Co-axial landscapes in South Norfolk and beyond: another view

By John Peterson

Introduction

In 2000 the Norfolk Archaeological Services Advisory Committee inspected an area of landscape identified in the South Norfolk Local Plan as worthy of conservation and protection. They met, with David Gurney, Tom Williamson and the author, at Vaunces Lane, on the old parish boundary between Dickleburgh and Rushall. David Gurney chose the meeting point – perhaps because Vaunces Lane typifies the wider system of regularly arranged, almost parallel, lanes and boundaries – and on the spot there was a brief debate about what the members of NASAC were looking at.

Tom Williamson sees this lane as an ancient droveway, an element of a co-axial system of access ways and boundaries (Figure 1) and since the Roman road from Scole to Caistor St Edmund cuts across this system obliquely (and seems to “slight” it) he suggests that the road is a later feature. On this hypothesis, the whole system can probably be dated to the Iron Age or earlier. The Prehistoric Society and many others have welcomed this idea, which was the starting point for an article in volume 12 of the Annual.

The author suggests that this landscape is based on Roman planning, and that Vaunces lane, which has the characteristics of a Roman road, is a major axis (quintarius) of the system. The oblique relationship between the Roman planned landscape and the main Roman road has, by itself, no particular significance for their relative dating.

Williamson’s Annual article, while making an unsympathetic reference to this idea, is intended to support his own hypothesis by producing comparable examples from elsewhere in eastern England, principally in Hertfordshire. This article repeats some of the arguments for a Roman system in South Norfolk and shows how Roman planning can easily be made to appear in one of Williamson’s Hertfordshire examples. Hence, comparing that system with the system in South Norfolk does not support his original hypothesis.

Roman cadastres, or “centuriations”

Roman cadastres are primarily systems of land administration, often based on a square survey grid. This, in its physical form, is frequently called “centuriation”. These structures are most easily appreciated by looking at maps, such as one at 1:200,000 covering Emilia Romagna in northern Italy. In this area the grids of centuriation have clearly had a profound effect on drainage. Streams, even major ones, are often diverted down the axes of the grids or link the corners of squares obliquely, as at Modena. An early main road, the Via Aemilia, is generally oblique to the grids. It must predate most of them, because the grids were set up to allow allocation of land to the inhabitants of settlements established on the road. Hence it does not “slight” them, even though it appears to do so.

Other Roman roads are also oblique to grids, but, like some of the diverted streams, pass obliquely through corners. Given that independently observed examples of such relationships occur widely in the Roman world, it is highly probable that they are the result of planning. There is only slight written evidence of this practice, but it is reasonable to suppose that, following the obligatory survey and mapping of the areas in which the cadastres were to be set up, the map could be used to direct engineering operations. Frontinus tells us he used maps in this way when curator of the aqueducts of Rome.

Not all cadastres are equally visible. Some, such as those of Modena, Bologna, Imola and Cesena, are obvious because existing roads correspond to a large part of the survey grid. Others, such as the centuriation of the Florence-Pistoia plain in Tuscany, are less visible; and
Fig. 1 Analysis of Parallel Landscape Features at Dickleburgh

The ruled lines represent the hypothetical survey lines of a Roman cadastre. The boundary features parallel to them and to the Roman road in Fig. 2 are derived from the 19th c. OS maps. Features corresponding to cadastral axes are shaded in Fig. 1; dots show features corresponding to 800 ft subdivisions. Stippled areas in Fig. 2 represent greens, often between arable areas with different orientations.

RS = Rectified Stream

Fig. 2 Local Parcelling at Long Stratton
we should expect that some systems might not be directly visible at all. The survey grid in southern Tunisia is a precedent for this. It is the size of Belgium, but cannot be seen on maps or aerial photographs. Nevertheless, even a very partially preserved, or partially developed, Roman system can be recognised by straight features with two orientations at right angles. The basis of most of these systems is a square survey grid of 20 x 20 *actus* (2,400 feet = 710 metres). This is the model for a hypothetical South Norfolk ‘A’ cadastré³. Roads and other features parallel to Vaunces Lane conform to it, not only locally but also on the Brooke-Shotesham parish boundary and at Oak Street, Norwich. These two features are taken to be Roman roads, so their coincidence with the hypothetical survey grid – plus that of three other fragments of Roman road – supports the idea that the Dickleburgh landscape is based on Roman planning. The position of some of these features also determines the parameters of a mathematical model, from which OS coordinates of the grid’s intersection points are calculated.

