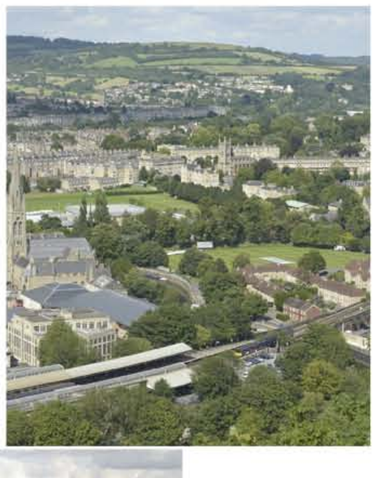
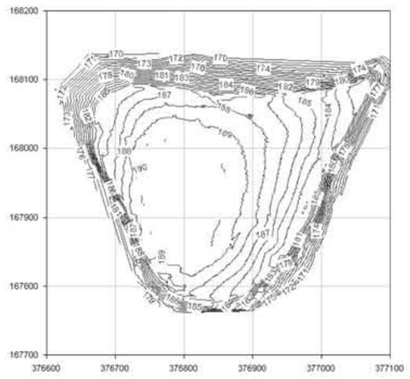
Geophysics on Solsbury Hill

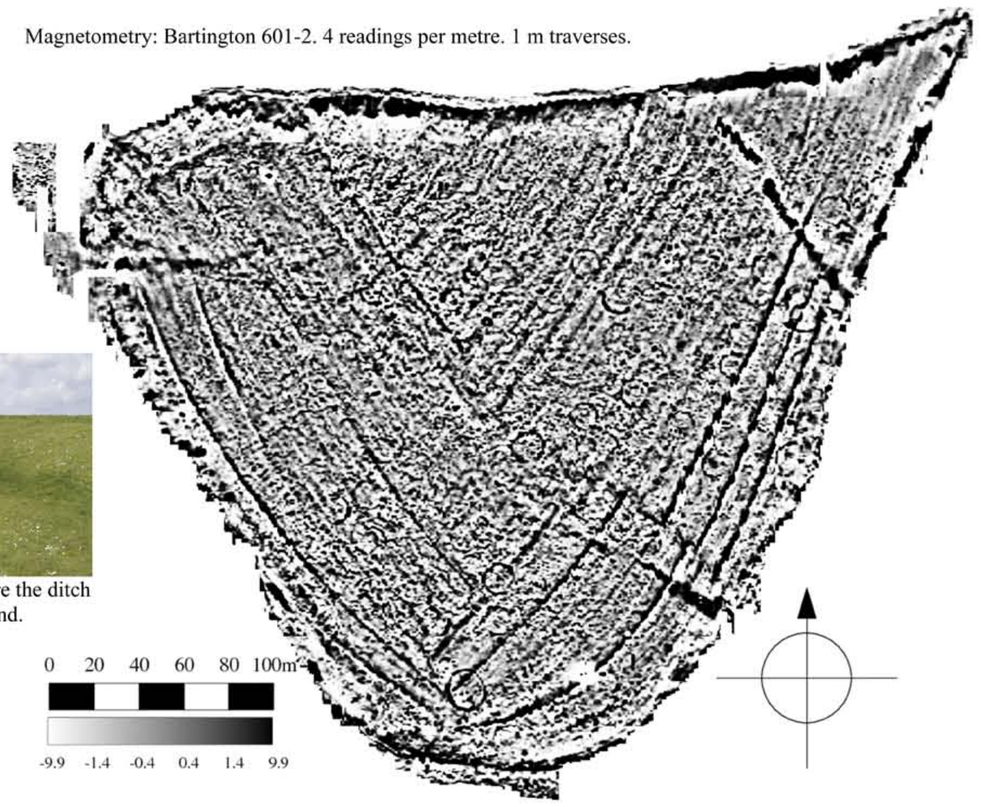
John Oswin and Rick Buettner
Bath and Camerton Archaeological Society





