6

Examples of Surveys

Your survey will have a particular purpose for you, and this will determine the instruments used and the extent. Survey areas could extend from only a hundred square metres to many hectares, even square kilometres. If you want to understand a previous landscape, you need to survey a large area, but if your interest is in a particular feature and you know exactly where it is, you may only need to survey a very small area to glean the details of interest to you. In this chapter, we present and comment on a few surveys by way of illustration of these types.

6.1 Small-scale resistance survey

This survey was conducted at the east end of an English village church, covering an area only some 20m by 25m. The survey covered both res and mag, but only the res is shown in Figure 6.1 as this contained the main detail.

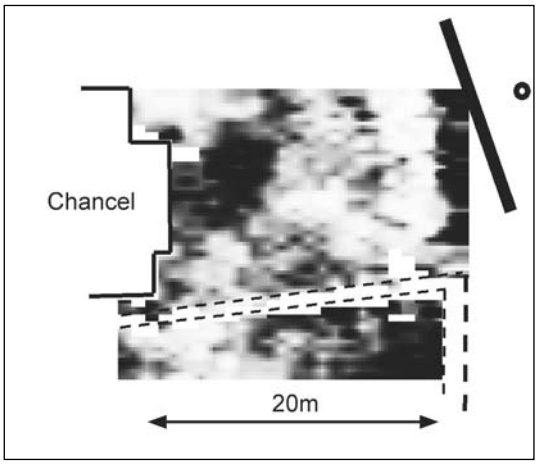

Figure 6.1 A very small area surveyed here showed the goal, the shadow of a building protruding from under a church, but did not show if there was anything else in the churchyard.

The east end of this church was known to contain masonry from the 12th century. The purpose of the survey was to see if there was a possibility of an earlier church on the site. The survey extended from the east wall to the churchyard wall only. The strong rectangular feature jutting out from the church wall suggests that there may well have been an earlier church protruding beyond the east end. In this case, a small targeted survey was sufficient to answer the research question of whether there was an earlier building under the church. However, there may have been other buildings in the churchyard which we still do not know about.

6.2 Magnetometer surveys

Two surveys of moderate area, between two and four hectares, are shown here as examples of where mag has proved valuable for answering different research questions in different parts of the world, and with differing geology.

The first survey comes from North America. It covered 3.3 ha in an area 240m long and up to 140m wide and used a Geoscan FM36. Its purpose was to try to locate the buildings of a late 19th century Indian agency in the western United States. A plan existed of the buildings but their exact location had been lost. The glacial-based soils here were likely to support work with the mag. The buildings could have been timber, but may also have had foundations of cobbles. The mag was considered sufficient to find beam slots of foundation trenches, and indeed proved so without needing res.

The survey shown in Figure 6.2 discovered regular anomalies which indicated the site of the agency, found possible irrigation ditches and irregular anomalies which may be traces of Indian campsites.

Figure 6.3 is an example from a tiny island off the coast of Shetland, north of the British Isles. Foula is only five kilometres north–south by three kilometres wide and its western half is mountainous. This survey was also done with an FM36. Settlement remains, burning and the Old Red Sandstone geology gave favourable conditions for the mag. The area shown had to be downloaded in two separate pieces either side of the burn, and then joined together, together with mapping details, to form the picture shown.

The northern end of the survey was very steep and the western area beyond the burn was very uneven, while the area to the south of the present buildings

