Wimpole Estate Outlook Field Report

On 20 May 2007 Archaeology RheeSearch carried out magnetometry and resistivity surveys in the field between the Hall and the Folly on the Wimpole Estate in Cambridgeshire. On 8 June 2008 Wenner array studies were carried out.

Members participating: Brian Bridgland, Pat Davies, Liz Livingstone, Ian Sanderson, Maureen Storey, Tony Storey.

Estate coordinator: Simon Damant.

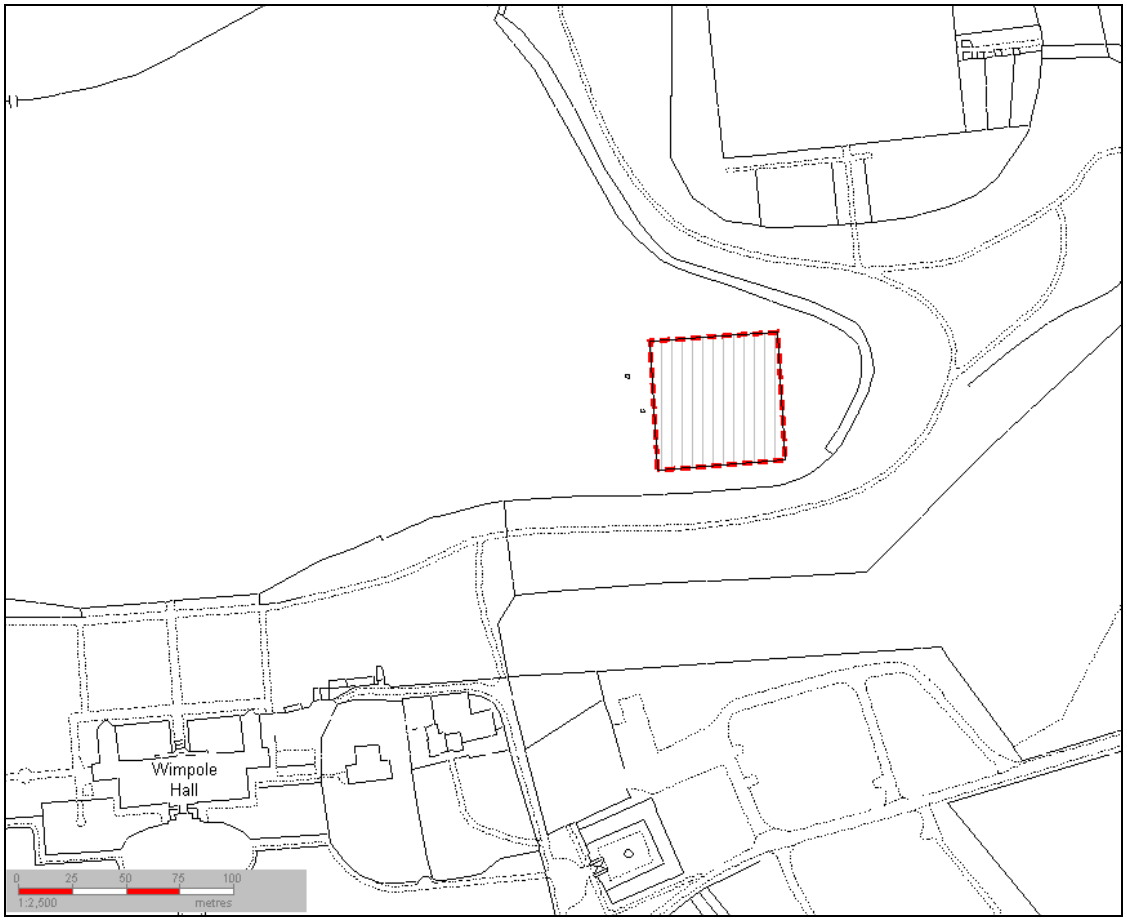
Site conditions: Predominantly low grass, with an area of tussocky grass. Level site bounded by a ha-ha ditch on the south side and mature trees on the east and west sides.

Weather: Warm and sunny. Rain during preceding week.

Equipment: Bartington 601 gradiometer; TRCIA 50cm twin probe; TRCIA Wenner (alpha)

Area covered:		
	Magnetometry	four 30 m × 30 m grids
	Resistivity	one 20 m × 20 m grid
	Wenner	one 15 m @ 0.5 spacing
		one 20 m @ 1m spacing

Location: TL 338512, 300 m NE of Wimpole Hall



Location plan: Wimpole Hall is in the SW corner and the southern portion of the Walled Garden is in the NNE. The survey area outlined in red.