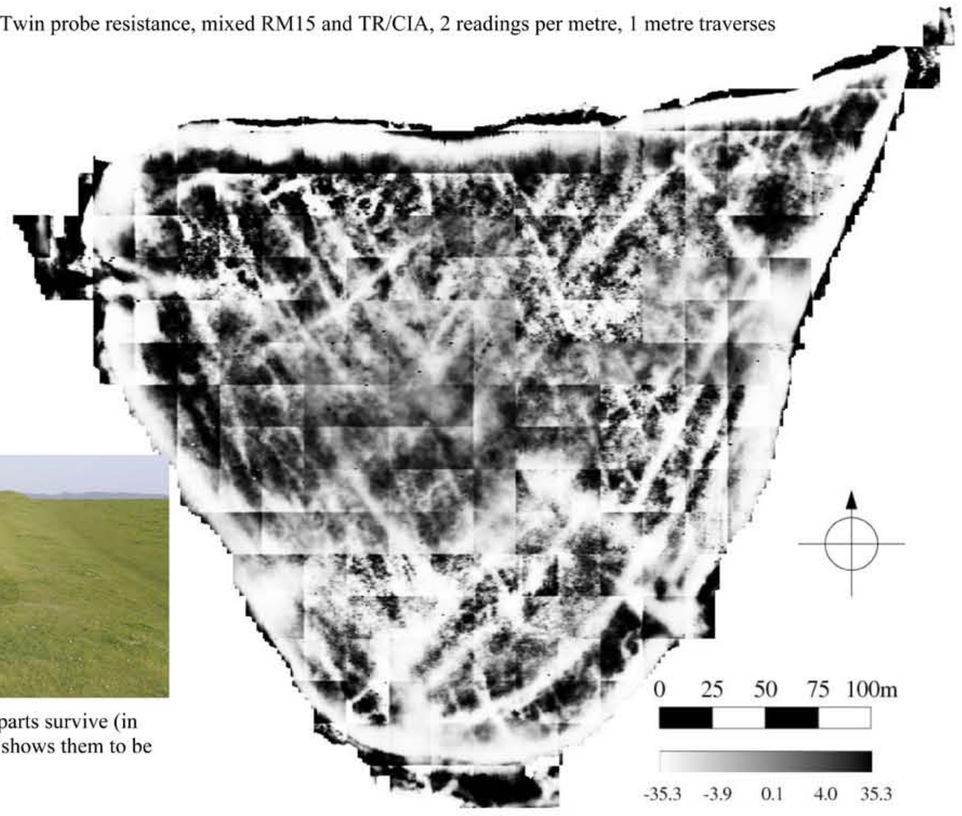
High definition contour plot provided by Chris Ellis of Wessex Archaeology

Magnetometry: Bartington 601-2. 4 readings per metre. 1 m traverses.



Inset: the only place where the ditch is still visible on the ground.

Twin probe resistance, mixed RM15 and TR/CIA, 2 readings per metre, 1 metre traverses



Inset: Where the ramparts survive (in the north), resistance shows them to be very stony.

We would like to express our thanks to Martin Papworth of the National Trust, and the Freeholders of Batheaston for allowing us to carry out this survey. It was carried out under English Heritage section 42 licence number SL00022677, set up with assistance from Richard Sermon, archaeological officer for Bath and North East Somerset.
Thank you to those Bath and Camerton Archaeological Society volunteers who have helped, using their equipment, and a particular thank you to Wessex Archaeology and Chris Ellis for the GPS survey.

The views above and below show quadrants of the panoramas from the ramparts.
They are: Top left: South-east Top right: South-west
Bottom left: North-east Bottom right: North-west

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Setting

Solsbury Hill lies just to the north-east of Bath, in the parish of Batheaston. The hill is triangular in shape and rises to just under 200 m OD, and commands the Avon valley westwards through Bath and southwards towards Westbury. In spite of its imposing aspect, it is lower than the surrounding hills and this protects it from the worst of the weather. Although the hill appears flat – topped from below, it is in fact dome – shaped, so there is no visibility from side to side, and the view from the top does not extend into the surrounding valleys.

Its geology is a chalky limestone of the Oolite series overlying Fullers Earth. There are a number of springs a little way below the top, and this makes for geological instability. The rampart on the eastern side has slumped. On the western side, quarrying has removed the rampart. The hilltop soil now appears to be very thin.

The hilltop was arable strip fields until the twentieth century. The hilltop is now the property of the National Trust. It is an open recreational area, much frequented by dog walkers, and is also used for summer cattle grazing.

The Survey

The survey was set up by a member of the Bath and Camerton Archaeological Society, using their equipment, and has been entirely unfunded. The magnetometer survey was completed rapidly in April 2012. The resistance survey was only partially complete by the end of April and was finished on 31st October. The area surveyed was about 11 ha, comprising some 250 grid squares of 20 m, going as close to the edge of the steep slopes as was safe.

Magnetometer

The magnetometer survey is shown opposite. The area was very lively. Indeed, one of the greatest problems was finding a spot quiet enough to use for calibration! The most obvious features are the mediaeval/ post-mediaeval plough lines and stone lynchets, but they do not obscure the underlying details.

The ditch around the inside of the rampart is a prominent feature. Excavations in the 1950s within the ditch in the north-west area showed traces of houses and of burning. Presumably, hillwash from the ploughed area has filled the ditch as it is only visible as a feature on the ground for a short length at the extreme south of the monument (shown inset opposite). Much of the rampart has slumped or been quarried, so the ditch now extends over the steep sides.

A number of circles, presumed to be drip-gullies of round houses are visible across the hilltop. Ditches seem to spread out from the main entrance in the north-west area. This also appears to be happen at the south-east entrance, and these ditches lead to a prominent round house. The south-east entrance is very steep, and was thought to be modern, but may now be seen as part of the original layout.