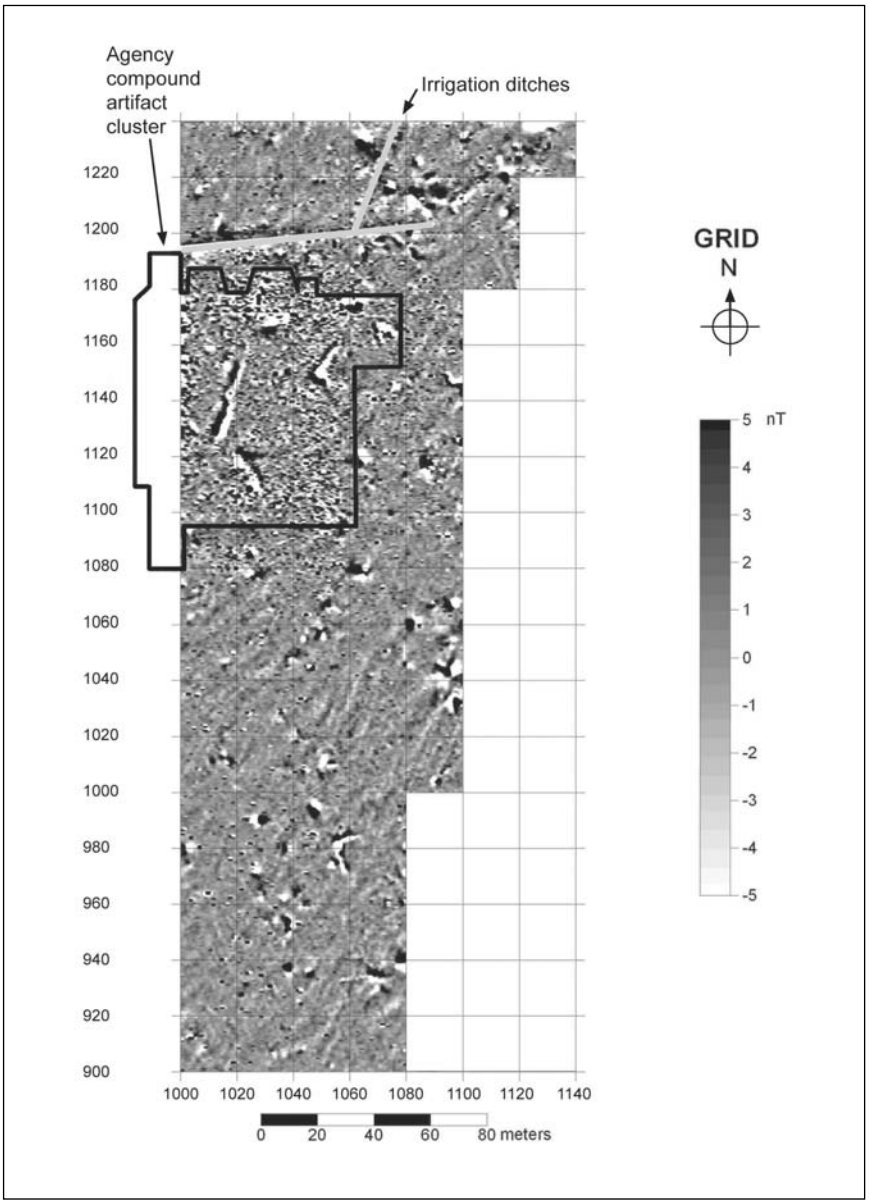

Figure 6.2 The magnetometer survey was sufficiently large to find the Indian agency it was seeking, and also to pick up signs of Indian settlement and irrigation ditches.

