshall St. Margaret	61636	28704		√	√	
40	Tivetshall St. Mary	61663	28581	√		√	
41	Pulham Market	61969	28608				
42	Pulham St. Mary the Virgin	62122	28517	√		√	
43	Starston	62350	28438				
44	Redenhall with Harleston	62638	28437				
44a	Harleston Chapel (disapp'd)	62451	28329				
45	Alburgh	62707	28728				
46	Wortwell				√	√	√
47	Denton	62863	28736				
48	Earsham	63261	28880				
49	Shimpling	61562	28263	√	√	√	√
50	Dickleburgh	61677	28242				
51	Rushall	61976	28266	√	√	√	
52	Needham	62309	28191				
53	Thelveton	61522	28124	√		√	
54	Scole	61510	27906	√	√		
54a	Thorpe Parva (tower)	61609	27902				
55	Billingford	61680	27907		√		
56	Thorpe Abbotts	61875	27890				
57	Brockdish	62043	27961	√	√	√	√

Figure 5.13c Churches, halls, limites *and fords (conclusion).*

For the sake of completeness all known parish church sites are included. The coordinates of ruined churches are taken from Batcock (1991), except in cases where a standing structure is shown on the 1:25,000 map in a different position to that shown by Batcock and it has been possible to verify the correct position on the ground. If so the centre of the structure depicted on the map is used.

Topcroft, St Giles, is omitted because Batcock's coordinates (TM 2692) define a kilometre square, and are hence too imprecise for any statistical test. No coordinates are included for a church in Wortwell, because the parish is served from Redenhall, there being no known independent Wortwell ancient parish church.

The noticeable relationships are shown on the following maps. First there is the group in which church and hall appear to have an axis determined by a *limes*.



Tharston church is at a corner of a century, on a gentle hill slope, not at the summit, linked by slightly deformed N-S potential *limes* to Tharston Hall whose position is at the intersection of the *limes* and an E-W natural drainage. Both church and hall, and other buildings in the immediate vicinity, have the orientation of the cadastre.

Figure 5.14 Tharston.

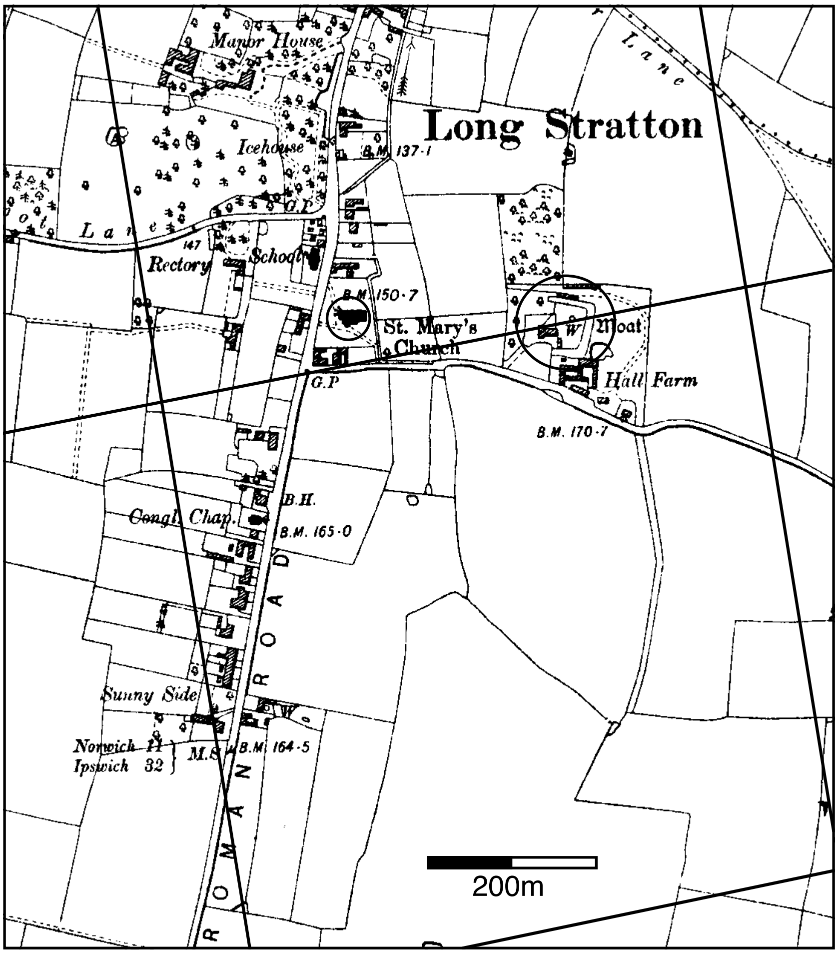


Figure 5.15 Long Stratton (Stratton St Mary).

At Long Stratton a theoretical E-W *limes* runs from the junction point of Hall Lane with the Roman road (A140) through a moated enclosure. It seems likely that the moat, beside the existing Hall Farm, is the site of the hall. The church is near the main road junction. Note also the boundary running south from Hall Lane, near a mid century line. This is shown on modern OS maps as a permanent stream. It appears to have made to conform to the cadastre, since it is not in the centre of its small valley.

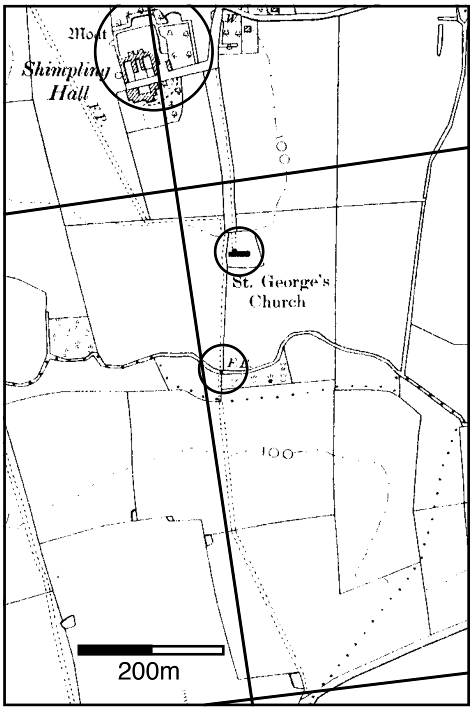


Figure 5.16 Shimpling.

Shimpling also has a church near the corner of a century, linked by a track slightly displaced from the line of the *limes* to a double moated enclosure. The *limes* passes through the centre of this complex on a line adjoining the modern Shimpling Hall. It also passes almost precisely through a ford to the south of the church. According to the reconstruction of *quintarii* proposed above, it is a *quintarius*. Again the orientation of the moats and modern hall are cadastral.

Rushall is the final example. Here the *limes* has been deformed to the west, but we observe that a footpath continues from the road junction between church and pub and comes back to the theoretical line. Church and hall are clearly related to this deformed *limes*. The church is at the intersection with a deformed E-W *limes*, the Dickleburgh-Harleston quintarial axis.

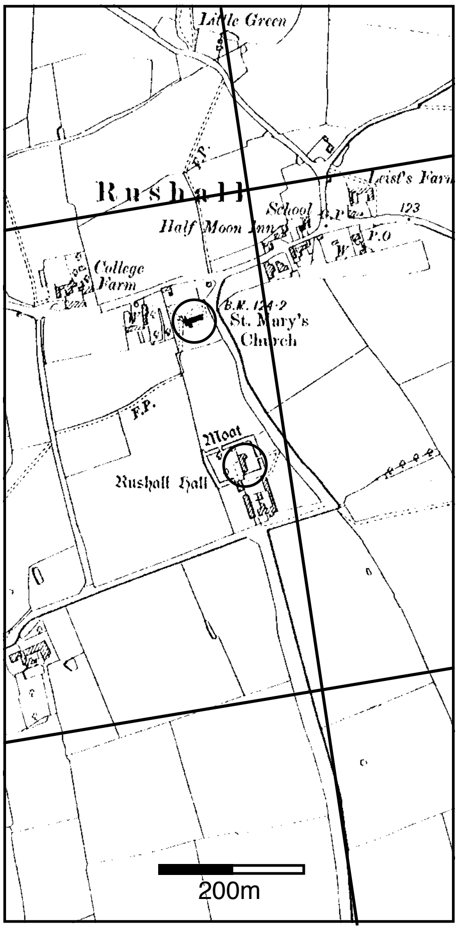
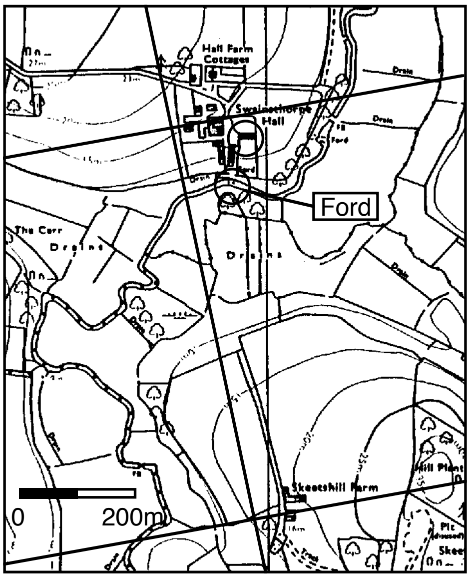


Figure 5.17 Rushall.

There are other cases in which a church is not involved, but where a hall appears to be linked by a *limes* to a ford.



Based on the 1977 Ordnance Survey 1:10,000 map with the permission of the Controller of her Majesty's Stationary Office © Crown Copyright

Figure 5.18 Swainsthorpe.

Swainsthorpe Hall, probably on the site of the headquarters of the united manors (Humphries and Small 1974: 4) is beside a ford of the river Tas near the crossing of the *quintarius* linking Harford Bridge and Hempnall. One can see that the *quintarius* may be represented by the farm track running from the south side of the river to Skeet's Hill Farm, also at the corner of a century.

Hapton Hall, a modern building[109], is linked by a footpath approximating the line of a *limes* to another crossing point of the river Tas. This is the same *limes* that appears to have structured the church-hall relationship in Tharston, 2km to the south. It is possible to follow footpaths, with some deviation from the line of the *limes*, between the two halls.

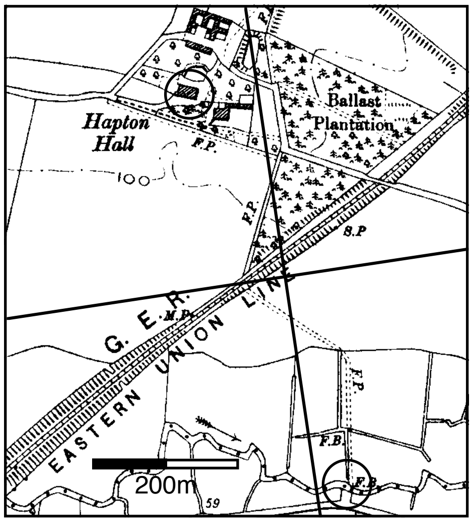


Figure 5.19 Hapton.

109 This may or may not be an old hall site

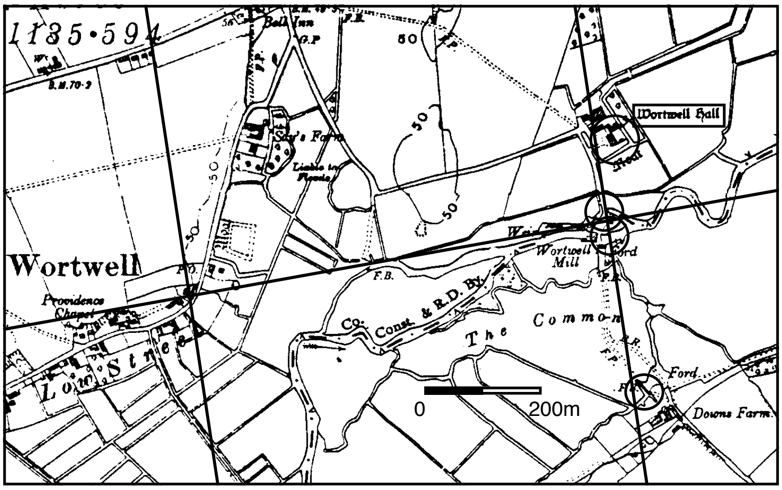


Figure 5.20 Wortwell.

Wortwell Hall, in a low-lying position on the flood plain, is linked by a straight causeway, exactly on the line of a *limes*, to a crossing of the river Waveney. There is a mill at this crossing which is at the corner of a century. Note also the backwater forming half of the southern side of the square. This is on the line of the Dickleburgh-Harleston *quintarius*.

