

Just to the west of Peterborough lies the Roman town of Durobrivae. This town is one of the so-called 'small towns' of Roman Britain and extended to 44 acres within the walled area. Until recently the only detail we had of the interior of the town was from air photographs and very limited 19th century excavations and recordings made by Edmund Artis. At the end of the summer of 2016 however, a team of people from Cambridge University, London University and the NVAT undertook a detailed set of geophysical surveys to see how the ground and its hidden archaeology would respond to various electronic, magnetic and radar surveys. The results from this pilot study were astonishing.



Fig. 1: Google Earth image of Durobrivae.

Oblique aerial photography over the years has revealed much about the interior of the town, as well as extensive suburbs, prehistoric features, villas and so on. Fig. 2 shows an oblique image of the town taken in 1977.



Fig 2: Oblique aerial photograph of the town. Reproduced courtesy of Dr.Stephen Upex.

Earlier Prehistoric archaeology is clearly evident to the west and south of the Roman town in the form of a large group of circular features, some of which appear to be the ditches around round-barrows, but others are far too large and are likely to be henges (Figs. 3 and 4).



Fig. 3: Google Earth image of the field to the south of the town showing circular prehistoric features



Fig. 4: Oblique aerial photograph of the field to the south of the town showing the Roman suburbs and earlier prehistoric circular features. Photograph courtesy of Dr. Stephen Upex.

During the period of fieldwork at the site the team undertook three days of survey running three main instruments (magnetometry, resistance and GPR), and one team member also used his UAV to take high-level photographs, partly with a view to creating topographic maps.

Despite early problems with the mag, the team managed to survey an 80m wide, 360m long strip NS across the town. The overall results can be seen in Fig. 5.



Fig. 5: the magnetometry survey.

There is a great deal going on in the results from the magnetometer. Ermine Street shows clearly running across the NE corner of the survey transect and matches the parch mark beautifully. On either side of Ermine Street are a series of buildings with their gable ends onto the road in the approved Romano-British manner. Other streets can be seen, again matching the parch marks. Not all the buildings are so clear, but there are clearly other walls that can be seen in the data. Towards the south, the pattern is more complex but the suggestion is that the buildings which fronted Ermine Street are more substantial while those behind the main Ermine Street frontage are less well built and perhaps even largely of wood, although on stone foundations.

The team also undertook a radar survey using a Mala GPR. Pushing the GPR was quite hard work in the long grass, especially as one goes over the agger on which Ermine Street appears to have been constructed (Fig. 6). The team did, however, manage to complete an excellent six blocks of data.



Fig. 6. Derek Roberts pushing the GPR over Ermine Street.

The images on the screen of the GPR showed that we were getting reasonable depth penetration and we created amplitude maps in slices through the ground. The third slice map (Fig. 7) clearly shows the surface of Ermine Street.

