SURVEY RESULTS

2005 / 56 Brimham Hall Farm
Hartwith, Harrogate

1. Survey Area

1.1 Several locations on Brimham Hall farm were investigated using a combination of resistance survey (Geoscan RM15 resistance meter), Ground Penetrating Radar (Pulse EKKO 1000 GPR unit with a 225MHz frequency antenna) and magnetic survey (Bartington Grad 601-2 fluxgate gradiometer). Figure 1 shows the location of the survey areas at a scale of 1:2000.

1.2 The survey grid was set out by **Dr Henry Chapman** and tied in to the Ordnance Survey grid using a Trimble real time differential GPS system.

2. Display

2.1 For the purpose of display and discussion each survey area has been allocated an area number. The resistance and gradiometer results are displayed as greyscale images, Figures 2 and 4, and this display format is discussed in the *Technical Information* section, at the end of the text.

2.2 Figure 3 and 5 are summary interpretation of the resistance and gradiometer survey results at a scale of 1:1500. Figures 6 to 10 show selected GPR data and relevant interpretation diagrams at various scales for ease of display.

2.3 Letters and numbers in parentheses in the text of the report refer to magnetic/resistance and GPR anomalies, respectively, which have been highlighted in the relevant data plots and interpretation diagrams.

3. General Considerations - Complicating Factors

3.1 Ground conditions were moderate to good for data collection; in Area 1 the pasture field had a relatively short grass cover and was free of obstructions. However, an electrical sub-station, indicated in Figure 1, influenced the gradiometer data. The power cable from the electrical sub station in Area 1 also ran through Areas 2 and 3. In Area 2 the ground was dry and hard in places making resistance data collection difficult. Areas 3 and 4 consisted of a grassed area with garden plants and furniture. The southern half of Area 5 was deeply rutted and the ground dry; Area 6 contained an electrical fence, hindering but not affecting the data collected.

3.2 Generally the resistance data were good, allowing identification and interpretation of suspected archaeological features.

3.3 While depths have been indicated on the GPR diagrams, these have to be viewed with caution. The conversion from time to depth depends on the velocity of the electromagnetic signal through the ground. Given the nature of the site, this is likely to vary markedly over relatively small distances and, as a result, any depth conversion *is only an approximation*. An average velocity of 0.08m/ns has been used for the time to depth conversions following velocity analysis using

graphical methods involving the fitting of curves to point source reflections.

3.4 Where there is a strong electromagnetic contrast, the GPR signal can be inter-reflected or reverberated, producing a delay in the reflection of the signal. This is termed 'ringing'. This happens, to some extent, with all reflections and results in a greater apparent depth than actually exists. As a result, it is often not possible to detect the base of features; only the tops of buried features/deposits are detected with certainty (Annan 1996).

4. Results of Survey

Figures 2 to 5 show the resistance and gradiometer data and interpretations, while Figures 6-10 display GPR data.

Area 1

4.1 This location was targeted after a wall had become partially exposed at (A). Area 1 also contained a depression identified in aerial photographs as a possible fishpond. Areas of high resistance corresponded with the partially exposed wall and clearly outlined the suspected fishpond (B). Excavation confirmed the high resistance was due to a wall constructed from millstone grit blocks of varying size. Other areas of high resistance (C) may also indicate a wall, however the proximity of the electrical sub station prevented excavation. The gradiometer data were inconclusive, possibly due to the presence of the electrical substation.

Area 2

4.2 Area 2 was investigated over the location of a series of excavations conducted by the Leeds University Archaeology Society in 1964 and 1965. The excavations had revealed walls and a tiled floor. The aim of the geophysical survey was to locate the backfilled trenches and provide additional information on the extent and layout of the structure. The high voltage (11000v) electrical cable significantly influenced the gradiometer data. Figure 3 shows the extent of the cable's influence, with extremely high values over the northern quarter of the area surveyed. Other smaller ferrous responses are likely to be modern iron objects, while the larger response in the southeast corner is due to a metal gate.

4.3 The resistance data were far more successful in identifying potential archaeological features. The area of high resistance (D) was confirmed, by excavation, to be a substantial wall. However, the 1960's excavations were not identified in the geophysical investigation.

4.4 The GPR survey was confined to the northern-most section of the field; an area of 20m by 10m along the southern garden wall of Brimham Hall farm, extending east from the edge of the trench excavated by *Time Team*.