All the images in this report are orientated with grid north towards the top of the page, except the non contextual results. The latter have been rotated 4º east for ease of presentation.

Purpose of survey: To locate accurately a major magnetic anomaly previously identified in the extensive magnetometry survey carried out by Peter Morris of the Cambridge Archaeological Field Group. It has been suggested that the anomaly may be an unexploded bomb, part of a stick of four dropped in November 1941, one of which destroyed part of the Walled Garden, 200 m NNE of the survey area.

Location on the ground:
The primary reference points were: a mature tree, the eastern one of a group of four; and the eastern corners of a post and rail barrier around an immature tree, the eastern one of two. The relevant corners are those of the NW 30 m × 30 m grid from a total 60 m × 60 m survey area.
NW grid corner:

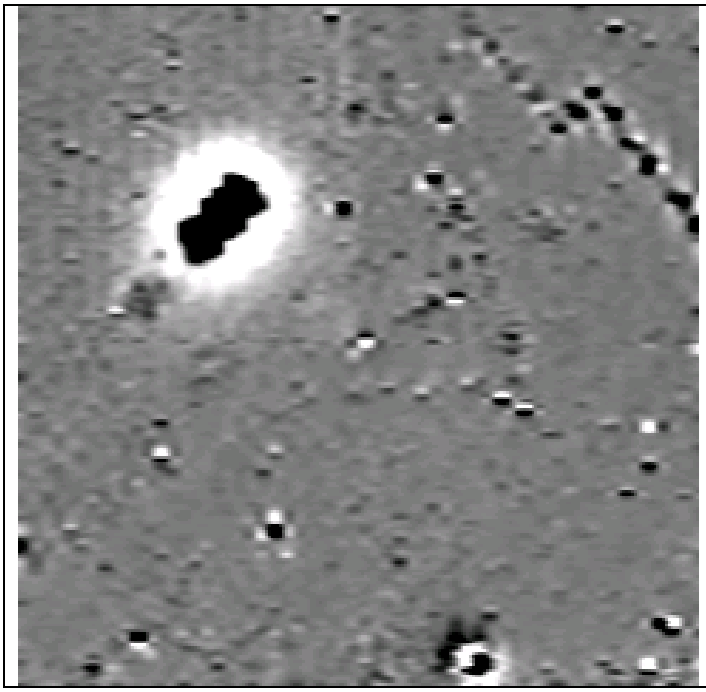
to the SE of the tree enclosure	20.07 m
to the NE of the tree enclosure	18.38 m

SW grid corner:

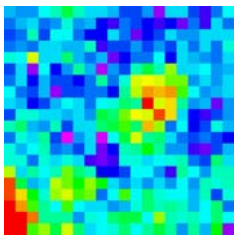
to the SE of the tree enclosure	16.67 m
to the NE of the tree enclosure	17.74 m

The resistivity survey of 20 m × 20 m had its southern edge along the southern edge of the NW magnetometry grid, 5 m from the eastern and western sides and 10 m from the northern side.

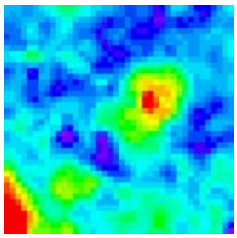
Results:



Magnetometry survey, 60 m × 60 m.



Raw data

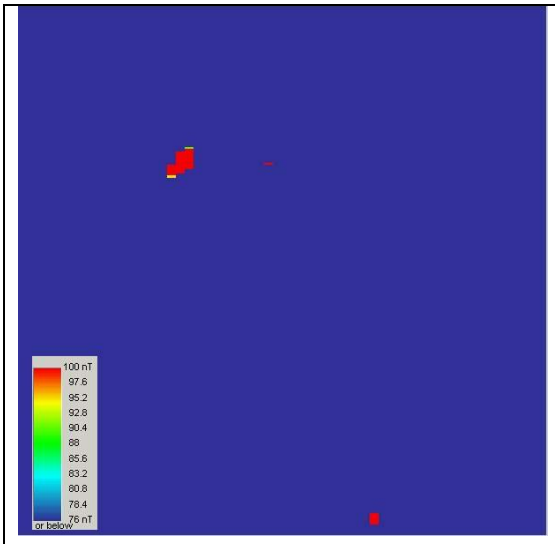


Interpolated

Resistivity survey, 20 m × 20 m.
(Red is high resistance, blue is low.)