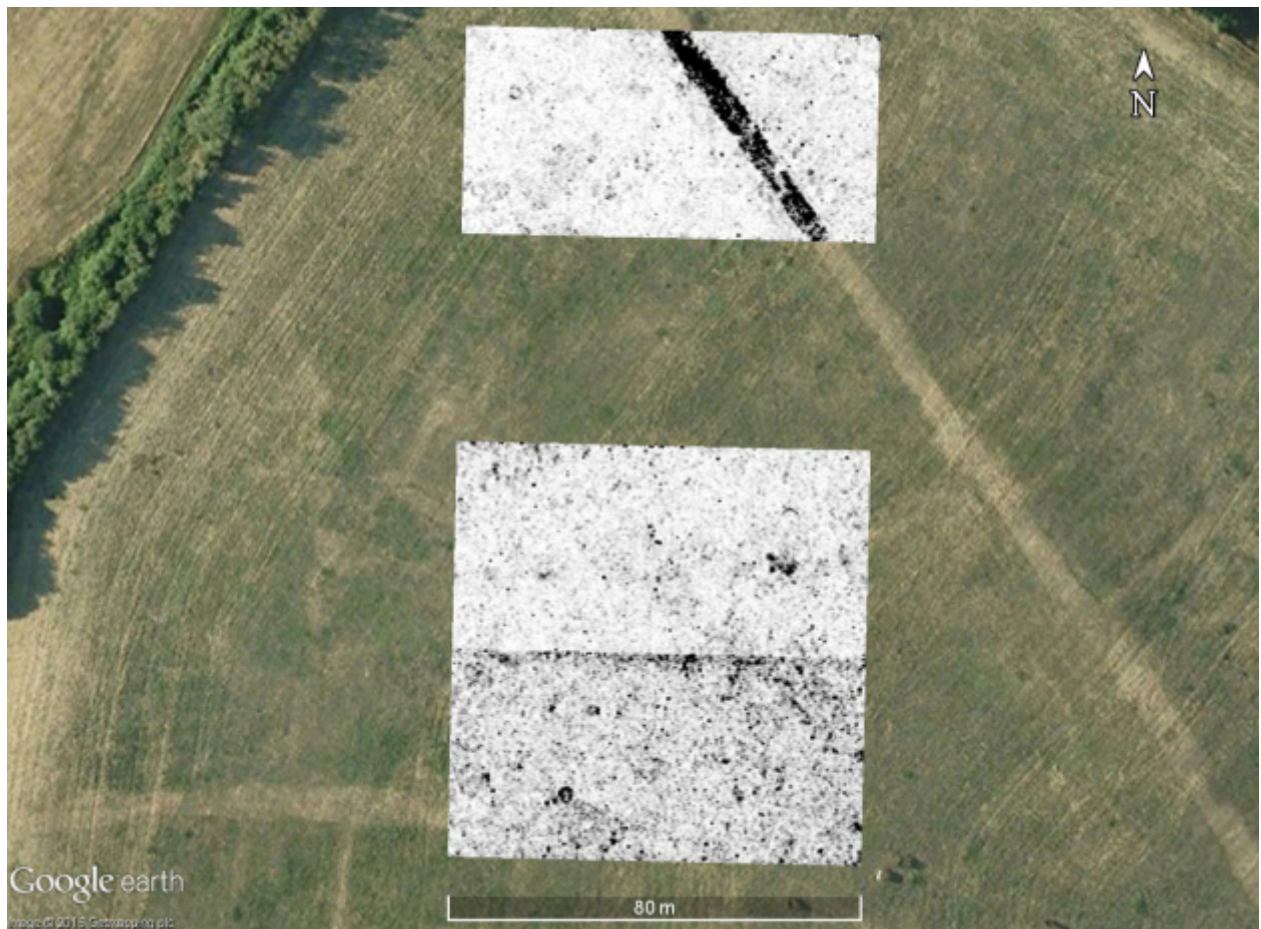


Fig. 7: time slice 3, 10.5-13.5ns.

In the fourth time slice (13.5–16.5ns, Fig. 8) some of the other roads are starting to show, and odd bits of wall. One very curious feature is the lighter coloured band across the middle of the southern area. Although it would appear to be related to our grid, our survey was conducted NS across that band. The aerial photograph (Fig. 2) does show a band across the field so perhaps this is related to some sort of cultivation pattern?