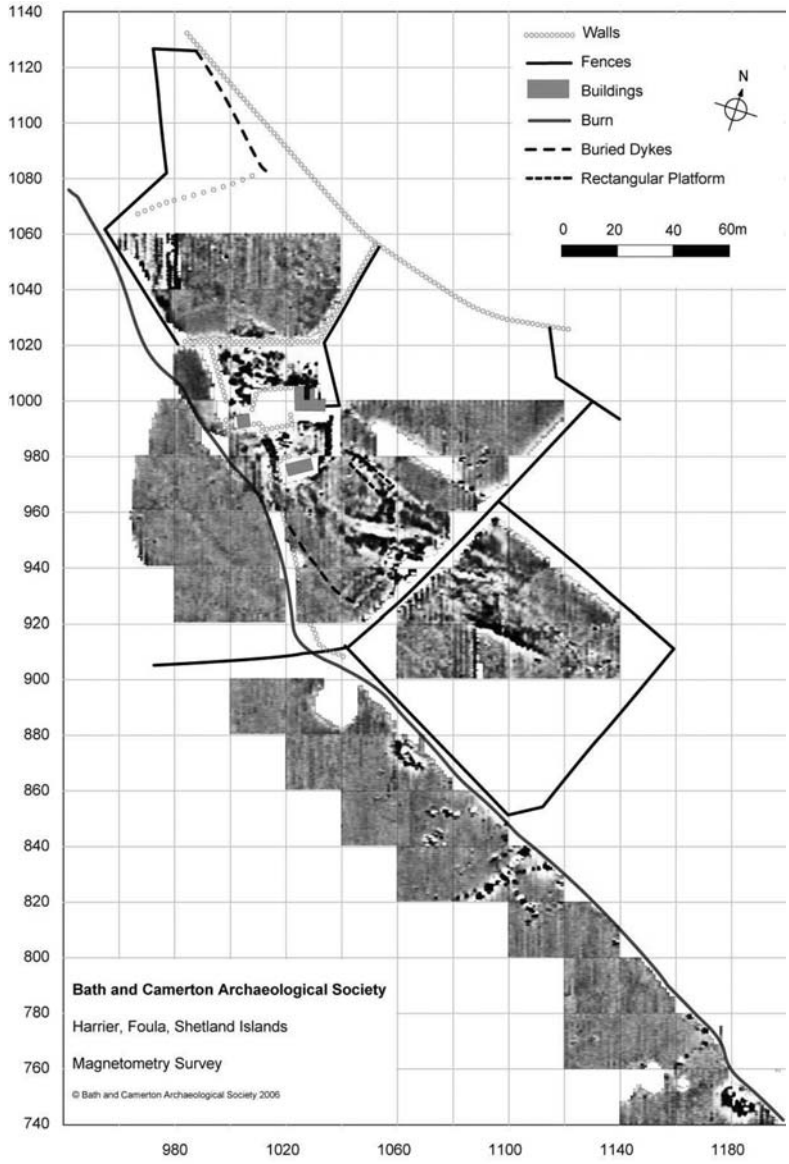

Figure 6.3 The survey in Shetland is mounted on a map as it comprised separate surveys east and west of the burn. There is intense activity in the south-east, and plenty of fainter activity elsewhere. The burnt mounds along the burn show strongly.

was flat lush grass. Three strong signals along the burn are burnt mounds, with many pebbles heated by fire then used to heat water. The northern and western areas also show signs of occupation, although these are faint, and a water pipe gives a strong signal towards the south.

The yard immediately north of the buildings shows intense activity, and the flat grounds south-east of the buildings are seen to be an area of settlement no longer visible on the surface. The area of about 4 ha was sufficient to throw light on prehistoric and historic landscapes not previously explored. The area covered was limited by the length of stay on the island rather than by geographical limits.

6.3 Resistance pseudo-section survey

This survey is of Roman remains at the eastern end of the Roman Empire, in Anatolia, north-east Turkey, close to the Black Sea. This was a military centre at Satala, controlling two routes, one heading east into Asia Minor, the other connecting the Black Sea with the eastern Mediterranean Sea. The area was subject to gradiometer survey, which revealed much activity but with limited definition.

Resistance was not measured by a conventional twin-probe device, but by building up a series of pseudo-sections at 2m intervals and combining the results from each at the same depth, as discussed in Section 3.1. This survey covered only about half of the area covered by the gradiometer survey. The result of combining rows of data, each 2m apart, at a given depth, produced an area display, rather like a ‘time slice’ obtained with ground-penetrating