4.5 The high-voltage cable and trench within which it lies can be seen as a sinuous linear anomaly (1) in the shallow time-slices, Figure 6. An anomaly on a very similar alignment (2) can be seen again in the deeper slices; it is not clear whether this is a 'real' feature or the result of energy 'ringing', from the metal electricity cable, down through the section and showing up when there are no backfill/structural reflections swamping it. The response is relatively strong and could conceivably be legitimate, but the fact that this follows the line of the power cable on site-maps would make for a very strange coincidence.

4.6 The 'standard' time-slices are complicated by the material used to backfill the building unearthed in the trench; the material has a large rubble content within which are sizeable pieces of masonry. However, between these original time-slices and the 3D 'fence' plots extracted from the

reconstructed data block, it has been possible to identify at least the extents of the structure/backfilled areas beyond the limits of the trenches.

4.7 The main body of reflections (3) is concentrated in the centre of the survey area extending out from the trench, getting narrower and displaying a lesser depth extent as it does so (see Figures 7 - 10). This main body of response can be subdivided into four parts: a relatively shallow zone of response (3a), perhaps a layer of compacted demolition rubble for consolidation purposes; a less coherent area of reflections toward the western limits (3b), which upon excavation was found to be large pieces of masonry and dumped soil; the largest zone of responses (3c) seen to narrow and become thinner to the west; and the deepest extent of reflections, found at the eastern end (3d), that appears to have a softer or slightly damper overburden compared with (3c) as denoted by the lack of reflections (such as those of (3a)) above it. The structural remains appear to extend to the south and presumably west (4), beyond the area surveyed and this was confirmed when the original trench was enlarged.

4.8 As for detail, it was difficult to differentiate between *in situ* archaeological features and back-fill/consolidation material. However, responses (5) and (6) were tentatively interpreted as possible returning walls. This was again confirmed to be true with the enlarging of the trench. The wall identified at (5) was far more substantial than (6) with greater depth extent and as such is very clear in the 'fence' plots, Figures 7 - 10. It is, unfortunately, inherently difficult to ascertain the exact depth extent of a feature without the aid of excavation, due to the 'ringing' of energy returned from solid features. A further potential wall line has been highlighted (7), though its character is more like that of (6).

4.9 A final anomaly of interest is apparent, at depth, in the northeast corner of the survey area (8), shown in Figures 7 - 10. This appears to relatively strong response and despite being coincident with (2) it is not an effect of the cable or, for that matter, the cable itself (though is obviously contributing to the ringing response). The reflections could be associated with the complex of buildings in Areas 1 and 3 (see below), though it seems too deep for this. An archaeological origin would seem likely.

Area 3

4.10 A resistance survey in Area 3, the grassy driveway, identified an anomaly as a potential archaeological feature. The anomaly, (E) Figure 5, is seen as an area of high resistance. Two exploratory GPR traverses were collected, parallel to the garden wall, in order to characterise the response. Whilst it was not possible to definitively interpret the reflections as a specific feature, their nature indicated that the high resistance was not merely a rubble spread but something more substantial. A small excavation trench (initially 2m x 2m) confirmed the presence of a wall constructed from large millstone grit blocks.

4.11 A second high resistance anomaly (F) also may correspond with the wall identified and excavated in Area 1.

Area 4

4.12 A resistance survey was also carried out in the garden adjacent to the driveway. The data showed a patch of high resistance (G) in Figure 5. The anomaly was less well defined than in the previous locations. A shallow excavation trench revealed rubble in this position.

Area 5

4.13 In Area 5 a number of depressions and ridges, within the landscape, were identified as possible

building platforms and fishponds by Stewart Ainsworth. A small piece of iron slag had also been identified on the surface of the field. A magnetometer survey was carried out over 0.48 ha followed by a 20m x 20m resistance survey over a potential building platform. The resistance survey showed two anomalous areas of high resistance but no obvious structural remains.

4.14 The gradiometer survey contained a few weak linear anomalies that may relate to archaeological features. Stewart Ainsworth had identified a depression within the landscape as a potential fishpond and this coincided with an area of low magnetic response (H). Stronger magnetic responses, particularly in the northeast of Area 5 (I) may indicate small scale industrial type activity or, more likely, modern debris associated with the construction of a nearby horse training paddock.

Area 6

4.15 This location was targeted due to the presence of numerous pieces of ornate ecclesiastical stonework and carved architectural fragments within a short stretch of dry stone wall. A resistance survey was carried out either side of the wall.