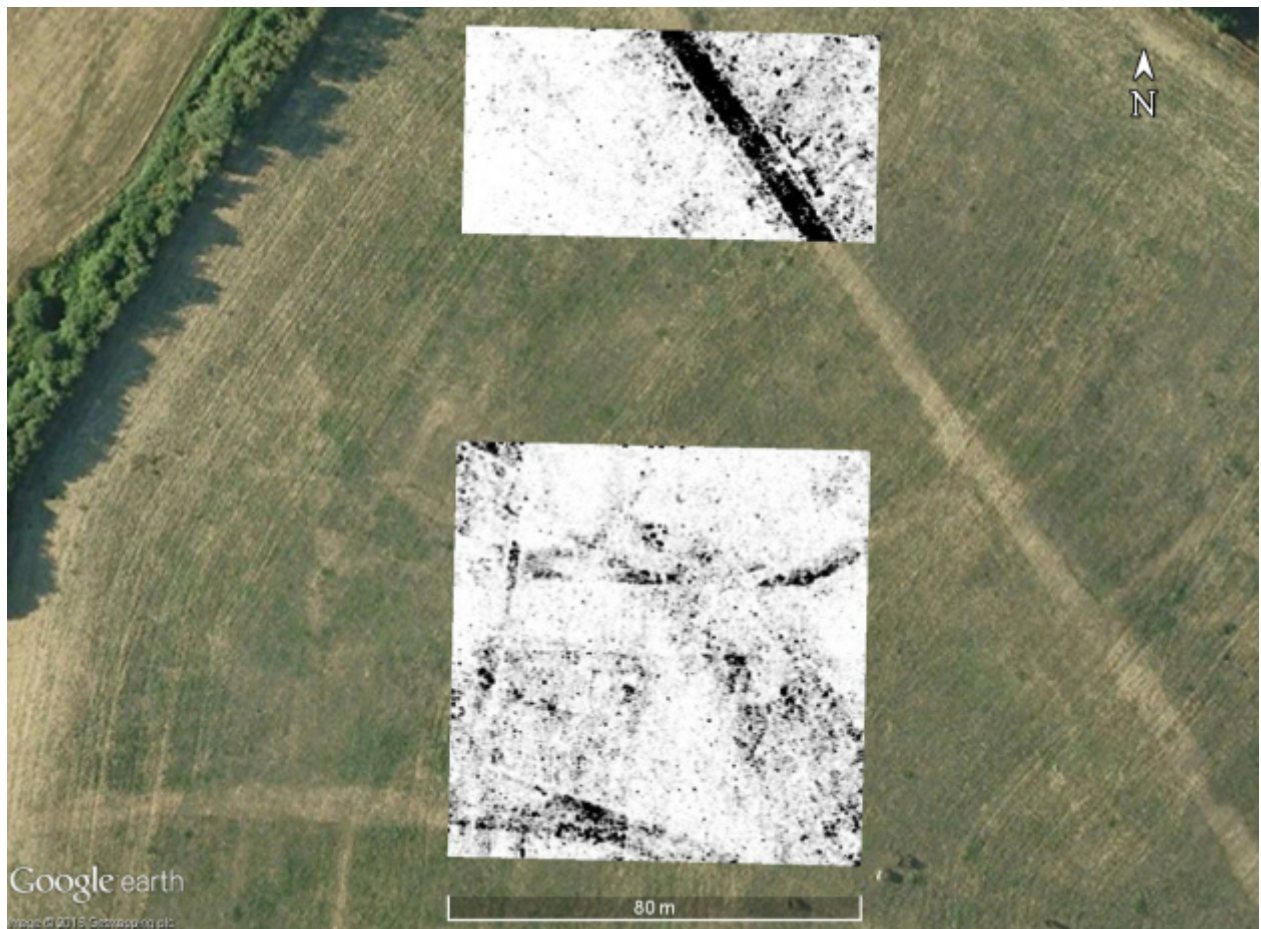


Fig. 8: time slice 4, 13.5-16.5ns.

The fifth slice (16.5–19.5ns) shows more details in the buildings (Fig. 9). In the centre of the lower block is a square feature. This is the Romano-Celtic temple known from aerial photographs. This type of temple, well-known from many sites across the north-western provinces of the Roman Empire consists of two concentric squares, usually reconstructed as an inner sanctum and an outer ambulatory. The two roads to the north and south of the temple appear to mark the edges of the *temenos* or sacred precinct. There is a hint of a possibly paved area to the west of the temple, and a solid feature between the internal and external walls to the east. In the northern block there are hints of the walls on either side of the road as seen in the magnetometry data.