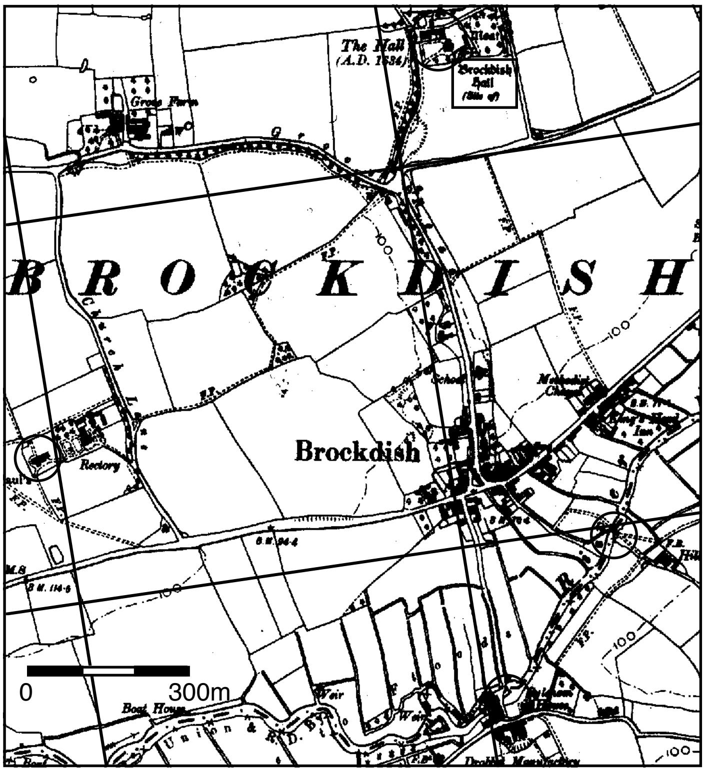


Figure 5.21 Brockdish.

Finally Brockdish provides another example of a hall linked by a *limes* to a crossing of the river Waveney. Note also the church on the next parallel *limes* to the west, and traces of orthogonal *limites*, the most southerly of which, another *quintarius*, coincides with a further crossing of the Waveney.

<u>5.1.4.2 *Limites* as the boundaries of common pasture.</u>

There is another another type of apparent association between *limites* and cultural landscape features. These are existing, or recently existing, boundaries of common pasture.

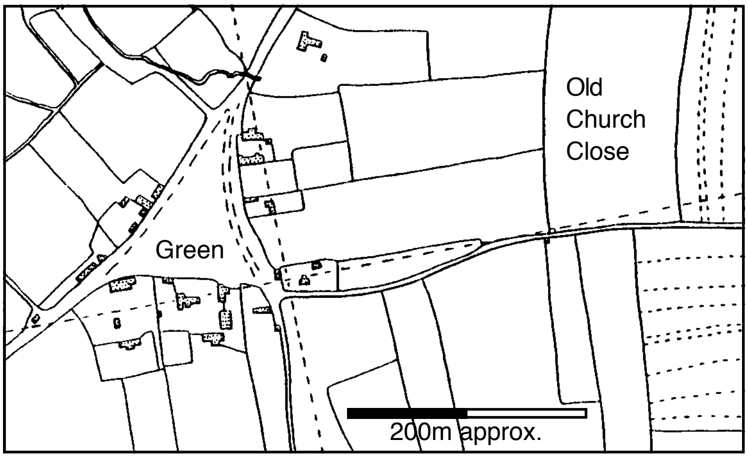


Figure 5.22 Caistor Green, 1795.

A late 18th century map[110] of Caistor St. Edmund shows that there was a green, subsequently enclosed into the garden of the new hall. Both its eastern and southern boundaries are well approximated by *limites*.

A part of the northern boundary of Saxlingham green is a substantial ditch exactly on the line of a *limes*. The ditch does not relate to natural topography.

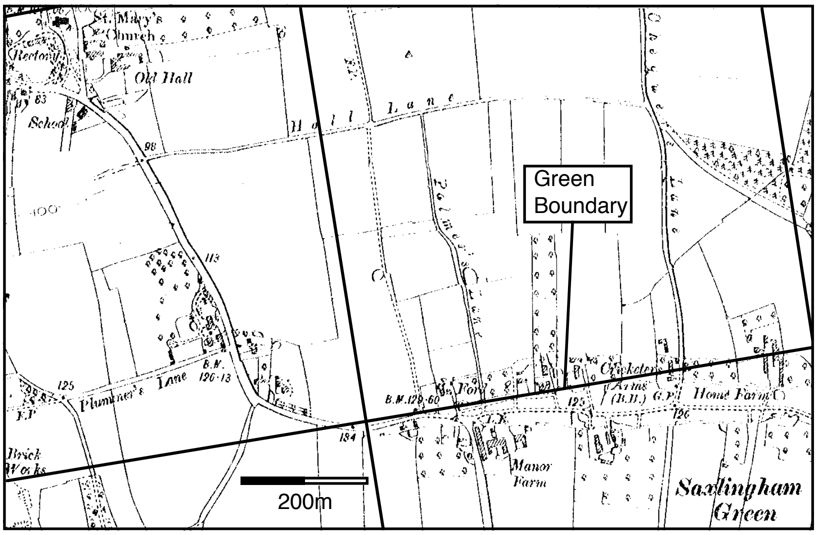


Figure 5.23 Saxlingham Green.

110 NRO MC 113/5. "Surveyd in May & June 1795 by Richard Lenny."

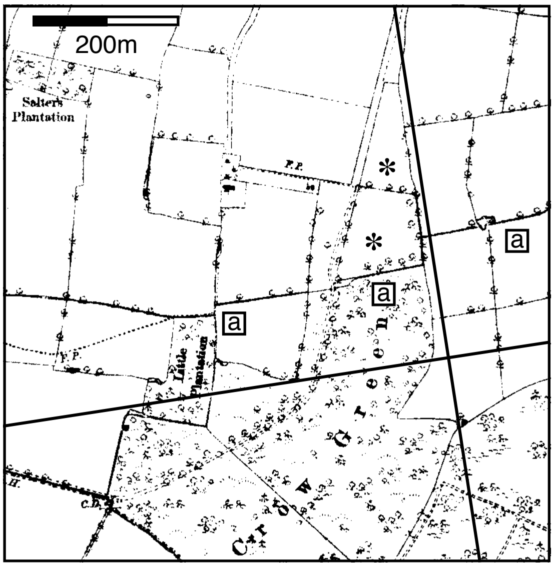


Figure 5.24 Crow Green, Long Stratton.

Crow Green, Long Stratton, includes the two enclosures marked with an asterisk. This area north of the stream was grassland in 1842, but is now woodland (Addington 1988: 36)). A substantial part of the eastern boundary of the green is near and parallel to a *limes*. The western, stepped, boundary adopts the orientation of the system of fields (a local parcelling) which appear to be based on the main Roman road south of Long Stratton *(see discussion below, 5.1.6)*. The boundaries of the green thus have two different orientations: that of South Norfolk 'A' and that of the Long Stratton system.

In this figure we can also see apparent modifications to the drainage, in that a stream (a-a-a) has sections oriented according to the cadastre. One of these cuts diagonally across an enclosure of the Long Stratton local parcelling. Despite the superficial appearance of an obvious chronological relationship, this need not imply that the section of stream postdates the enclosure and we will argue the reverse: that the local parcelling is based on the main road, which is itself based on the cadastre and that under this interpretation these stream sections oriented according to the original cadastre are relict elements which were not made to conform to the new layout The same origin could also be argued for the stream south of Hall Lane, Long Stratton *(figure 5.15)*.

Reurning to the boundaries of common pasture we see that at Billingford the course of a stream is diverted to run parallel to the river and form the northern boundary of Billingford Common. On the south side of this clearly artificial ditch is an elevated strip 5-10m wide which lies on the line of the *quintarius* passing through Brockdish.

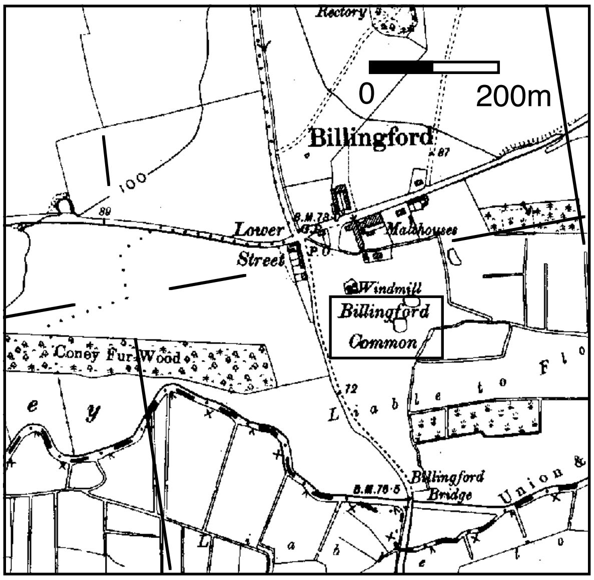


Figure 5.25 Billingford Common.

We also observe that the intersection of two *quintarii* appears to coincide with a corner of the former Billingford-Scole parish boundary. This point is within an area of similarly oriented crop-marks, some of which may be traces of fields of the Romano-British period, see below *(5.2.1)*.

In general, all these sections of boundaries of common pastures or greens are unrelated to natural topography. Their evident artificiality and their conformity to the *limites* of the cadastre makes them strong candidates as conserved boundaries of the Roman period.

But how could such continuity of small physical features be possible? The answer could lie in their function and legal status. These features are now (or were in the recent past) divisions between common pasture and land in other uses - woodland, arable, private gardens etc. If this distinction has been perpetuated from Roman times[111], it would be because at all times subsequently it was necessary to maintain a physical boundary in order to prevent livestock infringing on areas outside the common. Legally it

111 This hypothesis could perhaps be tested by a study of soils on both side of the supposed ancient green boundary.

would be necessary to record the extent of common pasture (orally if necessary) and attempt to defend it against encroachment[112].

Peter Warner, while he does not argue for continuity of arable cultivation in clayland areas, has the following to say about green boundaries in such areas in north east Suffolk, very close to our own area of study:

> ...the uninterrupted practice of intercommoning on the waste land between estates on the clay land may have led to the preservation of some common land boundaries, or green ditches, themselves the fragmentary remains of ancient estate boundaries - of Roman, or even pre-Roman origin. (Warner 1982: 52)

The boundaries of common grazing which have been described above seem to fit his model well.

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112 Of course, such attempts usually fail to some degree. Look at the house over the ditch on Billingford Common, or the minor encroachments at the west end of Saxlingham Green, or the obliteration of Caistor green.

5.1.5 Relationships with Roman roads.

As we have seen *(4.1.2)*, in cadastres whose reality is not seriously doubted, and from the examination of many examples over a wide area, it appears that main road segments were often planned from the grid. This can also be seen in the context of the hypothetical South Norfolk 'A'.

5.1.5.1 Roman road 3d, modern A140

Three alignments of this road are coincident with, or parallel to, lines between points of intersection of *limites*, or points halfway along the side of a grid square, as follows:

i) Swainsthorpe to Newton Flotman from
TG 2305 0345 to TM 2093 9751 at 5:3

ii) Tasburgh to Long Stratton
Close to and parallel to
TM 2126 9723 to TM 1995 9335 at 5:3

iii) South from Long Stratton
TM 1989 9369 to TM 1995 9335 at 11:4

The turn between the two southern segments (ii and iii) is in low ground. Such a feature is regarded as abnormal by Margary (1973), although he does not remark on it in this case. It is generally held that the Romans invariably surveyed roads by line of site, which would account for the many cases where changes of direction are made on hill tops, but in a cadastre this is unnecessary since the road segments could have been planned using a version of the cadastral base map, or *forma*, and specified to the road builders in terms of points which had already been surveyed, at one of orientations mentioned above *(figure 4.1)*.

The fact that the road changes direction in the centre of Long Stratton, in low ground, is another small piece of evidence that the its northern segments were planned after the cadastral survey had taken place.

River crossings at Newton Flotman and Dickleburgh are on *kardines*, and we observe that they differ in type. At the Newton Flotman crossing there are short segments which link the crossing to the main alignments *(figure 5.2)*. These short segments do not have the same orientation. This would seem to imply that the crossing existed at this point before the main road was built, which lends further support to the idea that the cadastre pre-dates the construction of the northern portion of road. At Dickleburgh, in contrast, the road crosses the stream without changing direction, which may imply that in this case the road determined the crossing point. This can be explained by proposing that the crossing existed before the cadastre, which was constructed to make use of it. However, the coincidence of *kardo* and road at this point may be may be solely due to chance; the reconstruction of *quintarii* proposed above does not include this *limes* and one might expect it to be a *quintarius* (or even the *kardo maximus*) if an existing stream crossing at Dickleburgh were used as one fixed point determining the position of the grid.

5.1.5.2 Roman road 36, modern B1332

The point where this road currently crosses the river Waveney on the Norfolk-Suffolk border is about 50m from an intersection of the cadastre. However the road appears to have become distorted a this point so it is not possible to say exactly where the Roman crossing would have been.

