Church Close, Western Bampfylde
Gradiometer Survey, October 2009

1.0 Introduction

The survey was carried out at Church Close, Western Bampfylde on behalf of the Victoria County History, to investigate the earthworks in the field, thought to be the site of a Deserted Medieval Village.

The field is situated in the centre of the village on the crest of the Western Bampfylde ridge on Lower Lias clay.

The work was carried out by Liz Caldwell and Nigel Harvey of GeoFlo.

1.1 Equipment

Fluxgate gradiometer – Bartington Grad 601-2

The Bartington Grad 601-2 is a dual system gradiometer, a form of magnetometer. It comprises two sensor rods carried on a rigid frame, each sensor including two fluxgates aligned at 90° to each other, one set 1m above the other. It measures variations in the magnetic field between the two fluxgates, recorded in *nanoTesla* (nT) at each sampling point within a grid. The manufacturer claims a depth range of approximately three metres. The instrument is most effective when carried at a consistent height, not exceeding 0.3m above the ground.

Magnetometers are especially effective for discovering thoroughly decayed organic materials, such as those which accumulate in ditches and pits, and matter exposed to intensive firing, including industrial areas, hearths and larger ceramics. All of these are likely to give a positive magnetic response, sometimes with a negative halo, giving a dipolar effect. Non-igneous stone features, such as walls and banks, are usually perceived as negative anomalies against a background enhanced by decayed organics.

Software – Geoscan Geoplot 3.00p

Geoplot 3.00p allows the presentation of data in four graphical forms: dot-density, grey scale, pattern and X-Y (or *trace*) plots. The latter are particularly effective when used in conjunction with other graphical modes to emphasise ferrous magnetic anomalies or other distortions which show as accentuated peaks or troughs. The programme supports statistical analysis and filtering of the data.

1.2 Field method

The area covered by the survey was divided into 20m squares orientated according to the Ordnance Survey grid (Fig 1). Readings were logged at 0.25m intervals along east-west traverses set 1m apart, in a zig zag pattern.

1.3 Processing method

Preliminary processing revealed some impact from modern ferrous magnetic features, characterised by sharp dipolar fluctuations ranging from approximately 15nT to over 3000nT.

1) Readings exceeding 30nT either side of 0 were replaced by null (dummy) entries.
2) Any anomalous isolated readings were similarly replaced.
3) Typical regular error due to the zig zag operation of the gradiometer was removed.
4) The mean reading for all grids was reset to 0
5) The mean reading for every traverse was reset to 0, with altered parameters for the grids where anomalies lying parallel with the line of traverse would have been adversely affected by the process.
6) The asymmetric data collection pattern was mitigated by the positive interpolation of data points along the Y axis using the calculation of sinX/X.

2.0 The survey area

The grid comprises 28 contiguous whole and partial squares covering the whole of the field (Fig 1). It was bounded by a hedge with wire fence and the stone wall of the church yard to the north, a wooden and wire fence to the east, and wire fencing and hedges to the south and west.

Visible ferrous magnetic disturbance was provided by a disused pump near to the north west corner (**V** Fig 6), a manhole cover near the corner where the field extends to the south (**W** Fig 6), metal gates into the field (**X** and **Y** Fig 6), and wire fencing along the hedges.

2.1 Results (Figs 2- 7)

Results of magnetometry surveys of Deserted Medieval Village sites can be variable, as buildings are most likely have been constructed from materials such as timber and clay and so provide insufficient contrast with the background geology. The presence of earthworks can also mask any underlying archaeological anomalies. Although some of the anomalies are directly related to the visible earthworks, the results do not always reflect what can be seen above ground. An earthwork survey is strongly recommended to assess the correlation between the two.

The survey results reveal a series of linears generally orientated from north to south and from east to west. Whilst some of the negative linear anomalies are dipolar responses associated with the positives, reversal of the shading (Fig 3) demonstrates that some reflect the presence of anomalies which are negative in their own right.

The overall results reveal a considerable amount of disturbance probably reflecting multiple phase occupation of the site. Although some of the anomalies could be due to modern ferrous disturbance (a public footpath runs roughly north-south across the centre of the field), it is more likely that they indicate archaeological features reflecting human occupation of the site, such as rubbish pits and hearths containing thermo remanent material or occupation debris indicative of anthropogenic activity. These anomalies generally range between 2 and 7nT, but some have a stronger magnetic signature, occasionally exceeding 20nT, which is within the range for significant thermo remanent features (eg hearths, kilns), or ferrous magnetic

disturbance. These have been highlighted separately (fig 7) in order to maintain clarity in the overall interpretation graphic (fig 6).

Major ferrous magnetic anomaly **Z** is most likely associated with a field drainage system as it aligns with a grid in the road beside the hedge to the south.