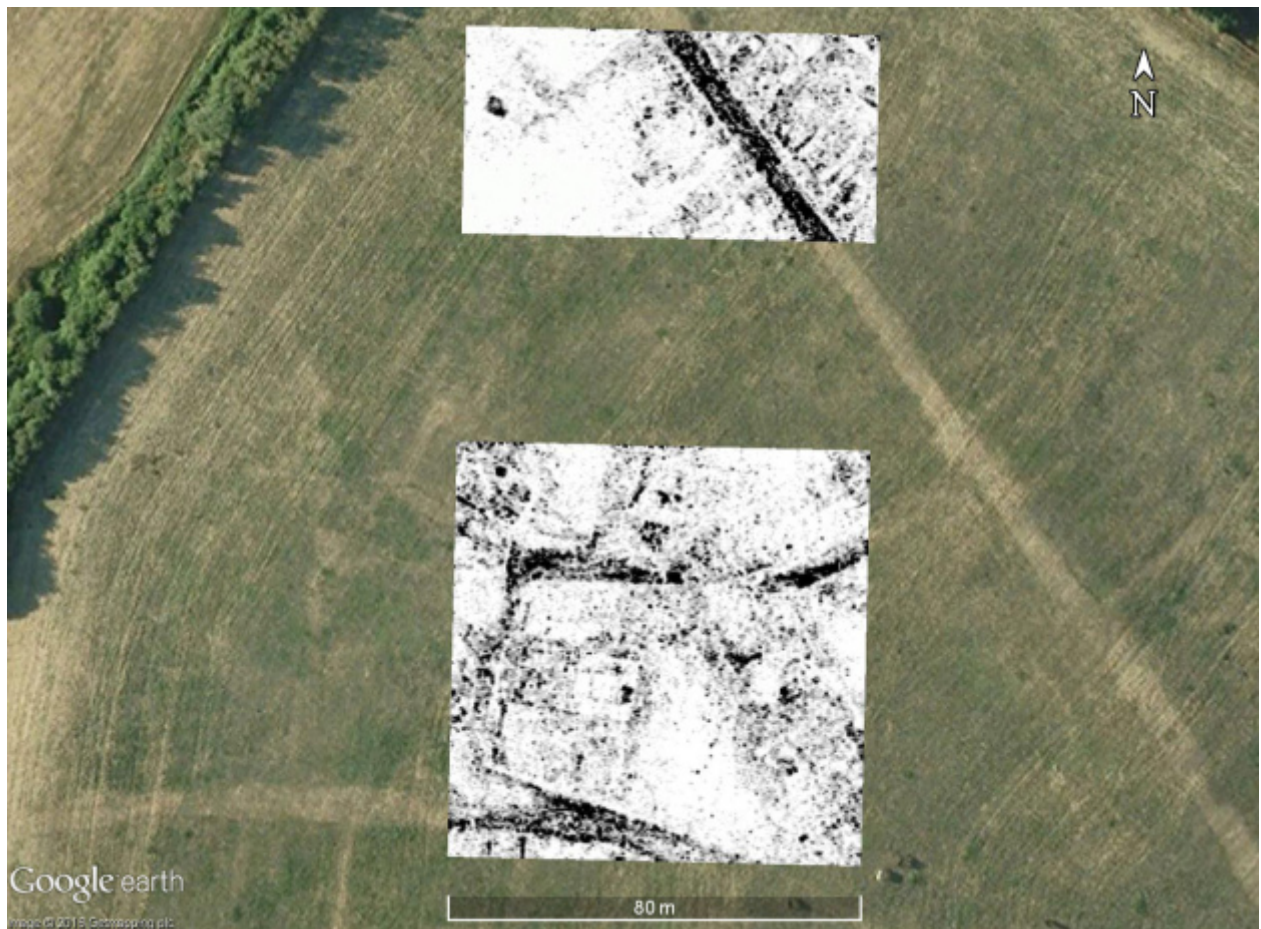


Fig. 9: time slice 5, 16.5-19.5ns.

In the sixth time slice (19.5–22.5ns) we can start to see some of the buildings along Ermine Street not, as I had expected, as black ‘high amplitude’ features shown in black *i.e.*, stone walls, but as low amplitude features, *i.e.*, areas which have fewer items that would reflect radar waves (Fig. 10). This may indicate that the stone foundations have been robbed, but we know little about the construction techniques used in Durobrivae. Part of the difficulty is that Ermine Street is on a marked bank which means the radar has a greater depth of deposits to penetrate.