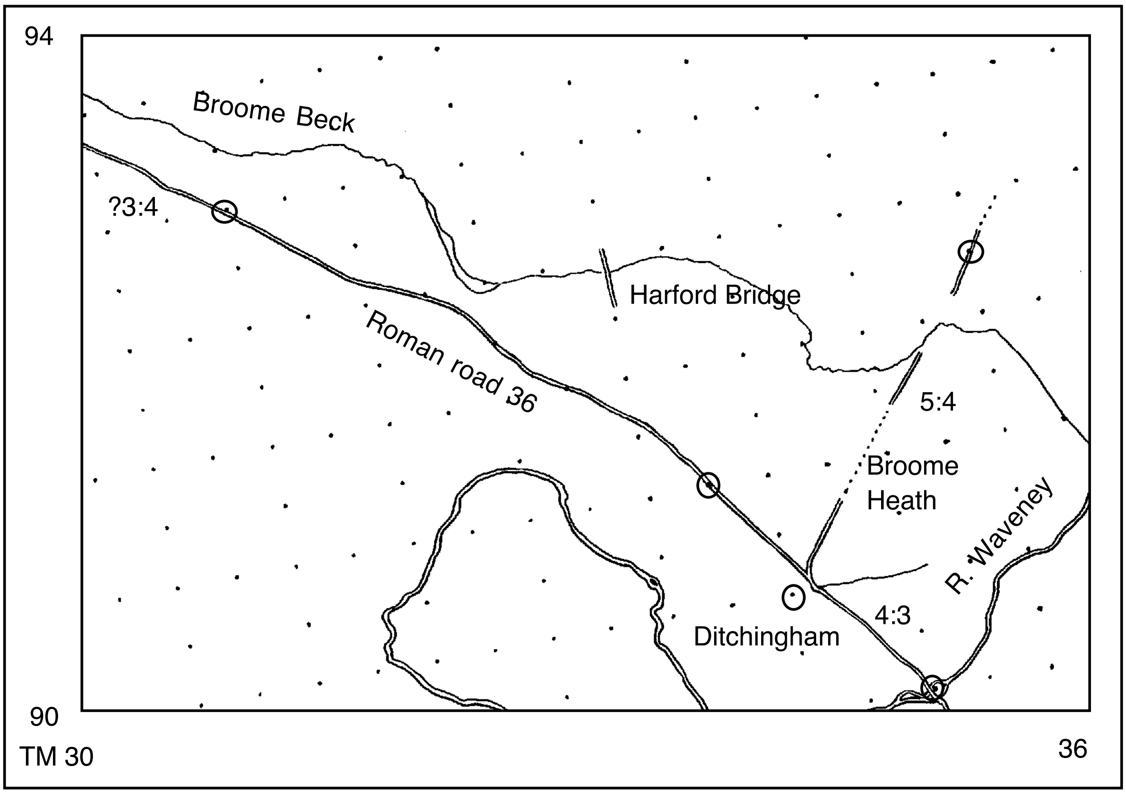

Figure 5.26 *Ditchingham, Roman roads. Points which may have been used to plan the alignment of road segments are circled.*

Nevertheless it is clear that the segment of road 36 running north west from the crossing is aligned on this intersection and passes through the mid point of a side, as follows:

TM 3504 9015 to TM 3372 9134 at 4:3

A little further on the road turns onto a new alignment and after nearly 3km runs very close to a further cadastral intersection at TM 3085 9295. From this point towards the north west the next short section of the road could possibly be related to the grid at 3:4, but the segment is too short to allow a high degree of confidence.

5.1.5.3 Other segments of possible Roman road

Ditchingham to Loddon

It has recently been suggested that the line of the parish boundary of Ditchingham across Broome heath and its apparent continuation through Broome Street *(figure 5.26)* is possibly a Roman road (Davison 1990: 50). If the line were extended by 170m at its south west end it would pass through an intersection of *limites*, and the north east end of this segment passes through a mid point of a side of a century, thus:

TM 3421 9071 to TM 3526 9273 at 5:4.

This suggestion, which was published two years after the initial publication of South Norfolk 'A' as a theoretical Roman cadastre, supports, and is supported by, the cadastral hypothesis.

Street Wood, Hempnall

The possible Roman road on the east side of field which was the site of Street Wood, Hempnall, joins the east-west *limes* (a *quintarius*) at the south east corner of the field at a point 600 ft from a corner of a century *(figure 5.4)*. The other end of the short segment of road passes near the mid point of the century's side. Thus the alignment of this feature could be 2:1. But, as we have seen (*5.1.2*) it can also be suggested that the *quintarius* itself is the "*street*", in which case the feature with the 2:1 orientation needs another explanation. It will be suggested that it is more likely to be part of a reorganised field system in this area *(figure 5.28)*.

5.1.6 Reorganisations of field structures - local parcelling

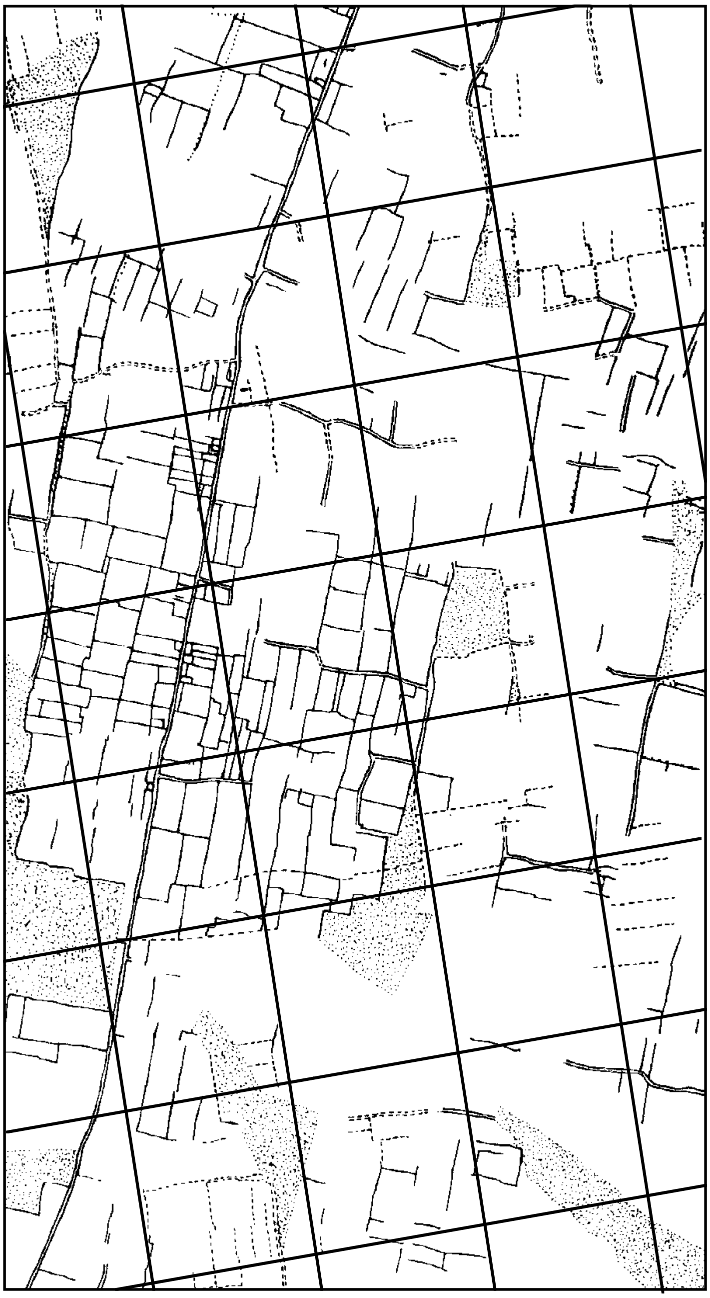

Figure 5.27 Long Stratton, local parcelling.

5.1.6.1 Long Stratton

Peter Warner has observed that at Long Stratton

"a very similar regular field system to that at Ilketshall *(an area adjacent to the South Norfolk 'A' cadastre, on the south side of the river Waveney)* coincides likewise with a Roman road and is also bounded by a most unusual angular system of greens and commons. It too lies in a woodland area where medieval secondary settlement was established bordering the clayland commons.

What we see here *(in the Ilketshall area, but also presumably at Long Stratton)* are perhaps large areas of late Roman arable regression, a one-time abandoned landscape, partly reverted to common grazing and woodland, with the salient features, the Roman roads, the associated regular Roman field system, and the pre-Roman curvilinear estate boundaries all surviving, in outline, and being reused in the subsequent period of settlement expansion in the late Saxon and early medieval period." (Warner 1982: 53)

In the centre of the area shown on Warner's map (1982: fig 16)) we can selectively trace, according to their orientation, boundaries shown on the second edition six inch map *(figure 5.27)*. In this figure the solid lines show those boundaries parallel to the Roman road south and north of Long Stratton (hence conforming to two slightly different orientations); they are the possible surviving elements of a field system at Long Stratton coincident with the Roman road. Broken lines at the orientation of South Norfolk 'A' show its possible traces, and the ruled lines show the theoretical position of its *limites*. The greens are drawn as shaded areas in the positions shown by Warner.

The first inevitable observation is that the detailed cartographic evidence does not support Warner's suggestion (in his figure) that the system south of Long Stratton could be a centuriation. There is no major boundary parallel to road which is at 20 *actus* or a multiple. The part of the boundary to the west which is claimed to be at 20 *actus* is in fact at 18.95 ± 0.15 *actus*. This is too inaccurate to be used as evidence of a standard form of Roman land planning.

So this "local parcelling"[113] is not a centuriation, but we may still ask if some part of it could have been laid out in the Roman period. We may examine the intervals between major features in order to see if they are measurable in commonly used whole numbers of *actus*.

On the west side of the main road south of Long Stratton this search is fruitless. There is a distance of about 19 *actus* across the system, but it is hard to see this as a commonly used measurement. However, north of the village a section of parish boundary parallel to the road is at 12.1 ± 0.2 *actus* from the road, and two boundaries at right angles to the road are at 10.0 ± 0.2 *actus*. The western boundary of Rhees Green is 24.01 ± 0.45 *actus*. Thus it seems conceivable that there was a rearrangement in this area, surveyed

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113 This phrase which has been coined as the equivalent of the French "parcellaire d'appoint".

in Roman times, in which 12 and 10 *actus* were being used as basic units. However, a Roman origin for these parcels is far from certain. South of Long Stratton, east of the Roman road, we may be on firmer ground. The line forming the western boundary of Wood Green and part of Crow Green is parallel to the Main road and at 29.8 ± 0.3 *actus*. There are also two long, parallel and collinear boundaries at 15.2 ± 0.3 *actus*. A further parallel boundary halves the distance between this line and the road, and there are boundaries which halve both the intervals so produced. Thus we could have a major boundary (green edge and lane) at 30 *actus*, important boundaries at 15 *actus* (or 1,800 ft), and further boundaries at intervals of 450 ft. This is the area which seems most likely to have been surveyed during the Roman period, because intervals of 5 and 10 actus often play an important part in subdivision of cadastres *(3.1.4, figure 3.12)*, although we must admit that other modules are possible.

Apart from the parallelism of fields with the main road, the other striking feature of this area is, as Warner says, the angular system of greens and commons. Five greens (of the eight shown here) have common feature. A substantial portion of their boundary has the orientation of the local parcelling based on the main road, and another substantial portion has the orientation of South Norfolk 'A'. These greens appear to be essentially triangular, although truncated in two cases, the acute angle of the triangle being that between two orientations, that of the main road and that of South Norfolk 'A'. They appear to be the awkwardly shaped pieces of land between differently oriented systems, whose shape would make them unsuitable for allotment to individuals. They would thus become, in the agrimensores' terms, **subseciua*. Such areas could be left as common grazing.[114]

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[114] This is not meant to imply that all the greens were necessarily first defined in the Roman period, since such triangular structures could arise at any time as new allotments parallel to the main road were carved out of the relics of the original cadastre. As with the former Caistor Green and Saxlingham Green *(Figs. 5.22, 5.23)* it may be possible to study the soil to determine if they had been cultivated before becoming common grazing.

So at Long Stratton the existing topographic traces suggest that there were several stages of development of a local parcelling parallel to the main road, both during the Roman period and later.

However the traces also indicate that, prior to this, South Norfolk 'A' had already been laid out, and that some reorganisation of drainage had taken place. Evidence for the earlier layout is present around the margins of the Long Stratton system. There are the triangular greens, it is possible to pick out seven segments of boundary at 10 *actus* from major *limites*, and we observe that the eastern boundary of Wood Green is at 800 ft from a limes (1/3 of a century), a distance which is of some interest, given the possible division of centuries into thirds at Dickleburgh *(5.1.3)*. Also, as we have seen *(figs. 5.15, 5.24)*, some fragments of the earlier cadastre seem to have been preserved within the local parcelling.

Another feature of the local parcelling is that it appears to have been based upon some of the fixed points established by the implementation of the earlier grid. Six out of the eight existing junction points on the east side of the main road are nearly coincident with the points of intersection of east-west *limites* of South Norfolk 'A'. It looks here as if the process of reorganisation has deliberately and systematically preserved the pre-existing junction points, but only on the east side of the road. Prior to modern developments, which will be discussed below, any systematic reorganisation is more likely to be Roman than Medieval. Hence the difference between the two areas (east and west of the road) would be consistent with the earlier suggestion, based on the metrology, that only the parcelling on the east side is likely to have been laid out in the Roman period.

This does not appear to be the only local parcelling parallel to the main Roman road in South Norfolk 'A'[115]. Further north at Tasburgh, the fields to the east of the main road have a very

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[115] And such local parcellings can also be observed much further afield. See, for example, (Chouquer 1983b: fig 2).

rectilinear layout parallel to the road, and at Swainsthorpe there is a similar layout, crossed by the parish boundary which runs in segments alternately parallel and at right angles to the road. Thus the parcelling pre-dates the establishment of this particular line of the boundary.