Subdivision, reorganisation and planned main roads

In Italy, and elsewhere, subdivisions in the squares of centuriations are often seen: at 10 *actus*, down the centre line of the squares (very obvious near Bologna) and at 5 *actus* (600 feet). Cultivation in the Po valley is often in strips, 600 feet long, at right angles to these boundaries. Another common subdivision is at 800 feet (237 metres), i.e. in thirds. Since such subdivisions are so common it is reasonable, given a suspected Roman cadastré, to look for evidence of them. The author has used Fourier analysis to identify these subdivisions in the Dickleburgh area⁴. This statistical technique can, if used carelessly, seem to reveal regular subdivisions when none are present, but in this particular case the subdivisions, by thirds, are reassuringly visible on the ground. Lines of dots in figure 1 show them.

Another aspect of the development of these Roman landscapes is the creation within cadastres of systems of parcels systematically organised at other orientations. These have been christened “parcellaires d’appoint”⁵, which may be translated as "local parcellings". One of the two examples so far identified in South Norfolk⁶ is at Long Stratton (figure 2). It seems to be based on the main Roman road, but is probably not all of one period. Boundaries parallel to the road on its eastern side are at 30 and 15 *actus* from it, suggesting a Roman origin for this part of the parcelling. On the western side no such Roman intervals can be found, so the parcelling may be of another (later) date. The apparent conservation of junction points of the road and cadastral axes on the east of the road, but not on the west, supports these conclusions.

Relict elements of South Norfolk ‘A’ may also be seen within the local parcelling. They are mainly “rectified” streams (indicated by RS). An explanation for their presence could be that the reorganisers of this patch of landscape did not consider it worthwhile, in some cases, to dig out a new stream course conforming to the local parcelling and so allowed these discordant elements to remain. In such a context the principle of landscape stratigraphy fails. Some features that are oblique to (and hence apparently later than) the coaxial local parcelling could, in fact, predate it.

As already stated, Roman roads are frequently related obliquely to a cadastral survey grid⁷ seeming to have been planned from the map that the survey created. The most obvious relationship is at 45 degrees, i.e. 1:1, using the diagonals of the squares, but other angles can be just as common. South of Long Stratton the relationship between the cadastral survey and the modern A140 seems to be based on the ratio 11:4. Further north on the Roman road two segments not in line are both at 5:3. The fact that the segments are parallel can thus be explained. No other explanation has been offered and the same explanation has been offered for another case of parallelism, also at 5:3, at Béziers in southern France.
Two visions of landscape

Williamson makes an ancient landscape appear from the available maps. This looks very like a genuine prehistoric landscape since it seems to have considerable – though not rigid – coherence. There are several reasons why this impression may have arisen. The people that have used the landscape since antiquity could have gradually made it more coherent. Ease of movement and efficiency of cultivation could have encouraged them to modify those features that did not fit, and to smooth out awkward angles. What appear to be axes, the through roads, could have been created, in some cases, from fragments that were not originally connected.

Secondly, this coherence could result from the application of the principle of landscape stratigraphy, which may encourage the belief that, in an area where many parcels have a similar orientation and seem to form a co-axial system, an oblique feature is later. The principle operates at two scales. On the large scale, it purports to give the whole co-axial system a date earlier than an oblique feature, such as the Roman road at Dickleburgh. On the small scale it allows the researcher to remove supposedly later oblique features from the map. This strengthens the impression that a co-axial system exists.