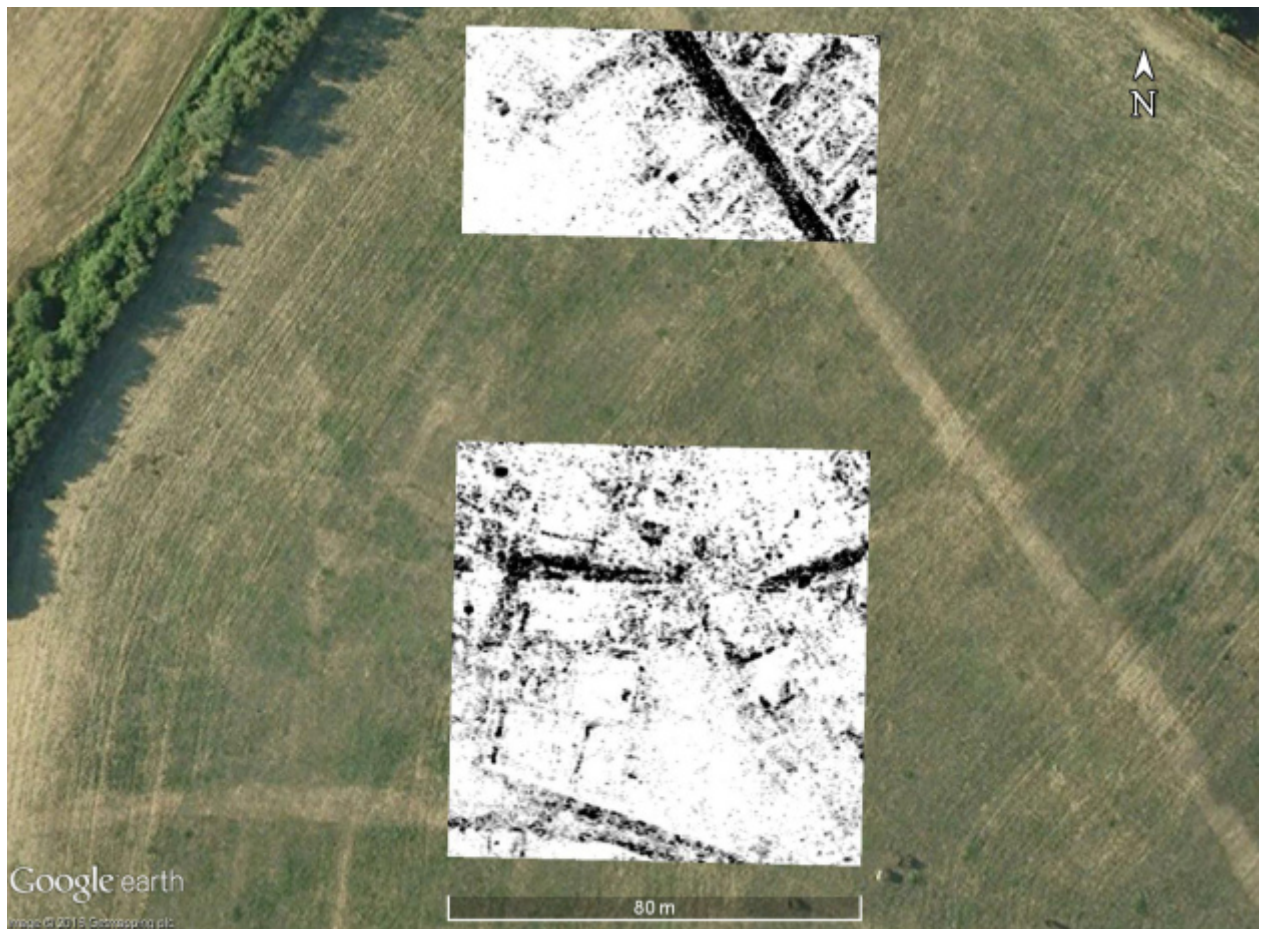


Fig. 10: time slice 6, 19.5-22.5ns.

In the seventh and eighth time slices (22.5–25.5ns, 25.5–28.5ns), the GPR radar waves were starting to attenuate and we were getting quite faint reflections, *but* some of the deeper foundations show in these lower time slices (Figs. 11–12). For example, some of the buildings along Ermine Street start to show very well in Fig. 11, and the outer wall of the Romano-Celtic temple shows very well in Fig. 12.