5.1.6.2 Hempnall

From the evidence presented at Long Stratton we may theorise that local parcellings, recognisable by their rectilinear structure, are frequently based upon main roads and may re-use important points within a pre-existing cadastre.

If this is so, then on seeing such a structure we may ask if there may have been a Roman road upon which it was based.

A case in point may exist in Hempnall parish, east of the present nucleus of settlement. Here we see a rectilinear layout, one element of which is the "possible Roman road" mentioned earlier *(5.1.2)*, and we have observed *(5.1.5)* that this feature is at 2:1 to the cadastre, passing through the mid point of the side of the century. It can be seen *(figure 5.29)* that this is also true for several other features of the landscape in this area, which pass through the *termini* shown with large dots. The observed system thus has the same sort of relationship to South Norfolk 'A' as that observed by Chouquer et al. (1987: 229) between *Atella II* and *ager campanus II* (although in that case the angular relationship is 3:2)[116].

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[116] It is also an interesting fact that these multiple 2:1 relationships, producing a new parcelling which is differently oriented to the old but closely linked to it, were observed prior to the publication of Italian example.

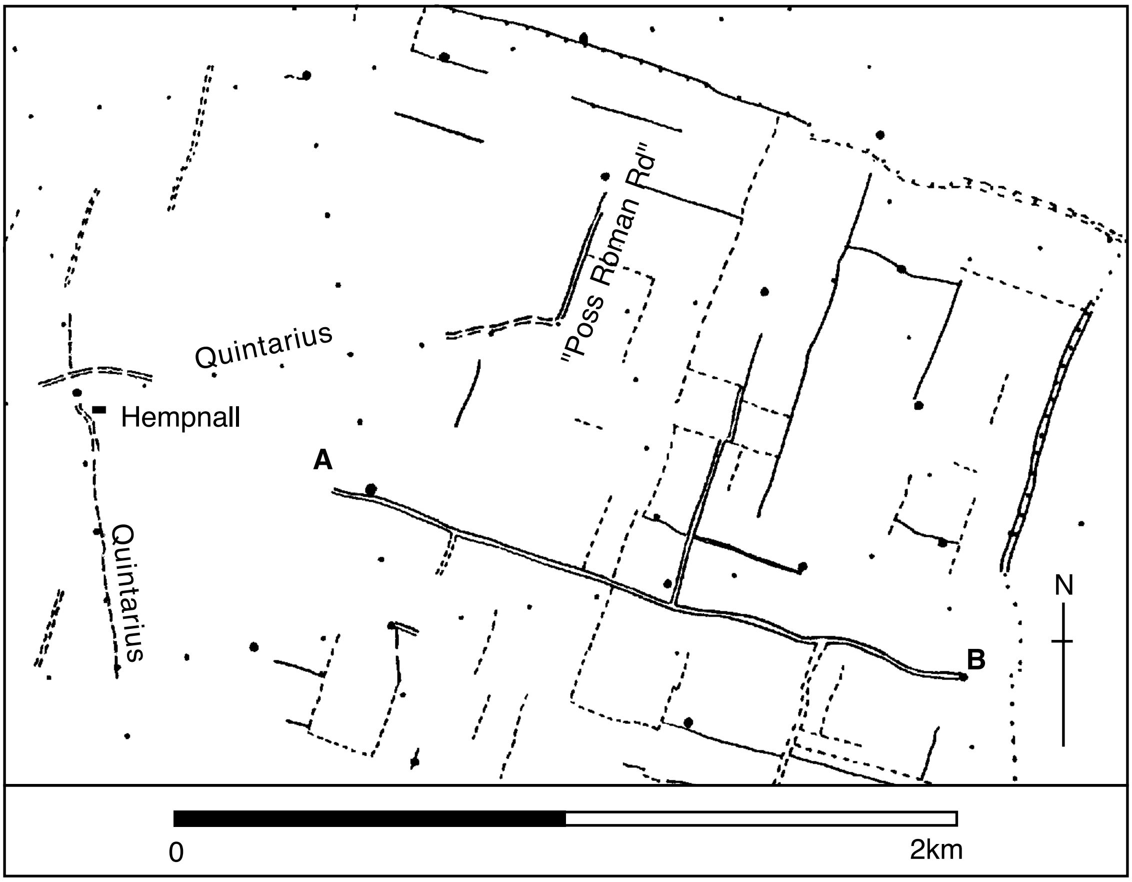

Figure 5.28 Hempnall, local parcelling.

In this figure the solid lines indicate those boundaries visible on the 19th century OS map which are at 1:2 and also pass through *termini* at 10 *actus*. The dashed lines represent those boundaries at the same orientation which do not. Clearly the former make up a large proportion of all the boundaries at this orientation and it seems that here we see a local parcelling linked to the cadastre in a way which differs from that seen at Long Stratton. The link is by way if the pre-existing *termini* of the cadastre, rather than by road junctions. Nevetheless, it is still possible that this parcelling incorporates a Roman road in its structure. The road AB is nearly at 1:2 and at the end of the eighteenth century it was thought to be Roman, as Faden's (1973) map shows.[117] If so, its possible link with

[117] However, the reader should be warned that, according to the Norfolk SMR primary record card for County Numbers 10199 and 13652, Faden was wrong

the cadastre, at 1:2 passing through the supposed intersection of *quintarii* near Hempnall church, may predict its precise original route.

This figure also shows those traces which conform to *limites* of the South Norfolk 'A' cadastre, by the longer dashed lines. Some of them appear to have been left as relics within the local parcelling as, over the course of time, the land has been progressively restructured to meet more local needs.

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since his idea was "based solely on the ground that it [the road] was believed to lead to Tasburgh fort, then considered Roman, and is a medieval road".
Despite this view, the existence of three more *street* field names, lying respectively to the south of the line AB, on its projection in the centre of Hempnall and to the north west of the village centre, also encourage us to speculate that there was a Roman road here, as Faden's informants presumably thought.

5.2 Field studies

Given the topographic, trigonometrical and statistical evidence for the possible existence of the South Norfolk 'A' cadastre, it is natural to expect to see, in addition to existing topographic features, prominent physical traces of the cadastre which do not correspond to the present-day cultural landscape.

This does not appear to be the case, for two possible reasons. The soil is heavy clay which does not reveal crop marks easily, and severe erosion has truncated some archaeological features and must have totally removed others. Despite this, some fossil features can be presented as possibly related to the cadastre.

It cannot be claimed that in most cases these features were discovered by any systematic search. Serendipity played a large part in acquiring the evidence presented here. In several cases observations of new features were made when looking for something else.

The negative view of this lack of method is that it is unscientific, but this criticism is not accepted because is based upon a highly theoretical and stultifying view of the nature of science. The positive view is that, because the findings are accidental and limited, there is still room for other independent observers to find evidence for or against the cadastre's existence. In other words, the potential for testing the hypothesis is not exhausted.

5.2.1 Crop-marks, surface and aerial photography

Despite the fact that South Norfolk is largely an area of heavy boulder clay soils revealing few crop-marks, there are some areas where they can be seen because the clay is varied by sandy or gravelly soil. One of these is the area in the extreme south, near the river Waveney where, as Tom Williamson (1987: 426) has observed, aerial photographs[118] show "a dense group" to the west

118 Cambridge University Collection, BOA 94-97; BYI 73-75.

of Billingford common which, according to him, "define fields whose size range - between 0.06 and 0.15 ha - suggests a Romano-British or prehistoric, rather than a medieval date."

The author has checked these aerial photographs as part of a search through all the photographs in the Cambridge collection which might show boundaries related to the cadastre. Williamson's representation of them (1987: fig. 5) looks accurate and we can agree with him that "These boundaries share the same general orientation as the extant features of the field system, ...". This is, of course, also the orientation of the putative Roman cadastre. The boundaries themselves are not geometrically straight but their consistency of orientation makes them comparable to similar enclosures in the Finage to the north west of the main Roman road, as depicted by Chouquer and de Klijn and reproduced above *(figure 2.1)*. Their size also makes them comparable to the supposed "celtic" fields in the same area, which have sides most often of around 40m, an area of about 0.16 ha (Chouquer and de Klijn 1989: 263).

Figure 5.29 South of Harford bridge, possible quintarius: *view from the A140, looking east*

Another area of gravelly soil lies in the northern part of the area of the cadastre where crop-marks show clearly. In particular we have the feature shown here *(figure 5.29, figure 5.2 point 'a')*. This was a green stripe (horizontal line half way up the slope of the hill) showing in a ripening cereal crop in July 1990. In the absence of a vertical photograph it is difficult to pin point its position but it is clear that it is pointing towards Harford Bridge, which lies 400m to the left of the picture.

In fact this feature was first noticed in the Spring of the same year, just before sunset, while looking out of an upper window of a double deck bus. There was no variation in the colour of the crop but a low relief feature was visible which appeared to be a narrow terrace crossing the hillside in the position of the cropmark shown here. The visibility of the feature may be attributed to the lighting conditions - the sun was directly behind the point of view shown here, at a very low angle - and to the elevated view point. At other times and from different angles the feature, as a feature of micro topography, was almost invisible.

Given this observation it was possible to identify a slight double change of gradient in the road ascending the hill just to the right of the field shown in the picture. This appeared to correspond to the position of the terrace and it could be located reasonably accurately by pacing from points marked on the 1:10,000 map. Its position is within 20m of the position of a theoretical *quintarius*.

The interpretation of this feature is that it may be a partially infilled talus which lay between two fields. Since this possible boundary does not seem to appear on any surviving map, it is not recent. A further possibility is that it represents the course of a road, on or near the line of the *quintarius*, of pre-modern origin.

Aerial photography also shows a feature apparently coincident with a *limes* at Shimpling *(figure 5.30, figure 5.2 point 'b')*. This can be seen as two parallel light lines (Edwards and Wade-Martins 1987: pl. 51), which appear to be on a *limes* to within 10m. Their possible origin was studied by soil sampling and excavation, as described below *(5.2.3)*.

Older aerial photography is often more illuminating than that obtained recently; this could be seen from comparisons of recent photographs of the Shimpling feature with that taken by the RAF in 1947. Climatic conditions may account for this particular difference,

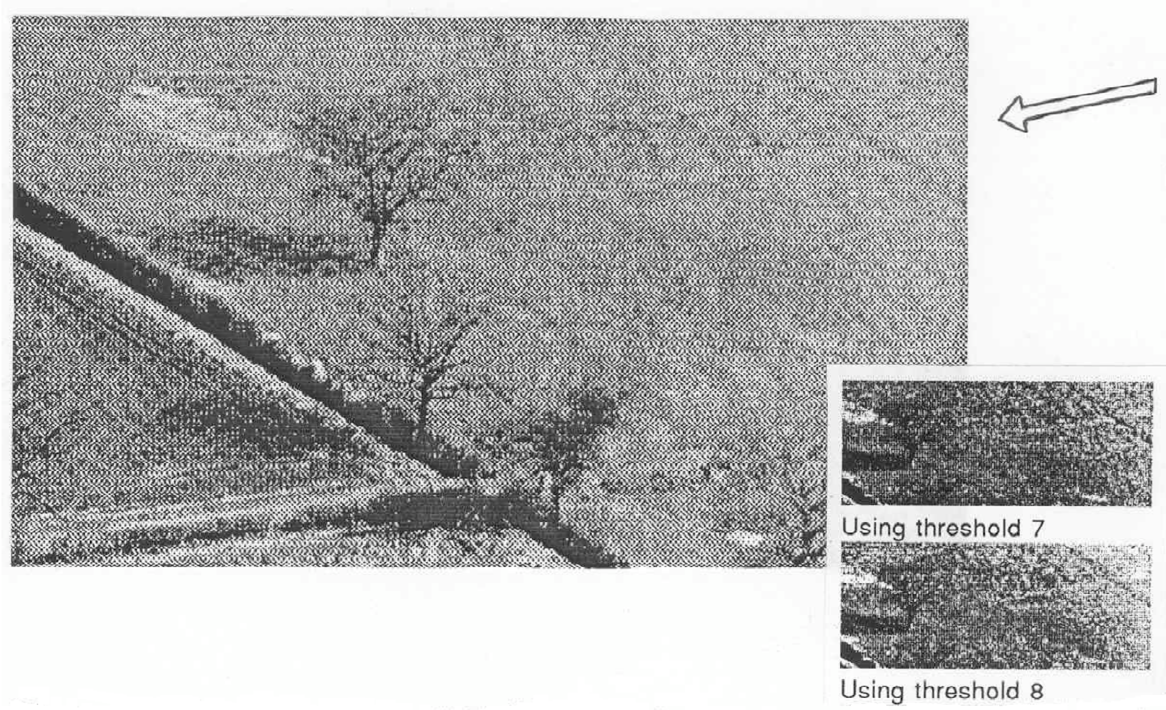

Figure 5.30 *Shimpling, possible* limes.

but there is the strong probability that the deeper ploughing of modern agriculture has destroyed many other features immediately below the surface. It was possible to obtain a loan of a copy of a Luftwaffe 1940s negative of the Second World War[119] covering several parishes including Topcroft, where a fossil *limes* may be detectable. Enlargements of this are grainy, because of its small size, but it may be possible to pick out a linear dark patch, which may possibly resolve into two parallel dark lines in places *(figure 5.31, figure*

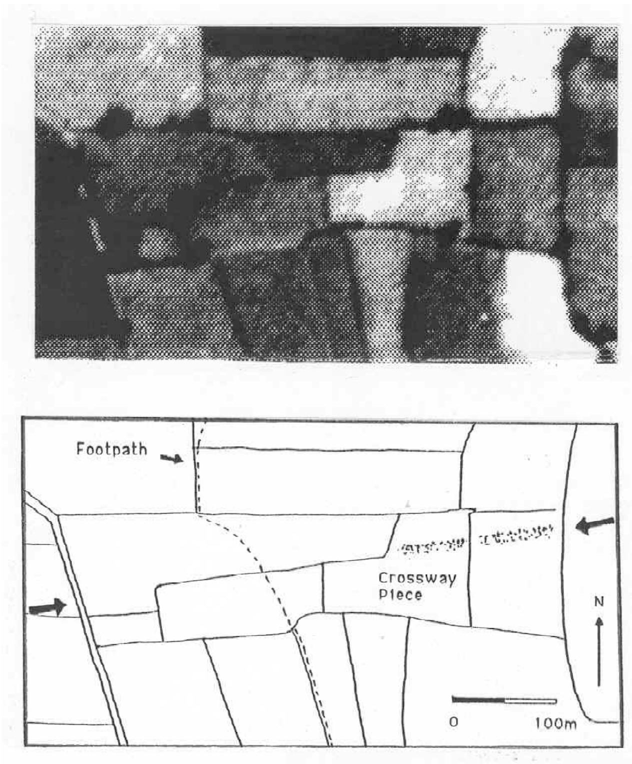

Figure 5.31 *Topcroft, possible* limes.