Thirdly, the way that the Williamson’s maps are drawn has, unconsciously, tended to make the landscape look co-axial in a prehistoric way. Boundaries are allowed to appear more sinuous than they are drawn on the nineteenth century maps. The scale on one illustration of the Scole-Dickleburgh system is incorrect. These slight distortions are not deliberate, but they will inevitably occur and, once the belief in a pre-Roman landscape is established, they will not be noticed in aspects of the map, such as scale, which have almost no significance for prehistoric field systems.

The landscape, as it is now, is a palimpsest of features originating at different times. Williamson gives us a vision of a single system that includes, or influenced the development of, many of these features. This vision is internally consistent; if this supposed system is essentially prehistoric it could account for much of what we see, even if the orientation of individual components is different.

If, on the other hand, we think that the landscape may contain traces of Roman land planning we cannot accept this view. From a Roman perspective, an important aspect of the boundaries is their precise orientation. A change of orientation normally signals a discontinuity. Neighbouring patches (parcellings) with different orientations may have been contemporary but under different administration. Alternatively, and particularly when centuriations are superimposed on earlier systems or on each other, the change of orientation implies a difference in date. Therefore, in this view, the landscape must be a bricolage - a cobbled together of discontinuous features that were not originally intended to form parts of a whole.

Both views impose order on a messy world, but they are different. The chief difference lies in the significance attached to changes in orientation. A researcher who does not see such changes as important – perhaps because he is already working on the idea that the subject of his study is fundamentally prehistoric – can imagine that the existing landscape reveals a single underlying co-axial system. Another researcher – thinking that part of the landscape could be Roman – would see changes in orientation as highly significant indicators of discontinuity. This difference in view may be illustrated by looking elsewhere, as Williamson does.

Williamson’s article in the 2003 Annual presents cases from Hertfordshire in support of his South Norfolk hypothesis. One of these, in the eastern part of the county, lies within the area covered by another hypothetical Roman cadastre previously identified by the author. This cadastre, Eastern ‘A’ has a different orientation to that of South Norfolk ‘A’ but a similar structure. The initial hypothesis for this system was that the Thurrock land division
could be, in part, the remains of a centuriation. Other supposed landscapes existing in the Roman period\textsuperscript{13} fit the same model (figure 3).

Williamson’s proposed co-axial landscape at Wormley-Broxbourne lies in the centre of this area and it is interesting to see what relationship it might have to the predicted cadastral framework. If this landscape is partly of Roman origin, nearby fragments of Roman landscapes show what to expect. At Saffron Walden, Essex (figure 4) the grid of Eastern ‘A’ is visible. A Romano-British settlement lies at an intersection of its axes. Some boundaries correspond to 5 and 10 \textit{actus} subdivisions. The course of the stream, centre right, could have been rectified to pass first along a cadastral axis and then along a 5 \textit{actus} division.

Another landscape is at Great Wymondly (figure 5). Seebohm\textsuperscript{14} suggested continuity of land use from Roman times and Applebaum\textsuperscript{15} proposed that this was divided into squares of 10 \textit{actus} parallel to a Roman road. It seems that this is a local parcelling, generally confined by axes of the cadastre, based on a Roman road segment planned at 3:4 from the its base map.

\textbf{Testing the Eastern ‘A’ hypothesis in the case of Wormley-Broxbourne}

A Roman road, Ermine Street, can be seen in the Wormley-Broxbourne landscape. This is part of a 26 km straight length, between a point just outside London and another point just south of Ware, which passes at 11:4 through four intersections of the grid of Eastern ‘A’\textsuperscript{16}. The most northerly of these intersections, on the boundary of Broxbourne, is at a point (figure 7, point A) where two minor roads now join the Roman road. These data, which have precise parallels in South Norfolk, support the Eastern ‘A’ hypothesis.