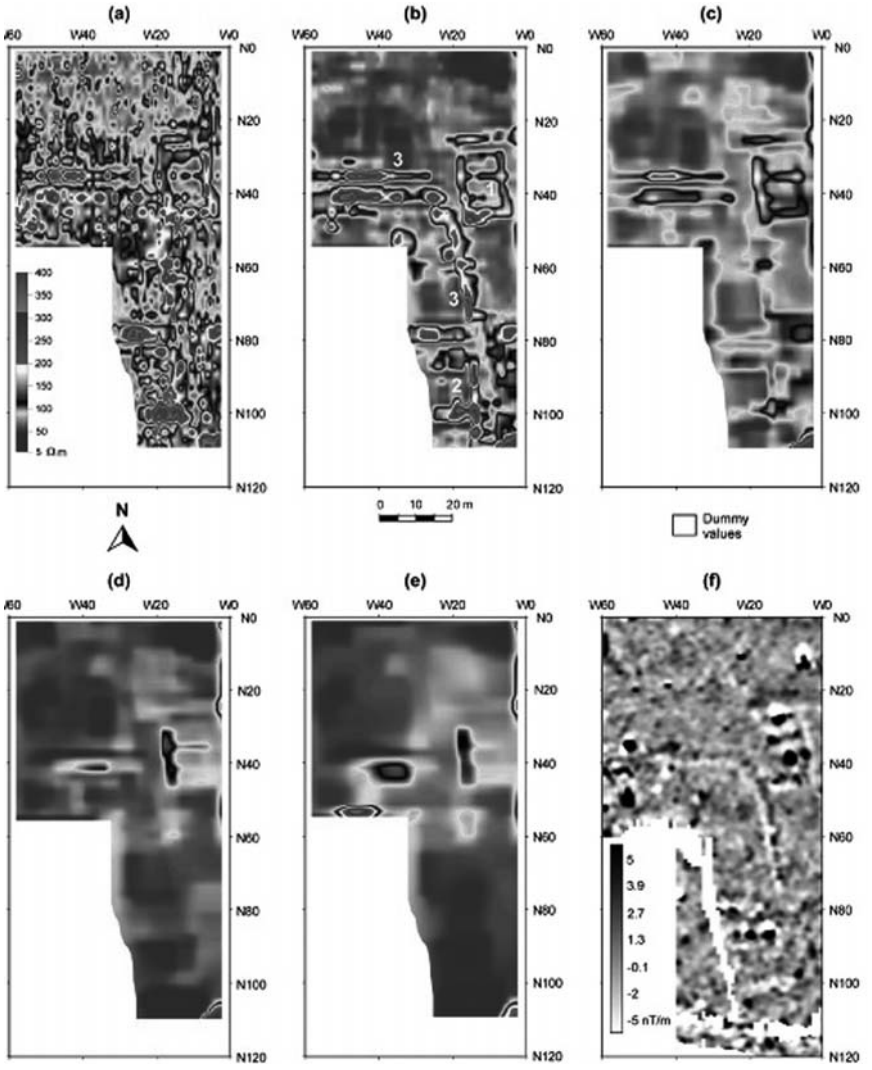

Figure 6.4 The picture bottom right is magnetometry. The other five are depth slices obtained by resistance profiling, and are Roman military structures at Satala, Turkey. Depth (a) is 0.125m, (b) 0.51m, (c) 1.09m, (d) 1.77m and (e) 3.4m. Main detail is in (a) and (b), but there is still significant detail in (c) and vestigial effects in (d) and (e). See also Plate 10.

radar. The plots shown in Figure 6.4 (which is also reproduced as Plate 10 in the colour section) show the presence of masonry structures at three depths below the surface, 0.25m, 0.79m and 1.41m. From this it was clear that there was much activity just below the surface, which would have dominated conventional resistance measurements, but the footings of some buildings went down to a depth of over a metre. The lower depth sections showed little masonry below 1.5m depth. These combined resistance sections produced clear images and were able to add significantly more information than could be gleaned from the gradiometer survey, albeit needing more effort.

6.4 Combined magnetometer, resistance and contour survey

The survey covered three fields, total area 9 ha, in south-west England, close to the church described in Section 6.1. It was designed to explore a 4th century AD Roman villa and its environs. The site was scheduled as an ancient monument and permission had to be gained from English Heritage before it could be surveyed. The approximate position of the villa was evident in advance, but not its extent.

The rock in this area is a bright golden colour, rich in iron, and likely to support work with the mag. It can also be quarried very easily, in sizes that are very useful for building. The res was therefore also likely to produce good results.