119 US National Archives GX 10373 SK exp 18.

5.2 point 'c'). As the interpretative diagram shows, this continues the line of a short length of hedgerow which is discordant to other local boundaries.

This interpretation is reinforced by the toponym "crossway piece"[120] This appears to indicate the existence of a way, although we cannot say with certainty where it ran[121].

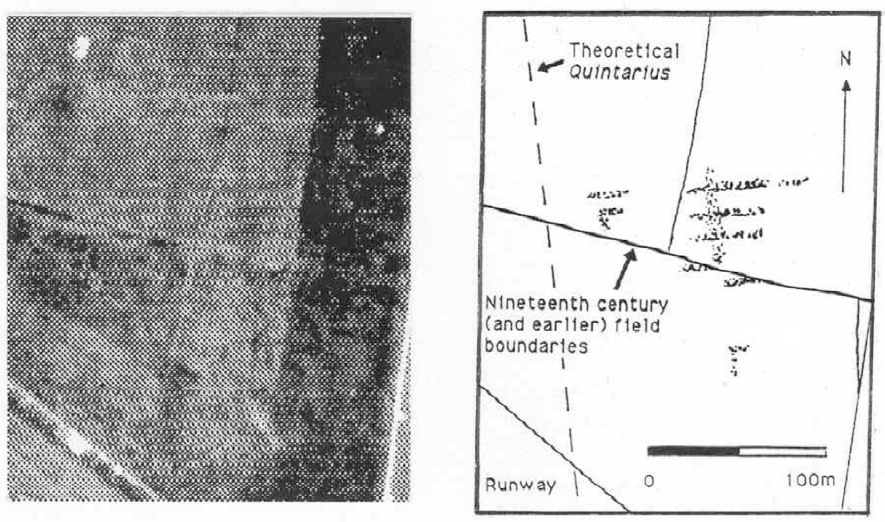

Figure 5.32 Hempnall, possible signs of cultivation of the Roman period.

Finally, an aerial photograph taken immediately after the Second World War[122] shows dark marks in the area of grass in the centre of Hardwick airfield in the south of Hempnall Parish *(figure 5.32, figure 5.2 point 'd')*. These are aligned at right angles to the orientation of the Hempnall north-south *quintarius*, which in theory runs nearby, but which is not visible. These marks are separated by multiples of approximately 15m, or 50 feet. This dimension may be compared to the intervals between similar marks in the Finage

[120] Topcroft Tithe Award 1839, parcel 130. NRO TA 354.

[121] The word "cross" is open to several interpretations. Did it cross the field, as the possible *limes* trace seems to indicate, or did it run beside the field, near the line of the footpath shown on the 19 century OS maps? This path, since it does not run towards the church, might be said to run across the parish.

[122] RAF ref 3340 RP 106G/UK/1429 16APR46.

(Chouquer and de Klijn 1989: fig. 14)[123]. Comparable divisions also occur clearly in Algeria (Soyer 1976: fig. 27) where a small patch of degraded centuriation has 400 x 100 foot plots.[124]

The suggested interpretation of these parallel marks is that they are the remains of sunken areas or ditches between plots. They would thus act as drains, which are very necessary in this area of heavy clay soil. It is interesting to speculate if the plots formed in this way are of the type mentioned by Columella, II. iv. 8 (1977: 133) called *porcae* by the country folk, which he judges appropriate to fertile water-retentive plains, and which are formed by ploughing "in such a way that the earth heaped up between two widely separated furrows affords a dry bed for the grain".

5.2.2 Micro-relief

During the initial stages of the construction of the Dickleburgh by-pass it was possible to gain access to the route in order to see if there might be any sub-surface features related to the cadastre. Apart from the traces of existing ditches, none were found.

However, the survey made it necessary to walk the 2.5km of the route of the road on several occasions in the Spring of 1990, when crops were in rapid growth. This made it possible to see fugitive features of the landscape in three places *(figure 5.33)*.

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[123] One group of parallel marks has an interval of about 23m (75 feet). Another has one of about 30m (100 feet).

[124] It might be asked why the *actus* (120 feet) is not being used as a basic unit. A possible answer in South Norfolk 'A' is that a division of centuries into thirds, as may possibly be seen around Dickleburgh *(5.1.3)* produces holdings 800 feet wide. Binary subdivision, into 2 x 400 feet etc., would then eventually produce parcels 100, 50 and 25 feet wide.

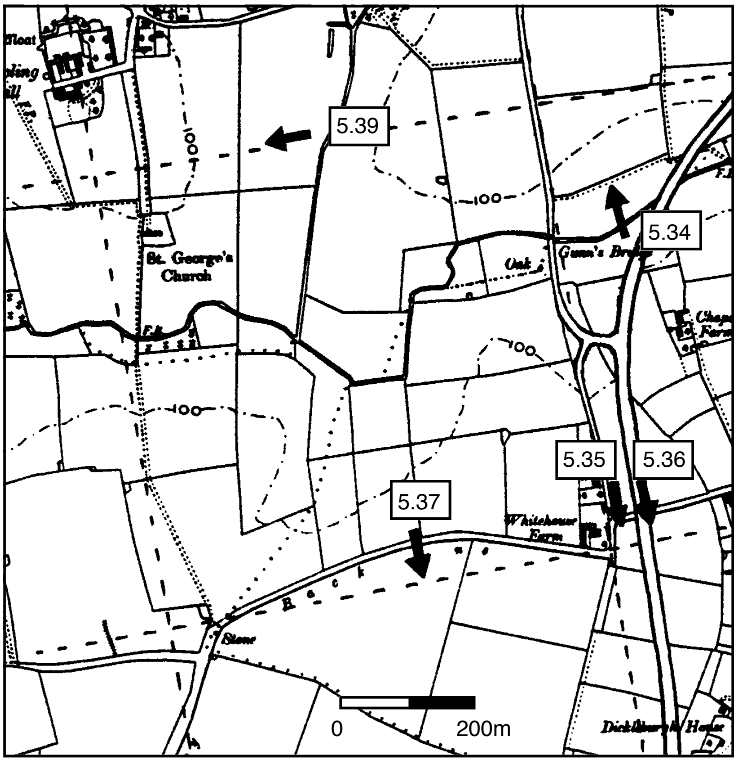

Figure 5.33 *Location of features, Dickleburgh/Shimpling. The Dickleburgh bypass is on the right.*

Figure 5.34 *Dickleburgh, degraded talus* on limes *(site of recent field boundary)*

A degraded talus was visible *(figure 5.34)*, but only in certain lights, on the line of a former hedgerow depicted on the 19th century maps, and also on the 1:25,000 map of 1956.[125] This feature is within 20m of a *limes*.

The appearance of this feature, of documented origin, may be compared with another on the *quintarius* immediately to the south *(figure 5.35)*.

Figure 5.35 Dickleburgh, degraded talus on limes.

This feature was only visible in low angle light, in the late evening, and when the crop was at a critical height. A few days after the photograph was taken, nothing could be seen[126].

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125 The actual date of its removal has not been investigated, but its representation on a map of 1956 does not guarantee that it was still there at that time.

126 Legros (1970: 42) observed that worn down talus slopes of fields of Gallo-Roman origin were more visible to low oblique view in June, when the cereal

Figure 5.36 Degraded talus, profile.

Fortunately, this is not the only evidence for the existence of this feature because the Dickleburgh by-pass cut a section through it. Nothing was visible in the freshly cut side ditches of the new road, nor on the surface of the subsoil which had been stripped on the line of the new road bed. But is could be seen that, after rain, water collected on this surface in a large puddle at its point of intersection of the *limes*. This would seem to indicate that at this point the ground surface was very slightly lower or badly drained, or both. This could be attributed to the wear and compaction of the soil caused by its use as a right of way, although other explanations are of course possible.

The interpretation of the feature as some sort of field division or road is supported by examination of the profiles of the side ditches

crop was up. Most of these undulations were not visible by aerial photography.

of the new by-pass. The eastern one in particular showed a marked change in level on crossing the line of the *limes (figure 5.36)*.

We seem to have here a feature identical to that which is seen when a former field boundary is removed *(figure5.35)*. Such a boundary is not shown on any extant map in this position[127].

During at least two visits to all parts of the by-pass line no other features of this sort were seen.

Figure 5.37 *Dickleburgh, possible degraded field boundary on* limes.

The third feature seen by observation at a low angle, in fact so low that the photographer had to crouch, was seen in a field of sugar beet crossed by the same *quintarius (figure 5.37)*. Again, the visibility of this feature depended upon the size of the beet plants. If

[127] This can be said with some confidence, because if it did then surely Tom Williamson would have included it among the boundaries of his coaxial field system.

they were too small they did not emphasise the perspective effect; if too large, they obscured it. This slight linear hump seems to be unrelated to any natural feature of the field, which is otherwise flat and covered in soil of a uniform colour.

5.2.3 Excavation

The cropmark to the north east of Shimpling church was investigated by augering and excavation.

An initial visit was made to the site in January 1990. It was clear that the crop mark was caused by differential growth of grass. The grass growing on two slightly raised linear areas flanking a shallow linear depression was shorter and less green than that elsewhere in the field. Augering with a one metre auger at an initial interval of approximately five metres, at right angles to the feature *(figure 5.38, point A)*, revealed that gravel had been mixed with the soil in these areas.

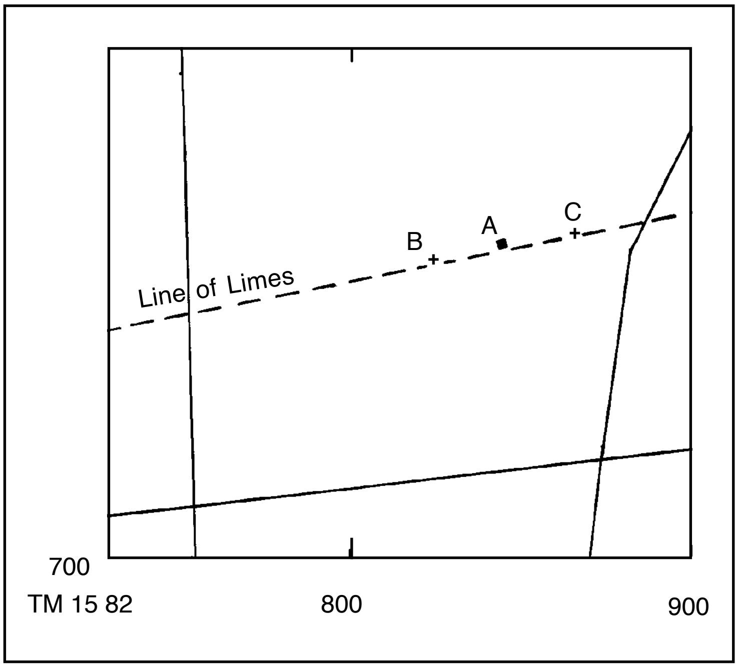

Figure 5.38 Shimpling, plan of sampling points.

The subsoil was generally grey alluvial clay over gravel , as the soil map showed, but the area between the linear raised areas contained chalky boulder clay, overlying a dark grey, wet, deposit containing shells. The same sequence was found at points B and C. Augering away from the line of the *limes* did not reveal any other points at which this sequence occurred.

The linear features as a whole were tentatively interpreted as a ditch deliberately filled with foreign material, which could have been brought from the field to the west. The most likely source of the gravel would then be the ditch itself, since it was deep enough to cut into the gravel layer under the grey alluvial clay.