2.1(i) Positive anomalies

1 Two parallel linears with widely divergent magnetic characters. The east linear is generally within a range of 2 to 6nT. The west linear, particularly at its north end, is characterised by a range from 5 to 12 nT and exceeding 20nT in places, indicating either ferrous magnetic disturbance or strongly thermo remanent local deposit. Possibly associated with field drainage (see **2** below) or with the disused pump represented by ferrous magnetic anomaly **V**.

2 Small linear abutting the west side of **1**, with readings generally ranging from 10 to 26nT. Most likely due to ferrous magnetic disturbance, as the anomaly runs directly towards a grid in the road beside the western hedge, and is likely to be associated with field drainage.

3 Curvilinear anomaly within a range of 4 to 10nT. Within normal range for a ditch incorporating thermo remanent residues.

4 Small curvilinear anomaly within a range of 3.5 to 5nT. Within normal range for a ditch. Possible small enclosure associated with linears **13** and/or **14**.

5 East-west linear with possible return to the south at its western end. Within a range of 1.5 to 4.5nT but much weaker as it turns to the south. Within normal range for a ditch. Possibly associated with **6** forming part of a rectilinear enclosure, but is more likely to be part of the field drainage system (see **15** and **22** below).

6 Curvilinear anomaly within a range of 2 to 6nT. Within normal range for a ditch and lower range thermo remanence. Possible bedding trench or drip gully for circular structure. A linear anomaly along the east side suggests some association with **5**, possibly forming part of a rectilinear enclosure, but the relationship between the two is uncertain.

7 Linear running southeast-northwest, within a range of 2 to 4.5nT. Within normal range for a ditch. Possible association with negative anomaly **h**.

8 North-south linear abutting ferrous magnetic anomaly **Z**. Generally within range of 2.5 to 10nT, which is within normal range for a ditch but with readings as high as 25nT at each end suggesting ferrous magnetic disturbance or higher range thermo remanence. Possibly associated with field drainage system. Alignment also suggests a possible continuation to the north (but see **9** below).

9 Linear anomaly within a range of 2 to 3nT, rising to 8.5nT in the middle. Within normal range for a ditch with thermo remanent local deposit. Possible continuation of **8**, although the divergent magnetic character of the two linears would suggest otherwise.

10 Two contiguous linears within a range of 2 to 4nT, rising to 10nT where they intersect. Within normal range for ditches with thermo remanent deposit. Possibly part of a small enclosure.

11 Intermittent east-west linear generally within a range of 3 to 7nT. Within normal range for a ditch.

12 Slightly diffuse linear anomaly generally within a range of 1 to 5nT but exceeding 10nT towards the southern end. Within normal range for a ditch incorporating thermo remanent deposit. This anomaly is particularly apparent in the unprocessed data (fig 4) but tends to become indistinct after processing sequences designed to smooth and enhance the data have been applied.

13 & 14 Two parallel intermittent east-west linears within a range of 2.5 to 5nT. Initial appearance is suggestive of ridge and furrow, but the readings are more typical for ditches. Possible association with **4**.

15 East-west linear within a range of 3.5 to 12nT. Within range for a ditch incorporating thermo remanent residues. Alignment suggests association with **5** and **22** (see below).

16 & 17 Two short parallel linears abutting **15**, within a range of 4 to 9.5nT. Within normal range for ditches incorporating thermo remanent residues, or possible ferrous magnetic interference. The west linear would appear to abut **Z** at its south end suggesting a possible connection with the field drainage system. There is a possible continuation of the east linear to the north (see **18**).

18 Short linear abutting **14** within a range of 1.5 to 4nT. Aligns with **17** but the significantly different magnetic signature suggests otherwise.

19 Amorphous anomaly within a range of 2 to 6nT, although rising to above 10nT at the northern end and considerably higher at the south, suggesting strong thermo remanent deposits or ferrous magnetic interference. The latter seems more likely to the south due to its proximity to a gateway into the field.

The anomaly corresponds with the location of a noticeable bank in the field's earthworks, situated to the east of a north-south linear depression which appears to correspond with negative linear **f**. The positive signature of anomaly **19** could be due to organic material being cleared from the field entrance and possible trackway (see **f** below) and redeposited onto the bank.

20 Intermittent north-south linear generally within a range of 4 to 8nT but readings exceed 20nT towards the north end. Within normal range for a ditch with strong thermo remanent deposit or ferrous magnetic interference.

21 East-west linear within a range of 2.5 to 7nT. Within normal range for a ditch.

22 Linear anomaly within a range of 3 to 8.5nT. Within normal range for a ditch incorporating thermo remanent residues. Abutted by negative linear anomalies **k** and **l**. Alignment suggests association with **5** and **15** and also with ferrous magnetic anomaly **Z**, and is likely to be associated with field drainage.