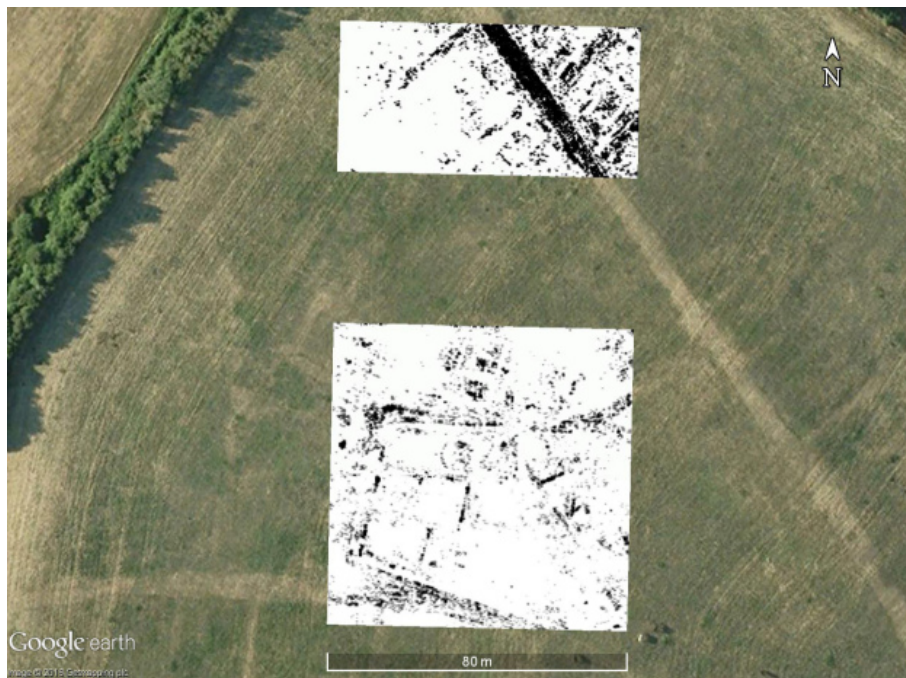


Fig. 11: time slice 6, 22.5-25.5ns.



Fig. 12: time slice 6, 25.5-28.5ns.

There is a great deal more which can be extracted from the GPR data, especially by looking at the radargrams (the vertical slices) and comparing them to the time slices. The results are quite complex, but there is a great deal going on in the data which will take a bit of work to tease out all the details.

As well as the magnetometry and radar surveys, we undertook a resistance survey using UCL's new RM85 meter (Fig. 13). We took readings every 50cm

and managed to survey an area 60x by 80m which had also been surveyed using the GPR and the magnetometer.



Fig. 13: Richard Cushing and Dr. Stephen Upex working on the resistance survey.

The result of this survey was quite surprising (Fig. 14).

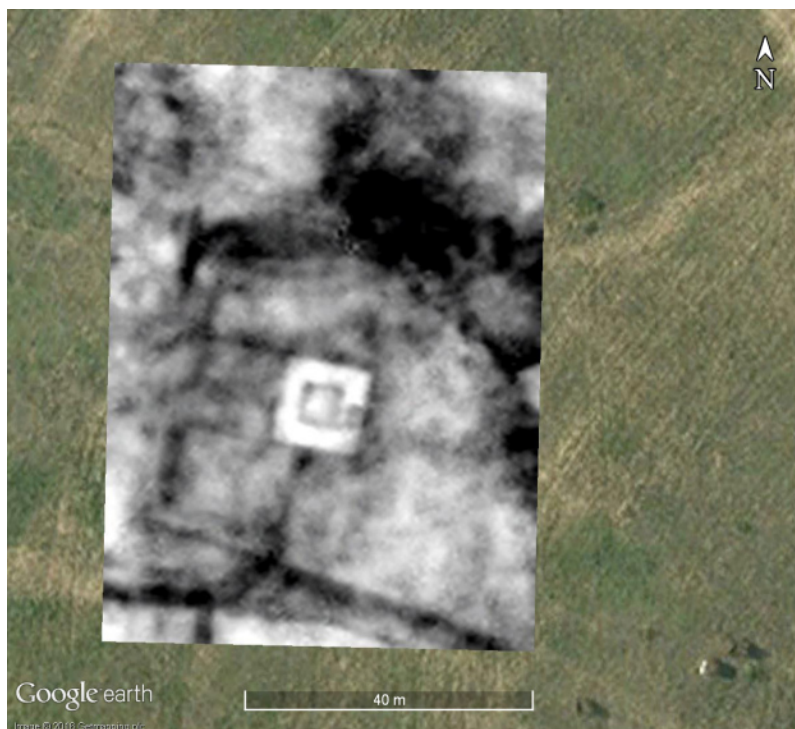


Fig. 14: the earth resistance survey.

The square within a square is the plan of the Romano-Celtic temple which could not have been more obvious. The small room on the eastern side, partially seen in the GPR survey, shows clearly and the *temenos* is also quite clear. This is a spectacular result, but one that raises a question. Why is the inside of the temple showing such low resistance? Normally, low resistance like this is related to water retention. Is the outer wall of the temple causing water to pool within the wall? It is useful to compare the three surveys (Fig. 15) and it will take a bit of work to draw-up a composite interpretation plan.