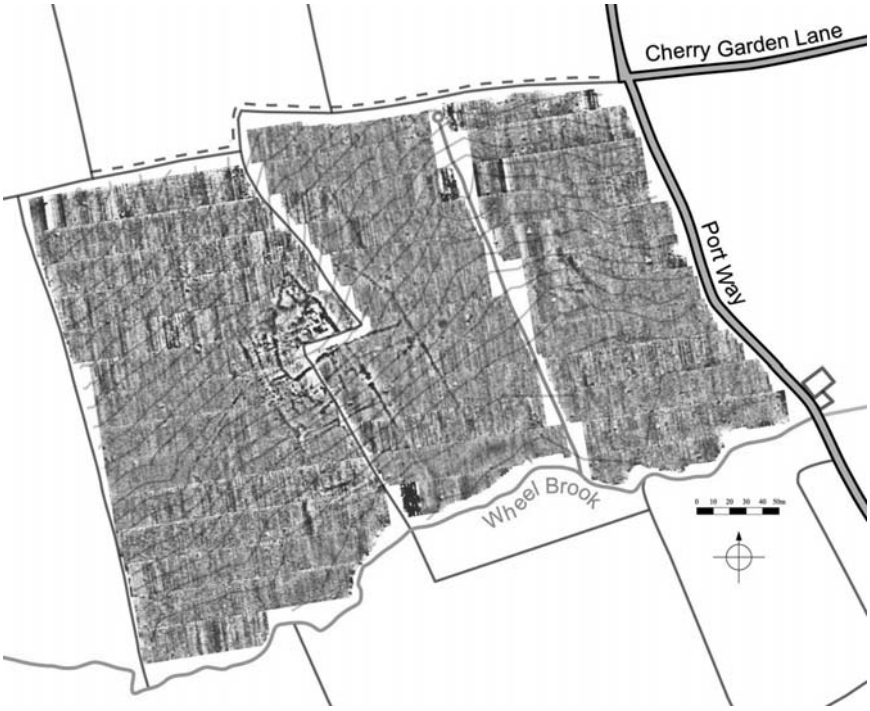

Figure 6.5 Magnetometer survey of three fields, total area 9ha. An enclosure with internal features is clearly visible in the western field near the kink in the hedgeline.

Figure 6.5 shows the mag survey. An area of intense activity within a triangular enclosure shows the villa site just in the westernmost field, with fainter lines extending into the next field. Figure 6.6 is the res survey and shows the main villa range where the mag activity was intense. Now the outline of the building and its individual rooms can be seen. Activity extends south from the building all the way down to the brook. The dark patches in

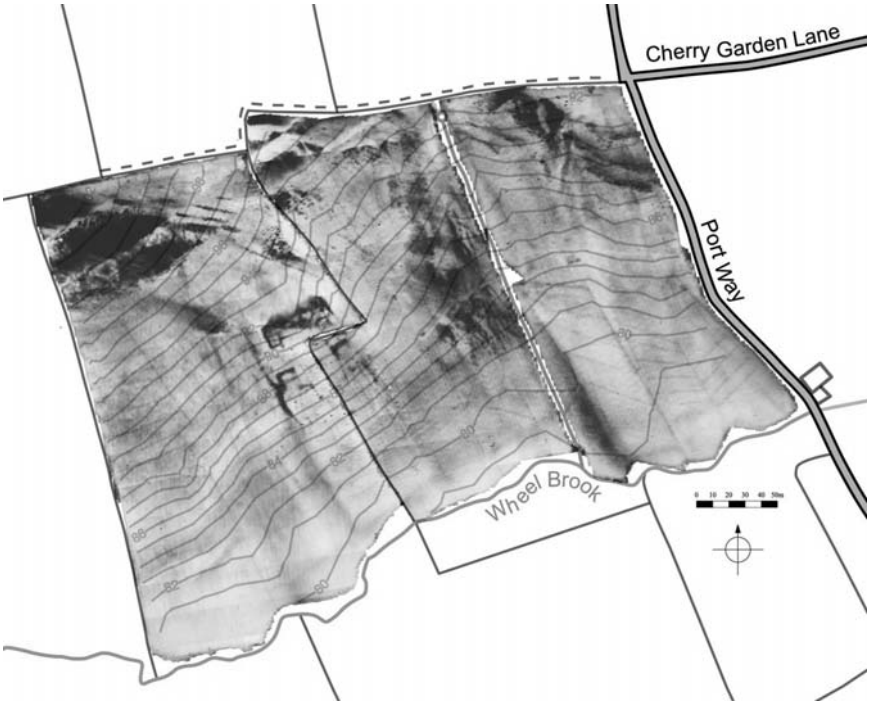

Figure 6.6 Resistance survey of the area. Some modern drainage lines are clearly evident, but a large building can be seen by the kink in the hedgeline, and a range of buildings below it.