Apart from this Roman road, the landscape of Wormley-Broxbourne contains no topographic feature that was certainly there in antiquity, so analysis of it must depend on an accurate map of existing, or recently existing, landscape features. To permit a valid test of the hypothesis, this map must also allow the axes of the cadastre to be plotted on it. Since calculated OS grid coordinates define these axes, the map must at some stage include information on the position of the OS grid. Williamson’s published synthesis of the oldest maps (figure 6) does not do this. It is not linked to the OS grid and the scale is neither uniform nor precise – it underestimates distances by about 35%.

So features corresponding to those mapped by Williamson were taken directly from the mid 20\textsuperscript{th} century OS 1:25,000 map. The author also included a few features shown by Williamson (but not shown on the OS map) and footpaths and other rights of way shown by the OS (represented in the figures by dashed lines). These features are unlikely to be shown on old maps, even if – as seems probable – many of them were there when those maps were made.

The features that have the orientation of Eastern ‘A’ are shown in figure 7. As far as the axes of the cadastre are concerned, it can be seen that they correspond to three road segments, at intervals of about 710 metres (arrowed). Possible remnants of the cross axes are also evident, particularly the two rectified streams (RS). Now, in the case of the South Norfolk system there is a large set of features from which a grid can be extracted. Given that this is so, Williamson argues that the coincidence of it with some of them is no more significant than supposed “proofs” of the existence of ley lines. This argument is over-simplified – it fails to allow for the relative importance of different features – but it is difficult to refute in the South Norfolk context. It may be easier to refute in the Wormley area because there are fewer features. Furthermore, the grid was predicted. The three parallel roads at intervals of about 710 metres, and the rectified streams, fit it. Although it is almost impossible to measure the chance of this coincidence being random, it seems low and the coincidence itself is clearly an expected outcome of a theory. According to the hypothesis of Roman planning, features seen within the area of Eastern ‘A’ that share its orientation should have a certain structure. In this case they do.
Fig 3. Proposed Roman Landscapes north of London

Dots show hypothetical survey lines of the Eastern A cadastre at 600 ft intervals. Other features identified by Basset (1982) as elements of a planned Roman landscape, derived from modern maps. Crown copyright Ordnance Survey. All Rights Reserved.

Fig 4. Landscape Features at Saffron Walden

Fig 5 Local Parcelling at Gt. Wymondley

Landscape features from Seebohm’s copy of the estate map (1883)
Fig. 6 Landscape at Wormley-Broxbourne

Williamson (2003), Fig. 4a, from earliest surviving maps

Fig. 7 Features at Wormley-Broxbourne.
Potentially corresponding to Eastern “A”

Same area as Fig. 6 from modern OS maps (1:25,000)*
Dots represent Roman cadastre at 600 ft intervals

Fig. 8 Wormley-Broxbourne:
Local Parcelling based on Ermine Street

Same area as Fig. 6 from modern OS maps (1:25,000)*

*Crown copyright Ordnance Survey. All rights reserved.
**Local parcelling at Wormley-Broxbourne**

Local parcelling based on Ermine Street – comparable to that at Long Stratton but more regular – is another aspect of Roman land planning which can be made to appear. It is possible that there are two examples of a grid of 10 actus squares, as at Great Wymondley. Figure 8 shows that in each proposed local parcelling there are features parallel to the road, at multiples of 10 actus from it. There are also some clues at to where the axes at right angles to the road might be.

In the northern local parcelling a rectified stream (a-a) runs on the south side of Thunderfield Grove (TG). Williamson includes it, in his interpretation of the co-axial landscape (figure 9), as part of an axis. At 20 actus north of the stream there is a feature that is a main axis of Williamson’s co-axial system (arrowed). He observes that this axis and its northern and southern neighbours are “terrain oblivious”. Such behaviour is, according to Oliver Rackham typical of Roman land surveying; centuriations, he says, have axes “marching mindlessly” across the natural landscape.

In the southern local parcelling, at Cheshunt, there is another stream (b-b) that, to all appearances, is even more plausibly rectified. It is not recognised by Williamson as a potential axis of his co-axial system, possibly because here there is here another system of boundaries – oblique to the Roman road – to which the principle of landscape stratigraphy gives priority. This stream and other features are at intervals that make a typically Roman pattern. There are indications – worthy of further investigation – that this pattern extends further south.