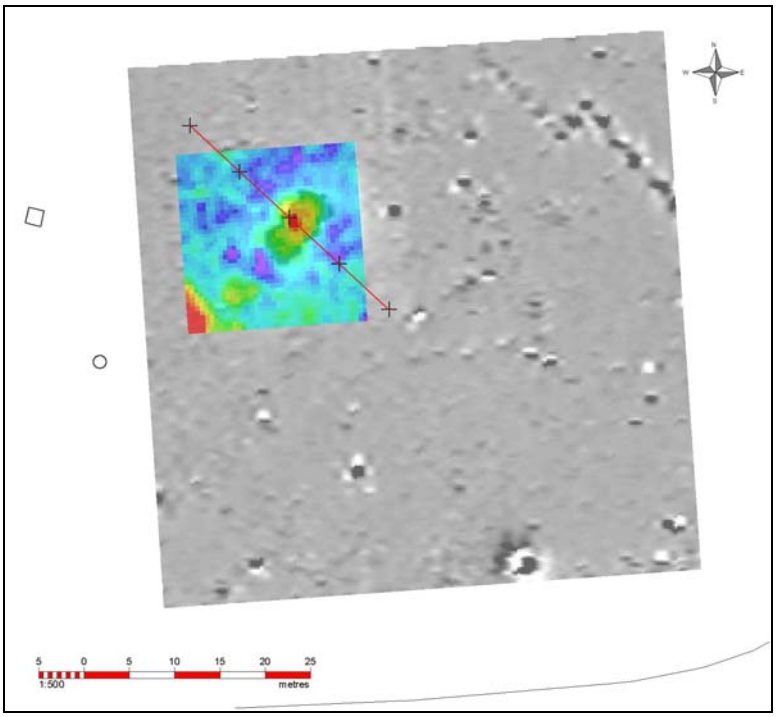
Magnetometry results show a very large area (approximately 8 m × 3.5 m) of strong magnetic signal in the NW quadrant. A plot of the peak signals only (below) shows that the central portion is approximately 4 m × 1.5 m.
Any estimate of size is influenced by the data collection intervals, which were 1 per metre EW and 4 per metre NS.
A linear feature crosses the NE quadrant with two right angle bends which change the course of the line without altering its direction. A strong circular response was detected on the southern edge of the survey area.

Resistivity results show an isolated area of high resistance with gradually decreasing resistance all around. The green area on the image above is approximately 8 m × 5 m. The raw data image suggests a ring of slightly higher resistance around a lower resistance in the centre with a small extension of high resistance to the SW. A larger area of high resistance occurs in the SW corner of the survey area.



Magnetometry data greater than 76 nT

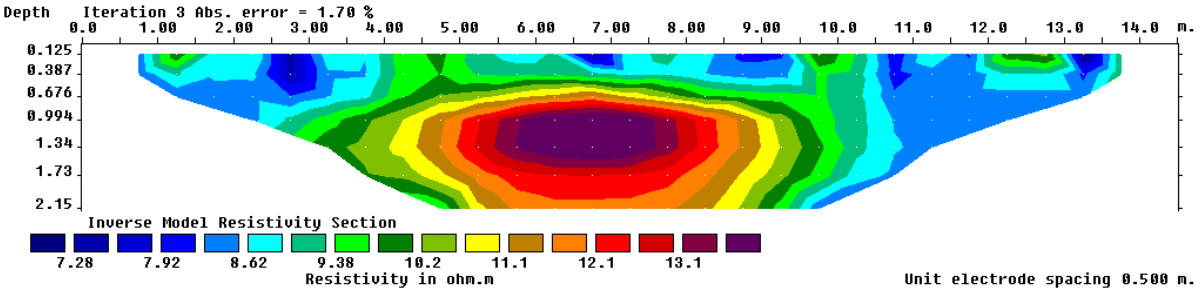
Aerial view of the site.



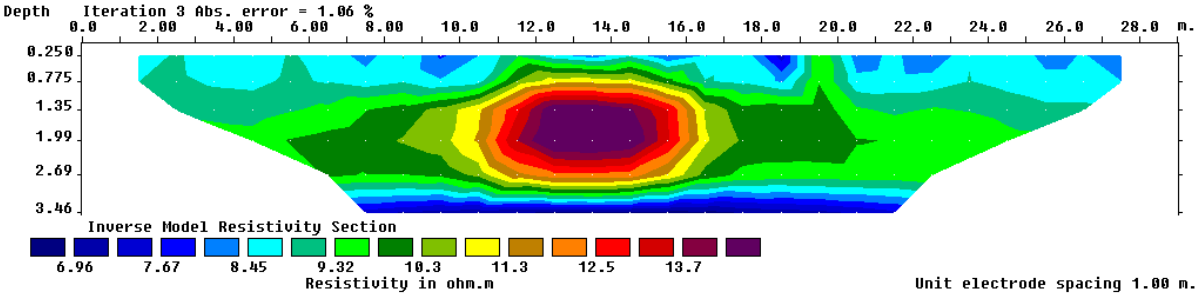
Location of Wenner array determinations with magnetometry and resistivity results superimposed.