A trial excavation of the feature was carried out on 25 May 1992, also at point A.

Figure 5.39 Trial pit, 25/5/92.

Figure 5.40 West face of trial pit.

Figure 5.41 South face of trial pit.

At the point of excavation the lower (sediment) fill of the ditch consisted of approximately 45cm of dark grey to black silt containing plant remains, wood (apparently pieces of twig and bark) including oak and ash, and fresh water shells. At least one layer within the silt was sandy and contained little if any animal or plant remains. The top of the sediment fill was not so wet as it had appeared in the Winter of 1990, but lower fill still appeared to be below the current water table.

This 45cm lower fill was sampled at 5cm intervals. The animal and plant remains from all these samples were studied[128] but it was not possible to indicate a date for the sediments.

The sample from the lowest 5cm was washed and sieved, and the shells and wood extracted, in the hopes that resources might be available for radiocarbon dating[129]. It was also noted that the silt

128 This was done by Simon Hazlett, School of Environmental Studies, University of East Anglia.

129 At the time of writing, resources are still not available.

contained grains of sand and some flint gravel. All the pieces of gravel were chipped, in some cases on all sides. There were also some small (approximately 1cm maximum dimension) pieces of chalk.

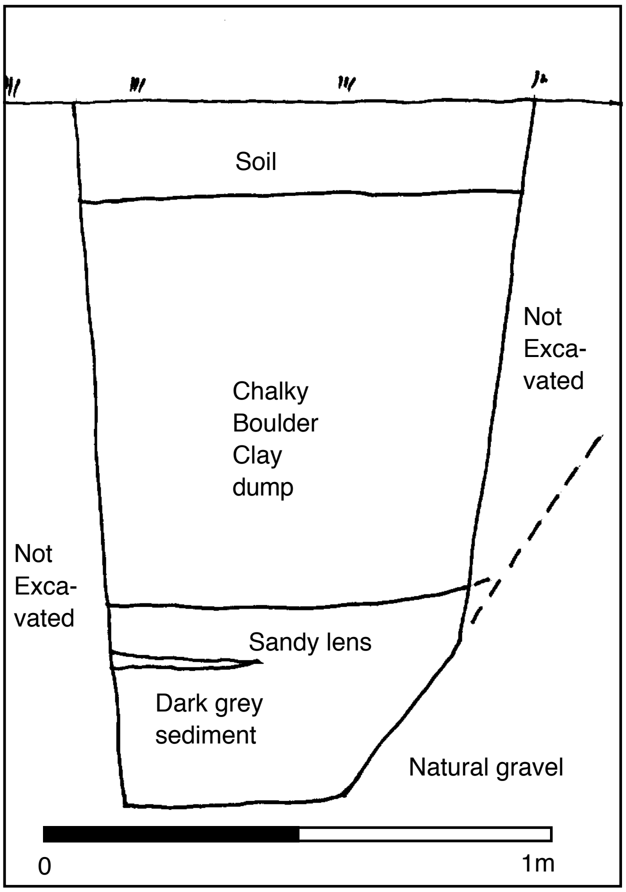

Figure 5.42 West face of trial pit (sketch)

The ditch itself appeared to be carefully dug, with a flat bottom and smooth sides at a slope of about 45°. The centre line of the portion investigated by augering and trial excavation appeared to be about 4m from the theoretical line of the *limes*. To the accuracy with which the cadastral coordinates are calculated, this is coincident.

This feature does not appear on any existing map, and has not been dug recently. It is also discordant in orientation to the long and very straight boundary on the west of this field and the three fields to its south *(figures 5.16, 5.33)*. It would not fit well into the existing layout of boundaries because a small parcel would thus be formed. At about 200m from any form of settlement it seems unlikely that such a small parcel would be needed.

For these reasons it appears possible that this feature predates the existing boundaries. They, because of their straightness, can probably be ascribed to a renewed layout of fields not long before the drawing of the tithe map in 1848.

5.3 Locational analysis

5.3.1 Some Romano-British features

5.3.1.1 Villas

We have seen that the area of South Norfolk 'A' does not contain many known villa sites, and that a set of coordinates drawn from the SMR is unsuitable for statistical tests. The Romano-British sites with building material are shown above *(figure 5.2).*

5.3.1.2 Temples

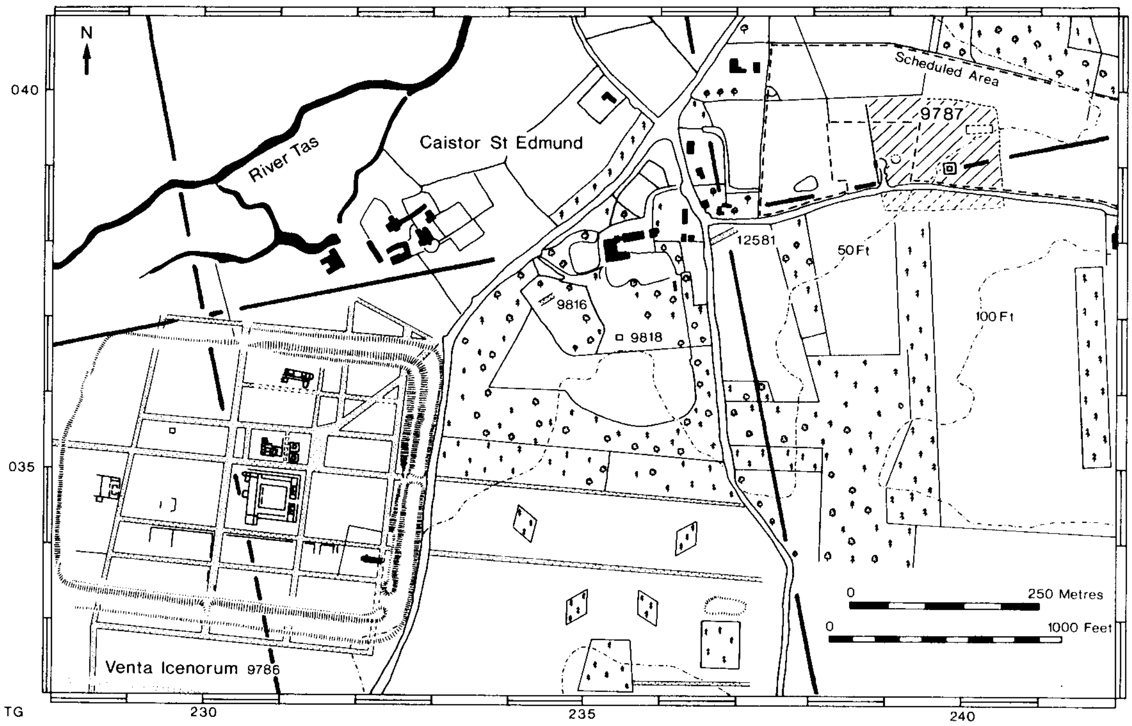

Figure 5.43 Venta Icenorum and the eastern Romano-celtic temple, after Gurney (1986).

A Romano-Celtic temple, and a crop mark which may be another temple, are located to the East and South of Venta Icenorum.[130] These were, until recently, the only known or suspected rural temples of the Roman period within the area of the South Norfolk 'A'

130 See descriptions by Gurney (1986) and Horne (1977) respectively.

cadastre.[131]. The degree of association of these two features with the cadastral grid can be measured with a Kolmogorov-Smirnov test. If we use Gurney's coordinates (TG 2399 0390) for the eastern temple, and coordinates measured from Horne's figure (TG 2309 0314) for the crop mark, this gives a distance from the *limites* of 0.67m and 4m respectively and a D value of .9775. Since a D value of 0.90000 would occur in only 1% of random samples and a D value of .92929 in only 0.5% of them, this is clearly a highly statistically significant result. There is considerably less than a one in 200 chance that the positioning is random with respect to the cadastral grid.

Furthermore this siting of temples has a parallel at Beaune *(figure 3.10)* and, more importantly, in the Limburg cadastre *(3.2.1, figures 3.8, 3.19)*, where there are also two rural temples of the Roman period in a statistically significant association with *limites*.

On pragmatic grounds, if one were to insist that *limites* always materialise as roads, one would expect that a building such as a temple would be located at some small distance from the line of a *limes*, but not on it, or else it would impede traffic. The temple to the east of Venta did not satisfy this expectation *(figure 5.43)* since when the line of the *limes* is superimposed on Gurney's illustration showing the location of the temple it is clear that it passes through the centre of the building, which would be an impossibility if all *limites* are also roads. However, as suggested above *(1.2)*, *limites* are essentially conceptual, they should be seen as boundary lines. If so, they must be marked by significant points in the landscape. For, as Monique Clavel-Lévêque has said,

> "Le cadastre assure la synthèse des cadres de vie. On peut le lire très souvent et quasi directement dans la description même du bornage, quand les arpenteurs y mentionnent, avec les bornes, l'utilisation d'éléments du paysage, tel que citernes, tombes, autels ou tas de pierre qui sont pris pour ce qu'ils sont, des signes symboliques et pratiques.

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[131] There are two other temples in the centre of the Roman town itself, clearly related to its street grid which (as is often the case) is not related to the cadastre

> Ces éléments remarquables, qui s'imposent comme tels en longue durée, permettent ainsi aux lignes cadastrales de s'insinuer, plus souplement, en s'arrimant aux traits familiers du paysage, dans la trame des pratiques quotidienne de vie et des habitudes ancestrales de voir et de penser." (Chouquer, et al. 1987: 53)[132]

The use of a temple in this way conforms to this practice.

The temple is not in line with the *temenos* gateway, the black rectangle which is approximately central in the western *temenos* wall *(figure 5.43)*. This curiously eccentric positioning clearly requires explanation. David Gurney (1986: 54) appears to accept this and puts forward the possibility that the temple may not have been the main focus of religious activity. Our explanation is that, given the existence of the cadastre, the location is in reality quite deliberately associated with the *limes*[133].

A closer look at the gateway area *(figure 5.44)* reveals other features. Among them is an 'old ditch' which has the orientation of the line of the *limes* passing through the temple, and which, given the limit on the accuracy of determination of the grid points (10m),

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[132] "The cadastre ensures the integration of ways of life. One can read this, very often and almost directly, in the description of the survey itself when the surveyors mention how, along with the boundary stones, they used features of the landscape such as cisterns, tombs, altars or heaps of stones, which are taken for what they are, practical and symbolic signs. These notable elements, which stood out as such over a long period, thus allowed the cadastral lines, tied down to well known landscape features, to be fitted more flexibly into the framework of everyday life and into ancestral habits of seeing and thinking. (Author's translation)

[133] Both explanations could be valid, but if ours is preferred to Gurney's we may then ask why the *temenos* was not laid out so that the entrance was opposite the temple. Perhaps the area within the *temenos* was sacred prior to the arrival of the Romans and the construction of the boundary wall, as may be suggested by the Icenian coin finds only within the enclosure (Gurney, 1986: 58). The Temple would then be offset because it was placed for preference on the line where the *limes* happened to intersect the pre-existing sacred precinct.

could lie on it. Again this is undated but it is an undoubted archaeological feature, comparable to that excavated at Shimpling *(5.2.2)* and forming part of the same grid.

It is instructive to compare the modern maps with the map of the late 18 century *(figure 5.22)* because they reveal an interesting example of continuity of form which appears to have been influenced by the alignment generated by the cadastre. The Green has now gone, but the new hall was built on its south side in perfect alignment with the cadastre *(figure 5.43)*, the north walls being on the *limes*. The old hall is in the complex of buildings further to the west, nearer the river, but also near the same *limes*. Thus the relocation of the hall seems to have maintained, or even strengthened, the hall-*limes* association.

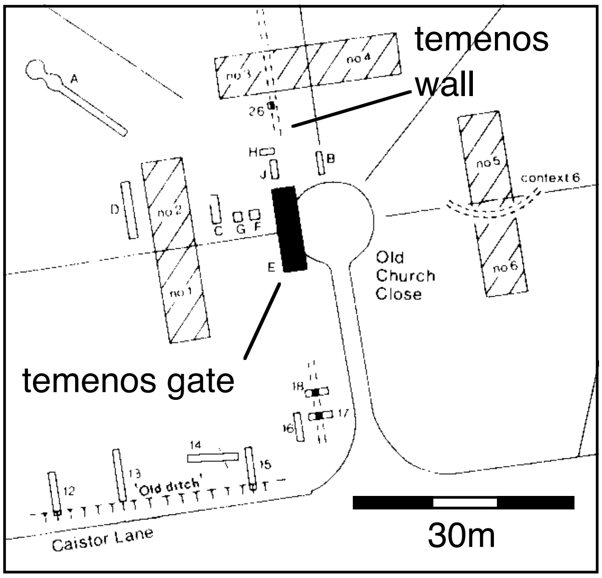

Figure 5.44 Temenos *gateway area, after Gurney (1986)*

The development of Old Church Close from 18 century field to modern cul-de-sac also seems to demonstrate continuity. Caistor lane was established near the line of the *limes* and we can see the closely related orientations of the *temenos* wall, the 18th century field boundaries and the modern houses. This orientation is of course that of the cadastre.