The north-east corner seems to form an enclave, separated from the main area by a ditch not visible on the surface. The ditch is broken by central and side entrances. Within the enclave, there appear to be clusters of small pits, possibly for posts carrying raised structures.

Magnetic Susceptibility

A Bartington MS2 (100 mm coil) was taken on a random walk, with locations recorded by hand-held GPS. This was sufficient for plotting over the entire hilltop area, including areas beyond the ramparts. Readings, amounting to some 1000 in all were taken every 10 m or so, with more taken if there were large changes. The plot is shown below.

Areas of high readings generally match those of the greater prehistoric activity seen in the magnetometry plot. The inner ditch appears to be very high susceptibility. Readings appeared to be lower in the north-east enclave, possibly because its ditch trapped much of the migrating soil. Readings also were generally lower beyond the ramparts.

The patch of high readings on the north-west edge is where the ditch had become exposed in a quarry. A section was exposed here in 1931 and is shown below.

Twin-Probe Resistance

The complete plot of the resistance is shown left. This survey started in April 2012, at the same time as the magnetometer, but only about 100 grids were completed in that month even using 2 devices (kept well separated). The survey restarted in September and took until the end of October to complete.

Use of RM15 and TR/CIA was problematical as one downloads parallel data, the other zig-zag, but this could be accomplished using INSITE.

Some of the grid squares opposite do not match contrast well with those next to them. These were the grids surveyed in early September, during one of the few dry periods of the year.

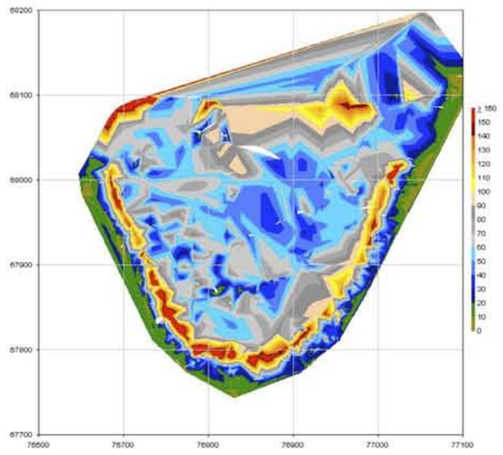
The plot opposite shows high resistance as dark. A number of colour schemes are being tried to see which best presents the data

Most of the features visible in magnetometry as dark appear in the resistance plot as light. The mediaeval field systems are less obvious in resistance, and this helps other features to be more visible.

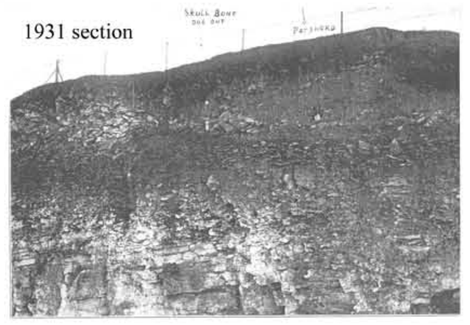
Some of the round houses are visible, but not all: The large circular feature towards the south does not show in resistance, but the inner ditch and the north-east cordon ditch are clearly visible.

Where they still exist, particularly along the northern edge, the ramparts show as very stony, strong responses.

Random Magnetic Susceptibility MS2



1931 section



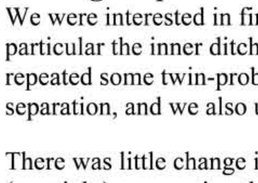
Delving deeper

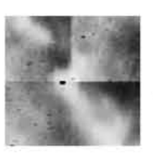
We were interested in finding more about the deep features, in particular the inner ditch and the north-east cordon ditch. We repeated some twin-probe resistance grid squares using 1 m probe separation, and we also used radar (MALA X3M, 250 MHz).

There was little change in the resistance patterns on the cordon ditch (see right), suggesting the ditch was deeper than a metre. The black spot in the northern terminus of the south ditch was not a mis-reading, but a distinctive mediaeval boundary stone (shown right).

For radar, a wave speed of 0.8 m/ns was assumed, but not measured. The depth slice shown right is at 2.5 m nominal depth, showing the ditch to be still present.

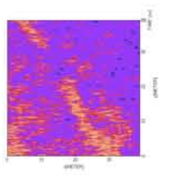
Similar work on the inner ditch along the north rampart showed that that ditch appeared to be greater than 1 m deep. In this case, a 20 m stretch of the ditch was between 1.5 and 2 m nominal depth.
The 1.5 m depth slice is shown below.





NE cordon ditch
40 m squares,
north to top.
1 m separation
0.5 m separation

The double boundary stone marks the cordon southern ditch terminus well, but by accident.



NE cordon ditch
40 m square
north to top.
Depth slice at 2.5 m nominal.