the fields are places where the bedrock comes close to the surface. You can also see modern field drains and the dark line where a ditch was filled in with rubble. There was a second building area some 120m southwest of the main range. This was very faint, so not visible in the main picture. The detail is shown separately in Figure 6.7. There are also signs of a farmstead in the extreme east of the fields, where the road kinks.

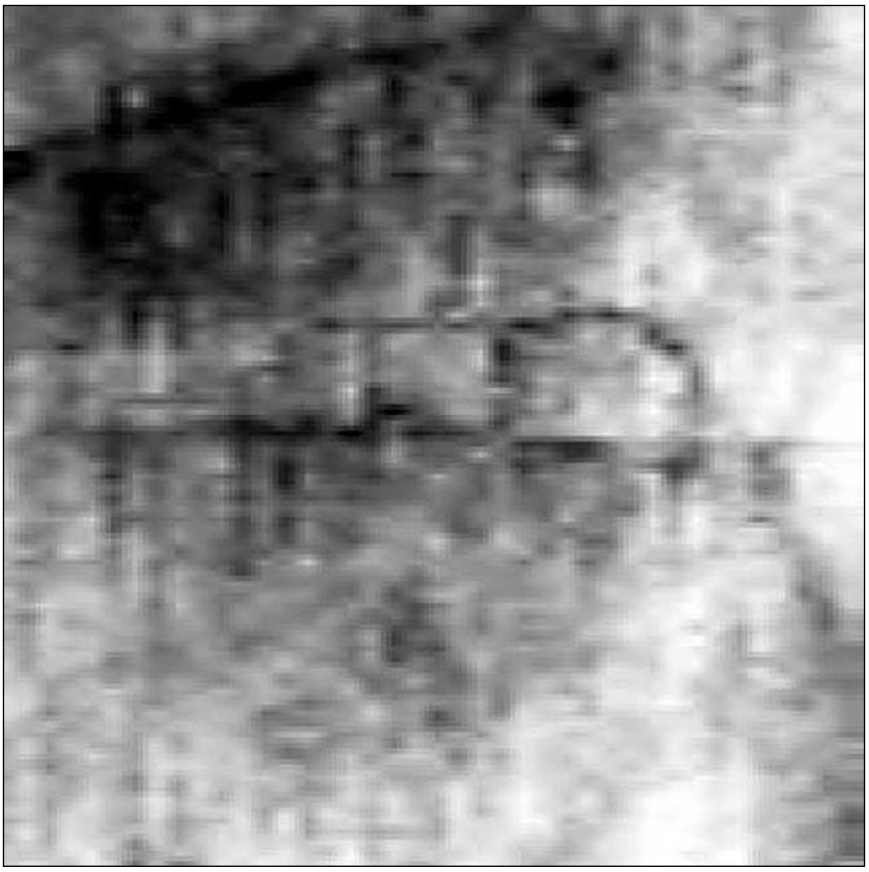

Figure 6.7 Detail of the resistance survey, showing a building some 120m south-west of the main building which is too faint to show on the main plot.