23 Slightly diffuse linear with possible return to the south. Within a range of 3 to 5nT but rising to 11nT north where it turns a corner. Within normal range for a ditch or gully with thermo remanent local deposit.

24 - 27 Amorphous linear anomalies to either side of negative linear **a**. Within a range of 3 to 10nT. These anomalies correspond with the location of substantial banks on either side of a clearly defined ditch in the field's earthworks. It is more

usual to see banks represented by negative anomalies, but the positive signature of these anomalies could be due to material being cleared from **a** and redeposited onto the banks (compare **19** above).

28 Narrow linear anomaly with a return to the southeast, within a range of 2.5 to 4.5nT. Within normal range for a small ditch or gully. Possible association with **29**.

29 Small linear within a range of 2 to 5nT. Within normal range for a gully. Possible continuation of **28**.

30 Short linear within a range of 4 to 9nT. Within normal range for a ditch or gully with thermo remanent residues or ferrous magnetic deposit. Alignment suggests an association with **20**.

31 Curvilinear anomaly generally within a range of 2 to 5nT but peaking to above 10nT in places. Within the higher range for thermo remanence or ferrous magnetic debris. Within normal range for a ditch. Possible bedding trench or drip gully for circular structure. Anomaly is particularly apparent in the unprocessed data (fig 4) but tends to become indistinct after processing sequences designed to smooth and enhance the data have been applied.

Note: The survey results in this area (surrounding **31** and south of negative anomaly **a**), reveal a series of amorphous anomalies generally ranging from 2 to 7nT, indicative of disturbed ground caused by the presence of a former orchard.

2.1(ii) Negative anomalies

a Strong curvilinear anomaly within a range of –3 to –8nT. Corresponds with a clearly defined trackway or ditch in the field's earthworks. The strong negative signature suggests stones/rubble deposited onto the track or into the ditch. The alignment of this anomaly with the current road could be significant. The road may have previously continued to the east of its current location before turning south. There is a clear association in the field's earthworks between this anomaly and the banks represented by **24 – 27** above.

b - d Intermittent linear trend running west-northeast across the field, within a range of -1.5 to –5.5nT. Within normal range for a stone filled ditch or track. The west end of **b** aligns with what appears in the earthworks to be a hollow way and former entrance into the field. The northeast end of **d** leads to a gate in the church yard wall opposite the church door.

e Amorphous anomalies within a range of –2 to –4nT. Does not appear to be a dipolar response, and is suggestive of an area of non-magnetic stone or building rubble.

f Linear anomaly within a range of –1.2 t0 –4.5nT. Within normal range for a stone filled ditch or track. Corresponds with a depression/track in the earthworks running north into the field from a gate in the southern hedge. (See **19** above)

g Short north-south linear anomaly within a range of –2 to –4.5nT. Within normal range for a stone/rubble filled ditch or track. Its alignment suggests an association with **f**.

h Weak, indistinct linear within a range of –2 to –4.5nT. Within the range for a stone filled ditch. Possible non-ferrous pipeline, however linear is only evident with a less

severe clipping of the results and would appear to underlie other anomalies (see fig 5). Aligns with southeast end of linear **7**.

i Diffuse linear within a range of –3 to –11nT. Corresponds with the location of a bank in the earthworks. Readings suggest significant stone composition or underlying deposit.

j Short, irregular linear within a range of –1.5 to –3.5nT. Within range for a stone wall or stone filled ditch or gully**.** Alignment suggests a possible association with **n**.

k & l Narrow linears abutting **22** within a range of –3 to –7nT. Within normal range for stone walls or stone filled ditches or gullies. Possibly non-ferrous pipelines associated with field drainage. **j** would appear to continue towards a manhole cover represented by modern ferrous anomaly **W**.

m Amorphous anomaly within a range of –3.5 to -10nT. Consistent with deposit of non-magnetic stone or stone filled pit.

n Rectilinear anomaly with widely diverging magnetic signature. The northwest end is within a range of –8.5 to –15.5nT, but to the southeast drops to –2 to –5nT. Possible stone structure, however the alignment and character of the northeast side of the anomaly suggests that it could be a continuation of linear **j**. This is particularly evident in the unprocessed data (fig 4).

3.0 Conclusion

The degree of confidence in the identified anomalies is generally very high. There are demonstrable archaeological features representing at least three phases of activity.

Most immediately obvious are the east-west linears, with what appear to be associated anomalies on a northnorthwest-southsoutheast alignment. Major negative anomaly **a** also seems to respect this general alignment. There would appear to be, however, a second phase of activity on this same alignment associated with field drainage. Highlighting of the stronger magnetic anomalies (fig 5) helps to distinguish between these two phases.

There is some evidence for a third, underlying pattern orientated northeast-southwest, demonstrated by linears **h** and **7**.

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