4.16 The prominent high resistance (J) is rectilinear in shape and orientated roughly east – west. Unfortunately, the anomaly lies either side of a dry stone wall which hinders interpretation as this has also produced a band of high resistance. The possibility that (J) is associated with a chapel cannot be ignored.

5. Conclusion

5.1 The resistance survey proved successful in locating walls and foundations of structures associated with Brimham Grange. Some of the high resistance targets were shown on excavation to be substantial wall foundations surviving *in situ*. Although not confirmed by excavation, the resistance data suggest the presence of a peripheral building to the south of the existing farm in Area 6. Given the presence of numerous ornate, ecclesiastical stone and carved architectural fragments in the adjacent field walls, the results may reflect the chapel anticipated to be on this site.

5.2 Gradiometer and GPR surveys near the farm were hindered by the presence of an electrical sub-station. That said, the GPR appears to have helped define the extents, both laterally and vertically, of the building south of the farm house, beyond the limits of the excavation trench. More detailed interpretation of the data has been complicated by the inhomogeneous nature of the backfill on site. Gradiometer results away from the sub-station were more promising with a number of geophysical anomalies identified in Area 5 though their interpretation remains unclear, whether archaeological or modern.

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Date of Survey: 17th August and 19th August 2005
Date of Report: 30th September 2005

References:

Annan, A.P., 1996	*Ground penetrating radar (workshop notes).* Sensors & Software Inc., Canada.
Edwards, K. & Twinch, O., 2005	*Proposed archaeological evaluation at Brimham Hall Farm, Hartwith*, *Harrogate.* Project Design, unpublished.
SSEW 1983,	*Soils of England and Wales. Sheet 1, Wales.* Soil Survey of England Wales.

SITE SUMMARY SHEET

2005 / 56 Brimham Hall Farm
Hartwith, Harrogate.

NGR: SE 222 629

Location, topography and geology

Brimham Hall Farm lies in a valley on the western bank of Lurk Beck, a tributary of the River Nidd. The closest village is Hartwith, 5 miles to the northwest of Harrogate, North Yorkshire. The areas of investigation are next to the present day farm buildings and in the adjacent fields. The soils consist of seasonally waterlogged fine loamy soils classified as being of the Dunkeswick (711p) Association overlying more clayey soils (SSEW, 1983). The underlying geology is Millstone Grit with sandstone.

Archaeology

The present day farm at Brimham Hall was once part of Brimham Grange, a medieval monastic farming estate associated with Fountains Abbey. The site has been used almost continually as a dairy farm for the past 1000 years. Brimham Grange was also the location of a country retreat for the Abbot and a chapel was built at the site in the $13^{th}/14^{th}$ Century. Aerial photography of the area shows a complex series of earthworks including fishponds, field boundaries and numerous unidentified features. The present farm buildings incorporate earlier medieval features and carved stone, some with gothic script. An excavation took place in 1964 and 1965 by Leeds University Archaeological Society. The only evidence to survive from the excavation is black and white photographs showing several trenches containing walls and encaustic tiled floor. The location of the trenches is not known.

Aims of Survey

The aims of the survey were to locate remains associated with the Brimham Grange and identify the nature and extent of associated archaeological remains that may be present. The work forms part of the **Time Team** programme for **Channel 4**.

Summary of Results *

Magnetic, resistance and ground penetrating radar (GPR) surveys were carried out in an attempt to locate the foundations and walls of the medieval buildings.

Adjacent to the farm buildings the resistance survey recorded several anomalies of archaeological interest. The high resistance targets suggested substantial wall foundations with clearly defined edges. Excavation confirmed these assertions. The gradiometer survey was less successful near the farm due to the presence of an electrical sub-station. The GPR data appear to have defined the limits of the building remains; however, extracting details of the structural layout has been complicated by the inhomogeneous nature of the backfill.

Magnetic and resistance surveys were carried out in fields containing earthworks close to the farm. The magnetic survey showed a few weak linear magnetic responses together with stronger, anomalous responses. These anomalies could be either agricultural or more recent in origin; no pattern emerged to suggest a building structure. In a separate area, resistance survey recorded a potentially rectangular high resistance feature. The responses are bisected by a dry stone wall, which contained ecclesiastical stonework and carved architectural fragments. The possibility that this is the location of the chapel cannot be ruled out.

Background information taken from Edwards and Twinch, 2005.

List of Figures