5.3.2 Medieval churches

The Kolmogorov-Smirnov test can also be applied to other point features of the modern landscape. The 49 churches previously considered (Peterson 1988b) were selected on the basis that they are currently visible and hence shown on the 1:50,000 map, although two are in ruins. 23 crossings of the river Tas were also tested. In both these tests the D values are positive, but not significantly so, even at the 10% level.[134] A further Kolmogorov-Smirnov test using the 69 church coordinates shown above (figure 5.13) gives a largest D value which is positive, 0.0715, but not statistically significant.

It is perhaps not surprising that no more supportive result was obtained, because the area considered was deliberately enlarged in order to increase the objectivity of the survey.

5.4 Toponyms

It must be accepted that the establishment of any link between English place names and Roman cadastres is surrounded by difficulty and uncertainty. The situation is very different from that existing in Italy and southern France, where names have survived which are clearly derived from specialised Latin words used by the *agrimensores* themselves. These include *Limidi* or *Limido* (from *limes*) in the centuriation of Modena (Settis and Pasquinucci 1989: figs. 47-49) and perhaps *Les Limiers* on the probable *decumanus maximus* of the centuriation of Valence (Chouquer and Favory 1980: 49), *Succivo* (from *subseciva*) between the two cadastres *Atella II* and *ager Campanus II* (Chouquer, et al. 1987: 229) and several other Italian examples listed by Raymond Chevallier (1983: 34). In these areas the modern language is largely derived from Latin, and this would tend to prolong the use of these terms.

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[134] In the case of church sites this lack of significance may be due to a rather low degree of association in the south of the area. This is in contrast to the north, where nine neighbouring parishes have their principal church near the theoretical line of a *limes*. Five of these are also near a corner.

In Britain, and particularly in the east of England, there was probably a radical change from the use of Latin and a celtic language to the use of Old English. Although Old English contains some words which are probably derived from Latin[135], none of them have been convincingly connected with any land surveyor's term.

A further complication in Norfolk, and elsewhere in eastern England, is the introduction of Danish words, for example those that now appear as *thorpe* (a subsidiary settlement) and *gate* (a lane or way, or street in a town).

Because of this change in language, one finds the parts of the ex-Roman landscape described, not in Roman words, but in the language of the incoming people. In some cases a word which was itself derived from Latin would be used to refer, in the same sense, to the Roman feature. Thus Venta became Caistor (one of many similarly named sites designated by the OE form of Latin *castrum*) and many Roman roads became "streets". We have used two examples of the last Latin-derived toponym at Hempnall to support our suggested location of *limites quintarii*.

However the English speaking in-comers had their own words for such things as boundaries and boundary posts, whether they set them up or whether they may have been pre-existent. Thus for these and other features it is necessary to examine the sense of the toponyms, rather than their language of origin. For example, in the centre of the system there are two lanes. Part of one is near a *limes*; the other is near a *limes intercisiuus* passing down the centre of a square *(figure 5.6, 'a' and 'b')*. They are called respectively Broadgate lane and Narrowgate way. The second part of these names is tautological, which seems to indicate that the earliest form of the name, without the explanatory "lane" and "way", goes back to the period of Danish influence on toponyms. The adjectives "broad"

[135] This is particularly the case where names for Roman artifacts or products are concerned, for example: Caestre (from *castrum*), Forc (*furca*), Lilie (*lilium*), Port (*portus*), Wall (*uallum*), Win (*uinum*).

and "narrow" are appropriate to minor roads whose relative importance may have been determined by their function as major and minor *limites*.[136]

"Harford Bridge" is another interesting name. There are just two so-named river crossings within the area under discussion. They both coincide with the theoretical intersection of *limites* and streams.. One is the major river crossing immediately north-west of Venta, towards which four modern roads, a parish boundary and a possible cropmark of a *limes quintarius* *(figure 5.29)* all point. The other, at the southern end of the cadastre *(figure 5.26)*, has only one feature of interest, a footpath on the line of the *limes* crossing a stream.

This name could derive from both "Herteford" (ford of the Hart) and "Hereford". No attempt has been made to find evidence for earlier forms of the southern example, but the northern one was, according to Blomefield (1769: vol. 3, 30) referred to as "Hereford" in the 13 century[137]. As with the town of Hereford, it can be suggested that this version of the place-name, literally "army ford" indicates an important crossing point[138].

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[136] Note also the field name "crossway piece", mentioned above *(5.2.1)*. Is it possible that the words "cross way" denote a class of objects? The most noticeable feature of *limites* which have been materialised as roads is that they cross at right angles. The question is, given that Roman cadastres had been implemented in Britain, and that orthogonal grids were partially visible to a much greater extent than they are now, what appellations could the roads forming the visible parts of these grids have been given?

[137] Humbleyard Hundred, Keswick.

"Sir [*m*] *John de Vaux* Knt. was succeeded about 1234, by his Son Sir *Alex. de Waus* Knt. who granted to the *Norwich* Monks, joint Fishery with him in his Stream from *Hereford Bridge*, ..."

[138] "Hereford (identical with Harford D) "army ford", probably referring to a ford sufficiently wide to be used by an army on the march." (Cameron 1961: 55)

Another interesting toponym is given as "Clintergate farm" on modern maps. The farm house is is situated on a possible east-west *quintarius*, five to the north of the Dickleburgh-Harleston axis *(figure 5.1, point A).*

This toponym, which is shown on Faden's map of 1797 as "Clintigate", appears to be a road name. Thus "clinti" should be adjectival. The Oxford English Dictionary has **clinty**, "consisting of or characterised by clints", and **clint** (a. Da. and Sw. Klint: ...) with the primary meaning "A hard or flinty rock".[139]

Do we have here a Danish-influenced equivalent of the "Stone Street" so commonly used to refer to a Roman road? It looks possible, and it would indicate the presence of another surfaced *quintarius* in addition to the two at Hempnall possibly identified by "street" names.

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139 According to the OED "Clint" is also used as a term in Geology to refer to a hard eroded rock surface. In the Mountain Limestone areas of northern England the limestone pavement is composed of "clints" separated by irregular chasms called "grikes" running along the joints. However, Trueman (1949: 145) claims (seemingly incorrectly) that both words refer to the chasms themselves.

5.5 The past, present and future of South Norfolk 'A'

5.5.1 A tentative chronology for the origin of the cadastre

The existence of main road alignments, both those that appear to be linked to the cadastral grid and those that ignore it, provides valuable clues to the relative dates of the road segment and the cadastre. When we look at the most important Roman road (the present A140) it is clear that it is associated with the grid in its northern half. However, in the southern portion the road appears not to have long straight sections, and there seems to be no such convincing association. The fit of the northern sections indicates that the survey of the cadastre (in this area) predated, or was contemporary with, the layout of the road. Conversely, the lack of fit in the southern area may indicate that the cadastre had not been surveyed when these sections of the road were constructed, and that here the road is older than the cadastre.

If road construction commenced before any detailed land survey had taken place, this could have been for several reasons. Possibly the construction of the road was seen as a priority, although the eventual implementation of the cadastre was envisaged. Or possibly there was no initial intention to create a centuriation but circumstances changed after road surveying, and some construction, had advanced ten kilometres north of the Waveney.

This road came to serve Venta Icenorum, where Swan (1981) has identified kilns (pre-dating the town's foundation) producing pottery for military use in the late Neronian-early Flavian period, a very few years after the Boudiccan revolt of 60/61. It therefore seems likely that the initial implementation of the cadastre, which occurred during the period of surveying of the road, must be very close in time to this event. Could there be a causal connection? Perhaps the activities of land surveyors, and their guards, prompted the revolt. Alternatively, the cadastre may have been imposed after the revolt, as in southern Tunisia where thirty years earlier such measures were used to combat what the Romans saw as brigandage (Dilke 1971: 156). Even if there is no connection it seems likely that the cadastre was in existence at a very early stage in the process of Roman take-over of the Iceni territory.

5.5.2 Modern developments and development proposals

Wherever ancient cadastral systems have been established they have a profound effect on subsequent developments. There is no doubt that cadastral grids have tended to constrain the location of medieval features, such as churches. It is not always possible to decide whether this is due to the sacrilisation of particular points, as has been suggested in parts of Italy, or whether it is a reflection of the influence of the communications grid often established by *limites* but, whatever the cause, the effect is clear.

The same goes for modern developments such as railway lines, power lines and airport runways, which tend to adopt the orientation of the cadastre. Points which the cadastral framework has made physically and socially important are adopted as the location for new developments. New buildings for industry often conform, as for example at Béziers where the industrial zone has fossilised an almost intact century of the suburban cadastre (Clavel-Lévêque 1989: 211), or as at Chalon-sur-Sâone where the northern industrial zone has numerous buildings with the cadastral orientation *(figure 3.13)*.

In South Norfolk there are very similar developments which also appear to conform to the cadastre.

The Dickleburgh by-pass was opened in 1991. It is in two main sections. The southern section adopts the orientation of the cadastre *(figure 5.33)* and the other section *(figure 5.45)* is at approximately 45° to the cadastre. For once we need not speculate on the reason for this, for when the route of the by-pass was subject to public enquiry in November 1987, objectors proposed an alternative. It was later reported to the local planning authority

> "(4) The Secretaries of State have accepted the Inspector's findings that a by-pass is required and that the overall advantage lies with the

Department of Transport's proposed route rather than the objectors' alternative route. They agree that although the alternative route shows better projected economic benefits, overall the proposed route has definite advantages both environmentally and from a highway point of view and is also preferable in terms of agricultural land severance." (SNDC 1988: 29)

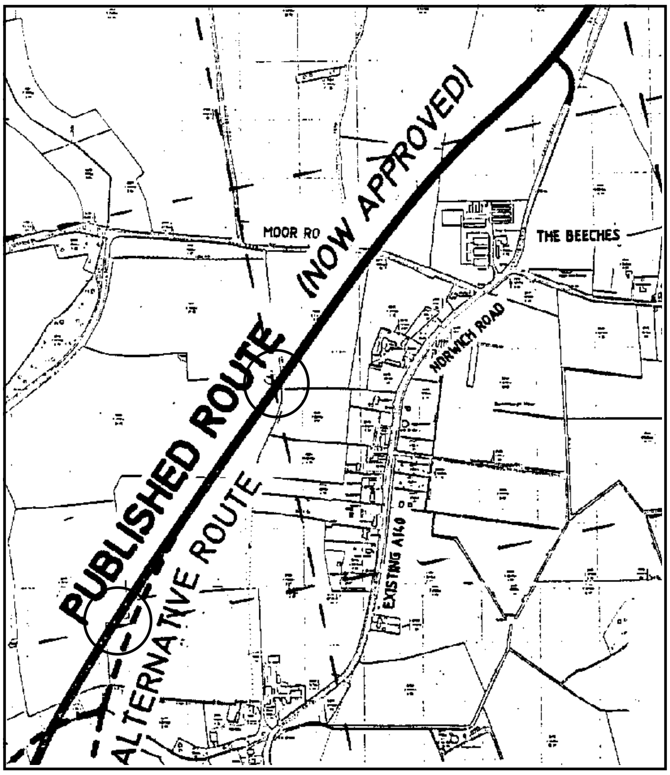

Figure 5.45 Published route of the Dickleburgh by-pass (part). (SNDC 1988).

From this it is clear that a consideration in modern road planning is to conform as far as possible to the existing field pattern. The southern section of the by-pass does so by being parallel. The next section is forced to cross the cadastre obliquely in order to rejoin the main Roman road. It is very nearly at 1:1 and, in order to avoid cutting up fields, passes through two existing meeting points of hedges which are very near the centres of the sides of a century *(figure 5.45, circled points).*

Another road building proposal came from a house-building firm at the end of 1988. Wilcon Homes offered to provide various community facilities and a by-pass for Long Stratton if they were allowed to build up to 1,000 new houses on the east side of the village, where major development had not hitherto taken place. Their initial proposal for the route of the by-pass showed it starting and ending at two points on the Roman main road *(figure 5.46, circled)* which are, as we have seen *(figure 5.27)*, existing junction points very close to the intersections of *limites* with the road.