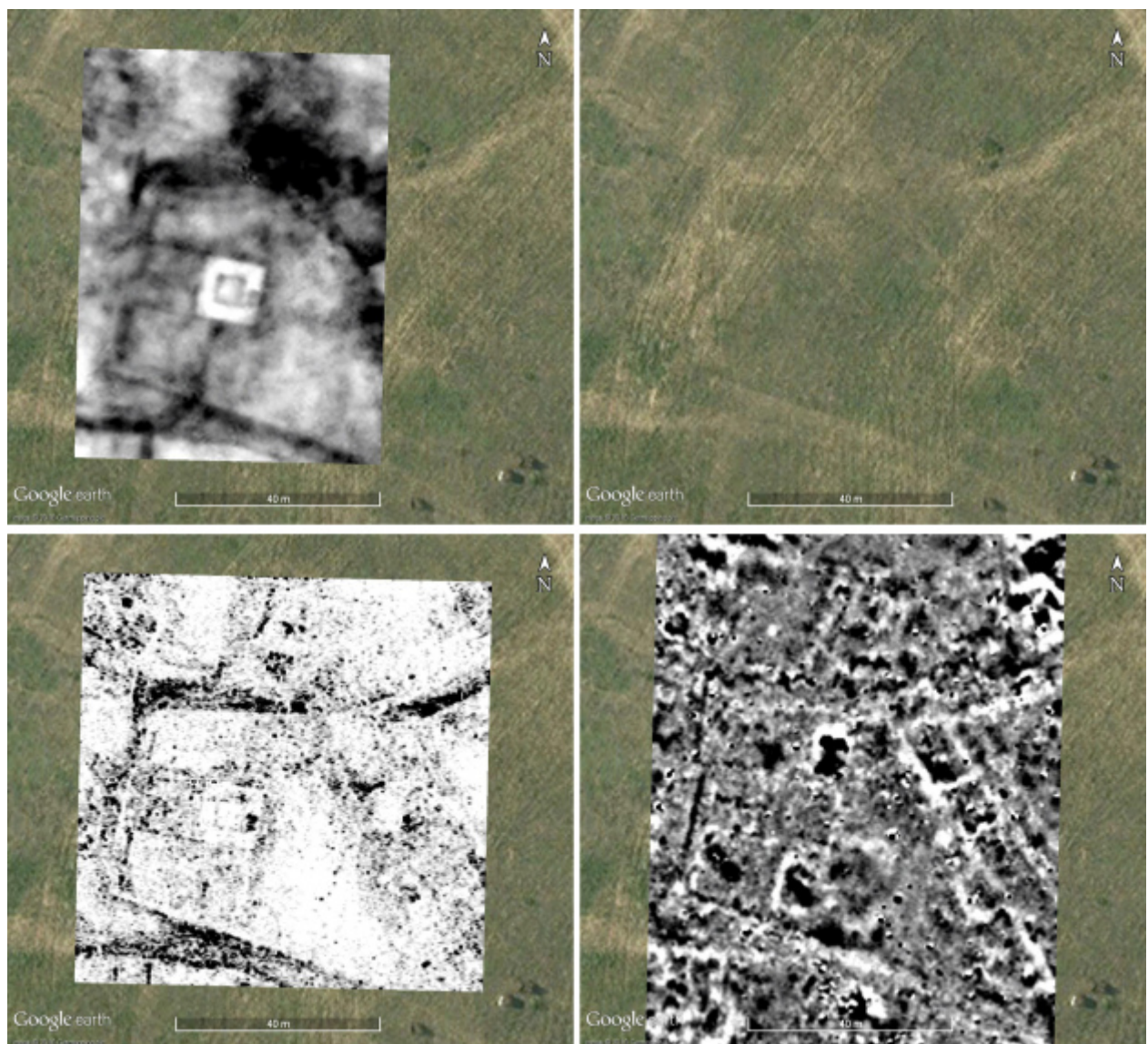


Fig. 15: comparing the three survey techniques and the parch marks in the area of the temple.

The plan now is to consider these results and plan for more work within the town area with the ultimate aim of producing a complete plan of the Roman town based on geophysical survey results.