**The Wormley-Broxbourne landscape seen as a bricolage**

In this landscape, apart from the section covered by the southern local parcelling, the basic framework is the same, whether it is regarded as an example of Roman planning or as part of Williamson’s co-axial system. Much more clearly than in South Norfolk, we can see it in two ways: either as a co-axial system (figure 9) or as a bricolage (figure 10). In this latter view it is composed of disjoint elements, with the following suggested interpretations.

*Areas A, A’, A”*. Surviving fragments of the Eastern ’A’ cadastre, at 17 degrees west of OS north. This part of Ermine Street was planned from its base map. The corresponding land division was also planned, but probably later than the road.

*Area B*. A northern local parcelling, originating in the Roman period, but with major elements perhaps added later parallel to an original major land division, now a parish boundary.

*Area C*. A southern local parcelling, perhaps extending further south, originating in the Roman period.

*Area D*. A local parcelling, possibly pre-Roman, but more likely to have been created after the Roman period as a response to local topography. In this case the elements of area C that lie within it are earlier relicts.

*Area E*. A co-axial parcelling, with orientation about 110 degrees east of OS north, running down into the Lea valley. The date of this is very uncertain, but its orientation (close to that of the Great Wymondley local parcelling) and the repeated interval of about 350m (10 actus) between its axes may be significant.

*Area F*. Cheshunt Park (14th century or earlier).
Fig. 9 Wormley-Broxbourne Landscape:
Interpretation as a Coaxial system
From Williamson (2003) Fig. 4b

Fig. 10 Wormley-Broxbourne Landscape:
Interpretation as a Bricolage
Discussion

The landscapes of part of South Norfolk and of Wormley-Broxbourne are comparable. Williamson says that, in both cases “it is hard to believe that this landscape is entirely organic and unplanned in origin”. Despite uncertainty regarding what “organic” means in this context, the author shares this view.

But, if planning is apparent, an important question is “What norms were the planners using?” In general, in both Norfolk and Hertfordshire, Williamson does not raise this question. True, in the case of Wormley-Broxbourne he refers to “two elements” which “run almost exactly parallel, 250 metres apart, for a distance of over 2 kilometres”, but this is an isolated example and not accurate\textsuperscript{18}. This lack of interest in measurement is understandable, given that the systems are supposed to be essentially prehistoric.

As already proposed, these landscapes can be interpreted either as unified “prehistoric” co-axial systems or as patchworks containing areas of Roman land planning; and three possible causes for this difference of view have already been given: degradation and “smoothing” of the pattern of boundaries as the result of its use, the effects of an unreliable research method (landscape stratigraphy) and the extreme difficulty of seeing inaccuracies and distortions – particularly those that have no significance in terms of the scholar’s preconceptions – in the interpretations.

Another cause of alternative perception may spring from the very nature of centuriation. Since a centuriated system has two sets of axes at right angles, it is doubly co-axial. In the process of degradation these axes become distorted, as Roman roads do. They also tend to remain more prominent in one direction than the other. Patches of centuriation or a local parcelling can thus end up looking like parts of a co-axial system. They only need a small amount of joining together, whether on the ground or in the researcher’s imagination, to create the whole pattern. The Wormley-Broxbourne landscape seems to illustrate this process very well.

In general the angle between centuriations can range from zero (when the systems are parallel) to 45 degrees, in which case they are as differently oriented as possible. In figure 10, the\textit{bricolage} view, there are, in terms of this possible range of values, some large differences in orientation. In particular, area E, considered as a degraded centuriation, has an orientation (nearest to OS north) of 20 degrees east, whereas the neighbouring area A (detailed in figure 7) is at 17 degrees west. The difference is 37 degrees. If landscapes with orientations as different as this (37 out of a possible 45 degrees) can be reconciled then perhaps any arbitrary set of planned fragments of landscape can look like a co-axial system.