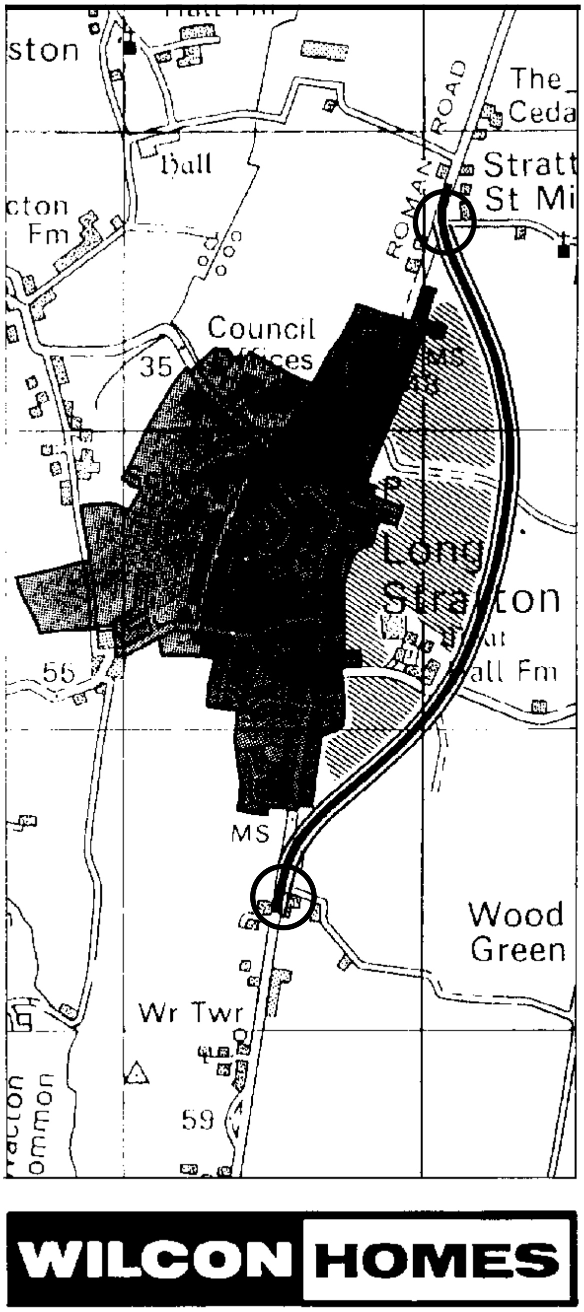

Figure 5.46 Proposal for a Long Stratton by-pass. (Wilcon 1988)

This demonstrates the potential for the existing important points to influence the form of modern proposals. These points are potentially to be preserved (although the by-pass has not been built[140]). Thus, by the principle of uniformity, we can expect that this mechanism operated in the past. The development of the local parcelling at Long Stratton is unlikely to have proceeded without paying regard to some features of the earlier landscape.

There have been earlier developments at Long Stratton. These are an industrial area and an airfield. This can be seen on a plan produced by a local operator of light aircraft and helicopters *(figure 5.47)*. There is nothing here that can be compared with the scale of Béziers or Turin but we can see that the landing strip (the dark bar labelled "runway") is aligned on almost exactly the cadastral orientation.

140 Nor will it be in this form because it was recommended, following a public inquiry into the SNDC Norwich Area Local Plan in 1991-2, that Wilcon's proposal be rejected.

Furthermore the rectangle labelled "dispersal" is the Long Stratton industrial area. This occupies the site of two former fields, again cadastrally oriented, whose western boundary was followed by a hedge within 20m of a *limes*, and whose eastern boundary is a very straight road which again has the cadastral orientation.

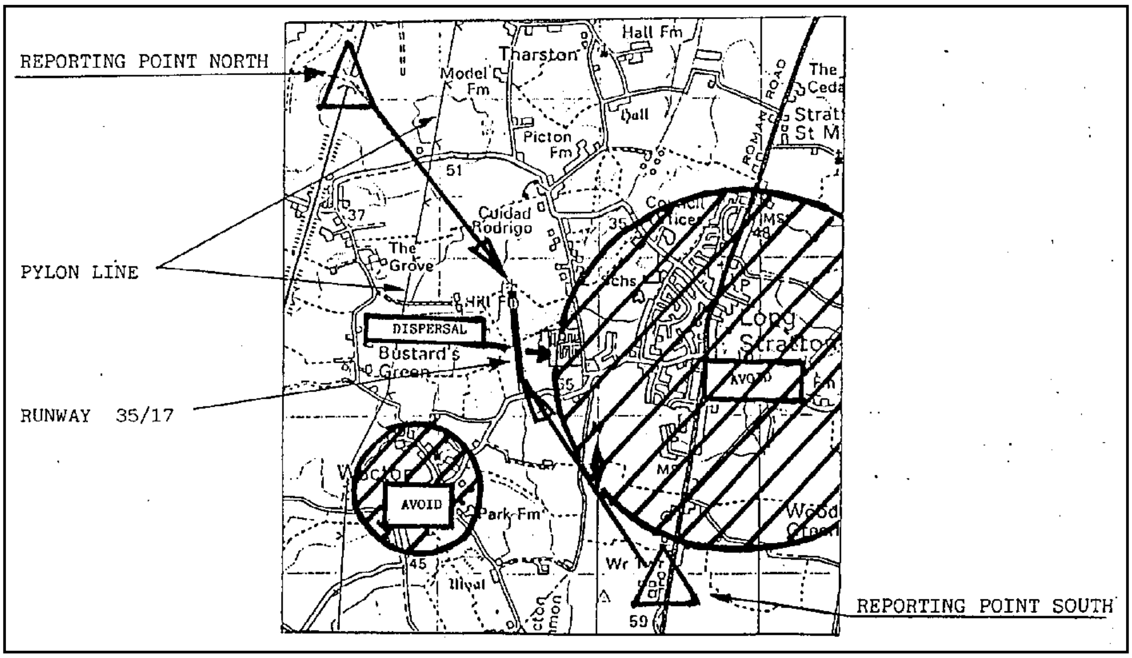

Figure 5.47 Long Stratton airfield and industrial area (CheqAir circa 1990).

It is clear that developments at Long Stratton derive, and will continue to derive, from the existing landscape. They are rooted in the past. The evidence of these roots, in the form of particular orientations and fixed points, is fully compatible with other evidence of the proposed Roman cadastre.

5.6 Discussion

Computational methods may strengthen our belief in the existence of a hypothetical Roman cadastre, and in some instances, such as the that of the Saône plain, this belief may be so strengthened that we can see the system, at least provisionally, as a fact. However, in most cases we would assign a lower level of probability and admit that there is a significant possibility that the cadastre does not exist.

For example the Limburg data indicates that the odds of existence are better than 200 to one, but there is still the possibility that, by some misfortune, Edelman and Eeuwens (1959), guided by the modern topography, selected one of the relatively rare sets of parameters which gives a significantly non-random result when compared to Roman sites.

Again, some people may see and accept the significance of statistical results but, as suggested above *(2.2)*, there may be others who view them with scepticism. For this audience the grid remains an empty shell and can hardly become a convincing reality unless there is some further study of its context. Circumstantial evidence is needed which allows us to imagine at least some of the life within the cadastral framework.

This provides some justification for the sort of extended case study undertaken here. Geometrical and statistical measurements alone are insufficient. We need to gather further evidence from many sources.

The first source was naturally the mapped topography, as it is now or was in the past. Cartography can be read and interpreted, but it is likely that individual interpretations of a particular cadastre, as seen on maps, will be different. Furthermore there may be a multitude of views of Roman cadastres in general, because each cadastre is unique.

However, despite this variability, any Roman centuriation will exhibit some typical patterns. If we study the commonly oriented features (by which we normally first recognise the possible presence of the cadastre) we may be able to see a structural hierarchy.[141] It may be possible to identify topographic features at a higher or lower level than the *limites* at 2,400 ft. This could be a plausible layout of *quintarii* or the signs of division by *limites intercisiui*. These latter may be so regular that they can be treated computationally, as was done here by Fourier analysis.

Signs of oblique planning within the cadastre are also anticipated. We expect to see signs of rearrangements of the cadastre in antiquity which reflect the earlier organisation by using again the same fixed points, and we expect to see some oblique Roman roads which also have links to the grid according to the theory of oblique planning described above *(4.1)*.

Other methods may reveal other features which are to be expected but which are not seen on topographic maps; such as traces of *limites* and ancient fields on aerial photographs, micro-relief features visible only at low angles, local placenames, and hidden features revealed by excavation or the study of soils.

There is also good reason not to limit our studies to the presently and recently visible past (as revealed by topographic maps and actual features) or to the hidden past (as revealed by other methods). Once it has been established, a conceptual cadastral framework is effectively eternal; it lasts as long as there anyone to recognise it; it thus exists in the past, present and future. So we may consider current developments within the area of the cadastre; we may study the changes that are taking place or foreseen, in

[141] This is an important factor in identifying the cause of the common alignment of boundaries. The natural environment may favour the development of a consistent orientation, but it is unlikely to arrange for major divisions to fall at (for example) 20 *actus*.

relation to the cadastre; and we may compare them to contemporary developments in cadastres elsewhere.[142]

Clearly very little of this reading of the details of the landscape comes within the definition of what Ginzburg (1989: 106) calls 'the Galileian paradigm'. Such investigations are probably not what we would immediately recognise as 'Science'. They belong to another group of disciplines, described by him thus:[143]:

> "It should be clear by now that the group of disciplines which we have called evidential and conjectural (medicine included) are totally unrelated to the scientific criteria that can be claimed for the Galileian paradigm. In fact, they are highly qualitative disciplines, in which the objects is the study of individual cases, situations, and documents, precisely *because they are individual*, and for this reason get results that have an unsuppressible speculative margin ... Galileian science, which could have taken as its own the Scholastic motto *Individuum est ineffabile* ("We cannot speak about what is individual"), is endowed with totally different characteristics. Mathematics and the empirical method implied, respectively, quantification and the repetition of phenomena, while the individualizing perspective by definition excluded the latter and admitted the former only as a mere instrument. All this explains why history never became a Galileian science."

Hence, in this case study, we may distinguish between two sorts of evidence. The first sort, which might be considered more objective, involved the measurement of some statistic relating to a particular class of objects taken from the area of the cadastre as a whole.[144]

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[142] It may seem paradoxical to suggest that the past can be studied by considering the future. But is it? Can we ever study the past directly? What we know of the past is inferred from what we see in the present; this is the archaeological method. When, as here, in the present, there is written evidence of these proposed future developments, they are (as another part of the present) a valuable source.

[143] In a section headed "Clues: Roots of an Evidential Paradigm"

[144] It is recognised that there is a problem here, since the original boundaries of the cadastre are unknown, and a definition of a likely boundary may rely upon the varying properties of the selected objects from place to place.

The other sort included all those details which could indicate the cadastre's presence. Each detail by itself could be considered non-significant, but collectively these clues enhance the probability that the cadastre exists.

Such a case, built from a mass of details, requires both interpretation, presentation and advocacy; and all these things have been done here. But this does not imply that the author himself is totally convinced; there is always room for doubt.[145]

So the existence of the South Norfolk 'A' cadastre is a hypothesis. As such it can be neither proved nor disproved, although further evidence may make strengthen or weaken it.[146]

New evidence will continue to appear, since in practice and in principle it is impossible to gather it all. Clearly there is more to be found, both in published material and in the field. Some of it has been assembled here, and it is suggested that, however tenuous it may appear, it converges to the strong impression of the pattern which Roman cadastres transmit to the landscape of the present day.

So this study concludes with an impressionistic view of the surroundings of Venta Icenorum in the third century AD *(figure 5.48).*

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145 For example, it is worrying, given the possible range of values of 20 *actus*, that an initial arbitrary choice of 709.5m turned out to fit possible fossil features of South Norfolk 'A' very precisely. Perhaps it was a lucky guess.

146 Again, for example, a radiocarbon dating of the Shimpling ditch *(figure 5.38-5.41)* to the Roman period would not *prove* that the cadastre existed, since a Roman ditch could coincide with an arbitrary grid by chance, just as a modern ditch could. Conversely, some future discovery of Iron Age settlement in the Dickleburgh area, associated with supposed *limites*, would not disprove the existence of the cadastre.

Figure 5.48 An impression of the surroundings of Venta Icenorum in the third century AD.

We are looking towards the south from a position above Harford Bridge. The *quintarius* now showing as a cropmark *(figure 5.29)* goes away south, towards Saxlingham and Hempnall. A Bronze Age necropolis is in the foreground.

Venta itself, in the middle distance, has, like many Roman towns, a street grid which is unrelated to the surrounding cadastre, but in the suburban area we can see conforming features such as, to the left, the *temenos* of the Romano-Celtic temple, and the area of *subsecivum* which may have been perpetuated in Caistor Green. The *termini* of the cadastre are unlikely to have been of stone, which is not available locally, so they are depicted as small trees, such as Elder or Thorn *(cf appendix 1)*.

Not all the landscape conforms to the cadastre. Even if originally well structured, it would have been redeveloped and modified.

Examples of this can be seen: new layouts parallel to main roads at top and bottom right, and parallel to a valley at top centre. At top left an area of light soil is shown excluded from the cadastre and left with a "native" form of land management.

Naturally such a view can be disputed on points of detail; for example, could the Romans really have used the river Tas to provide access to Venta[147]? Such uncertainties are inevitable because our knowledge of the Roman landscape, in areas now intensively cultivated, is extremely limited. For this reason the countryside in Romano-British reconstruction drawings is normally vaguely sketched and partially obscured by strategically placed clouds, particularly when the main subject of such a reconstruction is a built structure.

However in this case the countryside itself is the subject and so we are obliged to integrate what evidence we have for the South Norfolk 'A' cadastre into an understandable and familiar image.[148] This tries to show that, even at the supposedly agriculturally under-developed margin of the Empire, the cadastre need not have been an arbitrary administrative system, but could instead have been the foundation of a functioning Roman landscape.

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[147] According to Humphries & Small (1974) there is some indication that the river was navigable in the Middle Ages between Swainsthorpe and Tasburgh, which lie further up-stream.

[148] "To sum up: a reconstruction drawing - call it what you will - can be the vital final step in an archaeological study. By taking this step we can get inside the minds of the old builders, and savour something of their problems and achievements." (Sorrell 1981: 26).