Wenner array models.

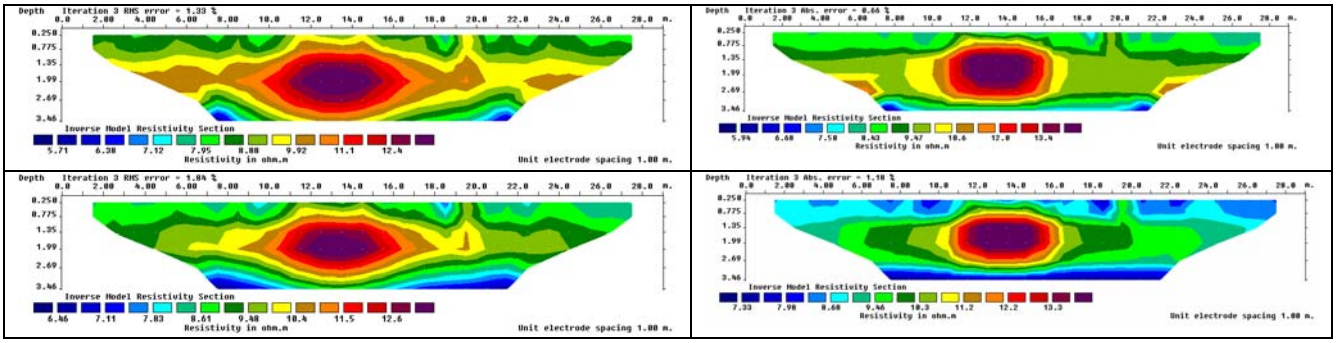
This technique utilises a series of ground resistance measurements along a line with equal but progressively increasing separation between the measurements. The greater the separation between measurement points, the greater the depth of the determination. The actual results are compared with a theoretical homogenous substrate and an image is generated on the basis of any deviations. The results are therefore models derived from the recorded data, and as such may be influenced, as illustrated below, by mathematical parameters which affect any comparisons with an ideal state. The first two images below reflect our best estimate of what is likely to be under the ground. The second and subsequent images illustrate the effect of varying the mathematical parameters with one set of collected data.



Data collection over 15 m with 0.5 m separation



Data collection over 30 m with 1 m separation



Alternative models using data collection over 30 m with 1 m separation

The principal models above have different levels of resolution but both suggest a cavity surrounded by high resistance material. The highest resistivity area starts 0.9 (1.25) m below the surface and is 0.6 (1.0) m in depth with a maximal width of approximately 2.5 (3.5) m. Bracketed figures are from the lower resolution (30 m) data.

Discussion:

The Wenner array data suggest a cavity or concentration of impermeable debris about 1m below ground level. The main magnetic anomaly is consistent with an area of intensely burnt or fired material beneath the surface. The limited horizontal extent of the magnetic and resistivity data suggests that this is not a brick built drain. A significant concentration of ferrous material lying within the detection range of the Wenner array would have produced a much stronger magnetic response than that measured during the survey, thus ruling out a bomb as the source of the anomaly. The most likely explanation is therefore a kiln with a firing chamber about 3 m diameter and 0.7 m tall possibly with a stoke hole to the SW. The difference in resistance measurements across the survey area was small, which is consistent with the Wenner data indicating that the mass is towards the limit of detection of the equipment (0.8 to 1.5 m).
The linear feature may be the foundations of a garden wall containing fired material such as brick. The right angle bends suggest it is not a ditch or drainage channel.
The magnetic signal detected on the southern edge of the survey area suggests a single, but substantial piece of ferrous material.
The area of high resistance in the SW corner of the survey area is probably due to the proximity of a mature tree about 10 m away.

Conclusion:

The geophysical data confirm, and the survey data enable the accurate location, of a major magnetic anomaly first located by Peter Morris. The anomaly is inconsistent with an unexploded bomb and is most likely a kiln. A line of wall foundation was also located.

Ian Sanderson 2008