The supposed chronological relationships between main Roman roads and these planned systems is an issue. One problem is the circularity of the argument used at Dickleburgh and Scole for a pre-Roman (or at least pre-road) date for the land division. If the planned landscape is Roman the oblique relationship between it and the road could arise whatever their relative dates. Landscape stratigraphy can only “prove” that the landscape is essentially prehistoric if, in fact, it is. This circularity implies that the principle of landscape stratigraphy is not a method of proof; it provides one possible explanation for the origin of the perceived pattern.

Furthermore, it seems that this “principle” is difficult to apply consistently. Williamson relies on it to support his argument in South Norfolk but with respect to Wormley-Broxbourne he says “The Roman Road, Ermine Street, follows the side of the Lea valley and thus runs more or less at right angles to the network of co-axial lanes and boundaries, and much of the field pattern where the two would have intersected has been disrupted by the creation of Cheshunt Park, … so that no dating evidence can be adduced from their relationship.”\textsuperscript{19}

This statement is made despite the fact that immediately north of Cheshunt Park there is a clear oblique relationship between the Roman road and the co-axial system (figures 9). This looks just like the configuration at Dickleburgh, but attracts no attention.
Williamson also does not consider the strong possibility that the best-structured part of the co-axial system (area, or sub-system, B in figure 10) originally continued up to the road. It approaches to within 350 metres of its line and shows no sign of stopping – indeed, the principal axis (arrowed in figure 8) continues as a parish boundary. If the whole sub-system continued we might have to consider the idea that, since it at right angles to the Roman road, it was laid out from it. This would contradict the hypothesis that the co-axial landscape was there first.

Interpretation of the Wormley-Broxbourne landscape shows, even more clearly in another context, the problems arising from a co-axial interpretation of part of the South Norfolk landscape. Hence it seems to weaken the original hypothesis, rather than strengthen it. More positively, this Hertfordshire landscape shows predicted features of the Eastern ‘A’ cadastre. It can also reveal those secondary structures of the Roman period, the local parcellings, which seem to appear in an almost identical way in South Norfolk.

Tom Williamson has successfully given prominence to a planned landscape in South Norfolk. He presents it as a good example of a co-axial system in lowland Britain. Another view is that, together with some of the other similar systems, it may be more appropriately presented as the fragmented remains of one of our best surviving Roman cadastres.

Notes

1 Williamson (2003).
2 Touring Club Italiano (2001).
3 By convention, the first cadastre discovered in an area is called ‘A’. There may be others here, as there are elsewhere.
5 Chouquer (1983).
6 Peterson (1997) This may be accessed at the “Evolutions” website or alternatively at http://www2.cmp.uea.ac.uk/Research/researchareas/JWMP/evoluzioni/evoljp1.html.
7 Peterson (1992b).
8 This procedure differs from that used by “cadastre hunters”. According to the principle of landscape stratigraphy the feature is removed because it is thought to be of more recent origin. In the search for a hypothetical centuriation, the only features that can be considered are those whose orientation is appropriate. No judgement is made about their date.
13 These supposed Roman landscapes are at: Great Wymondley (Applebaum 1972); Saffron Walden (Basset 1982); southwest Essex (Coles 1935); Wickford (Drury and Rodwell 1980); northeast Hertfordshire and northwest Essex (Peterson 1988); Middlesex and southwest Essex (Sharpe 1918, 1932).
14 Seebohm (1883).
15 Applebaum (1972).
18 These elements are the axis arrowed in figure 8 and its southern neighbour. A series of measurements between them, using the 1:25,000 map, gives the mean interval as 280 metres with a standard deviation of less than 20 metres. Expressed as a rough measure, to the nearest 50 metres, this figure should be 300 metres. Again, on Williamson’s map (figure 9) the next interval to the north is made to look the same or, in places, larger. This
is misleading because a similar set of more accurate measurements between these two axes gives a mean of 240 metres (with a larger standard deviation of nearly 30 metres). This is smaller than the first interval and similar to the 800 foot (237 metre) interval observed in South Norfolk.


References