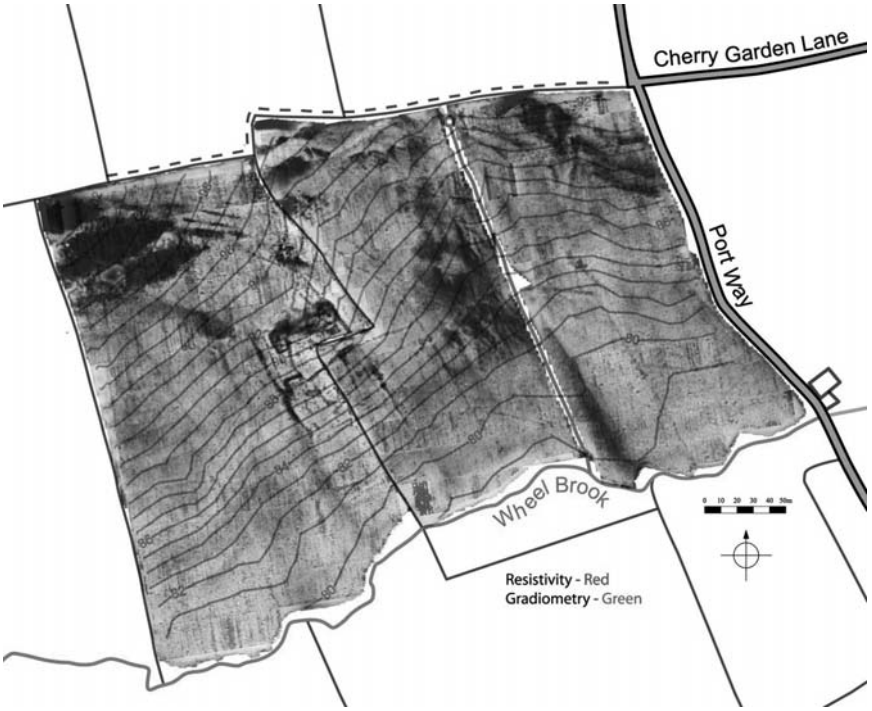

Figure 6.8 Overlay of mag and res (Figures 6.5 and 6.6). Colour is used to distinguish between the instruments (see also plate 11). The large building is now plainly sitting over the ditches of the enclosure.

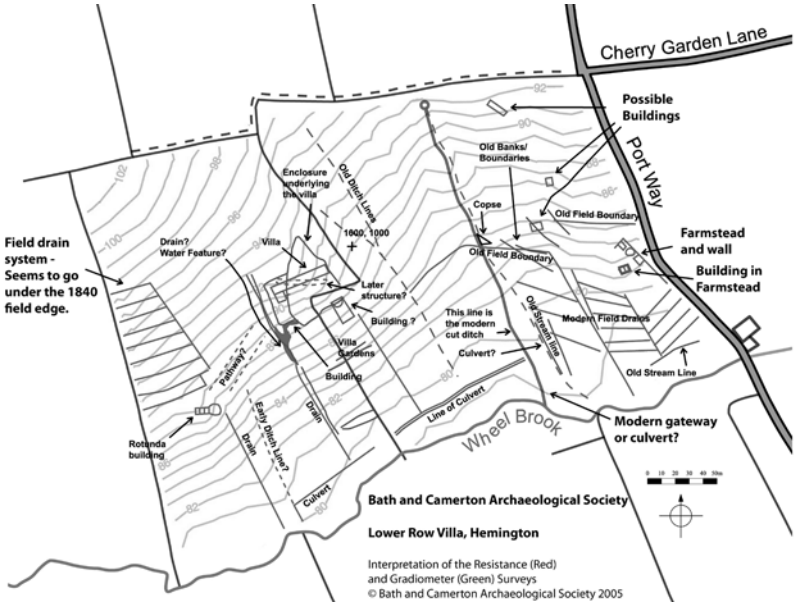

Figure 6.9 An interpretation sketch of the features shown in Figure 6.8 (Plate 11).

Figure 6.8 (also reproduced as Plate 11 in the colour section) shows the mag overlaid on the res, and with contours added. The main villa range can now be seen sitting across the ditch of the triangular enclosure. You wonder if the building started to collapse!! The contours show how the ground slopes steeply from the north down to the brook, while the villa sits on a slight mound. Figure 6.9 (also reproduced as Plate 12 in the colour section) shows an interpretation sketch of all the features found in these fields, including many not associated with the villa.

These are just a few examples of knowledge gained either of buildings or of whole landscapes by the use of relatively simple geophysics equipment. I could easily add many more examples, but now is the time when you can start adding your own! The next chapter will give a brief summary of what we have learnt through the book.