LAND OFF WHEELDON WAY,
HULLAND WARD
DERBYSHIRE

Report on geophysical survey conducted in January 2015

Prepared by P. Johnson

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TPA Project Code – WWH

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SUMMARY

- Trent & Peak Archaeology was commissioned by Pegasus Group, on behalf of Clowes Developments, to conduct a geophysical survey on land off Wheeldon Way, Hulland Ward, Derbyshire, centred on NGR SK 25356, 47329 at a height of c. 205m OD (Fig. 1).

- The work was carried out between the 30th January and 2nd February 2015 in accordance with standard, accepted practices for archaeological geophysical surveys (EH 2008).

- The site is situated on deposits of Bowland Shale Formation, with no recorded superficial deposits.

- The site was composed of two adjacent areas within adjoining fields to the north-west of Wheeldon Way, Hulland Ward, Derbyshire.

- Ground conditions for the survey were generally good, the land was in use as pasture during the survey.

- Geophysical survey demonstrated the presence of potential buried archaeological features, these comprised:

    - Probable archaeological features indicating past agricultural activities, possible ridge/furrow, ([23], [24], [25], [26]; [39], [40]; [63]); ([8], [9], [11], [19], [20], [21]; [43], [44], [45]; [68], [71], [72]); ([16], [17], [18]; [50], [51], [54], [55]); ([56], [57]; [81]).
    - Possible boundary/enclosure ditches [86], [87], & [89].
    - Linear, rectilinear, and curvilinear features which may possibly represent domestic structures or activities [52], [53], [61], [69], [70], & [90].

Report on the geophysical survey of land off Wheeldon Way, Hulland Ward, Derbyshire. NGR SK 25356 47329

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ACKNOWLEDGEMENTS

The Project Manager for the work undertaken was Paul Johnson. The Project advisor was Lee Elliott. The Project Team comprised Tom Hooley and Povilas Cepauskas.

1. INTRODUCTION

1.1. Trent & Peak Archaeology was commissioned by Pegasus Group, on behalf of Clowes Developments, to conduct a geophysical survey on land off Wheeldon Way, Hulland Ward, Derbyshire, centred on NGR SK 25356, 47329 at a height of c. 205m OD (Fig. 1).

1.2. The fieldwork was conducted in January/February of 2015 on an approximately 2 hectare area of land to the north-west of Wheeldon Way, Hulland Ward, Derbyshire.

1.3. The site is located on deposits of Bowland Shale Formation; Sedimentary Bedrock formed approximately 313–335 million years ago in the Carboniferous period. Superficial deposits are not recorded in this area (British Geological Survey).

1.4. Topographically the site lays to the west of the village of Hulland Ward, immediately adjacent to the end of a residential street named Wheeldon Way and behind properties on a second street named Ashes Avenue. The site is bounded to the south-east by residential developments, to the west and north by fields, and to the south by properties to the north of the A517. The site is comprised of land currently used for pasture. The site displays notable topographical variation, sloping upwards by c. 20m from north to south.

1.5. No archaeological remains are known within the site of the survey, although the southern end of the site is close to the likely area of mediaeval activity at Hulland Ward. A DBA undertaken in 2013 revealed the presence of a number of known heritage assets within a 1Km radius of the development site.

2. PROJECT BACKGROUND

2.1. Potential Remains

2.1.1. The archaeological potential of the site is considered to be moderate.

- *Prehistoric*
  No prehistoric remains are recorded within the survey area. However, two Neolithic-period finds, a polished stone axe (SMR Number: 8404- MDR2714) and a leaf shaped arrowhead (Monument Number 310544), are recorded within 1Km of the site.

- *Roman*
  No Romano-British remains or finds are recorded as being located within the site, or a 1Km radius thereof.

- *Mediaeval*
  No archaeological remains of Mediaeval date are recorded in the HER from within the survey area. However, earthworks which may be associated with Mediaeval agricultural practices, were observed within the boundary of the survey area during walkover survey for the DBA (TPA report no. 048/2013) and are also visible from aerial photographs.

- *Post-Mediaeval*
  No Post Medieval or Modern heritage assets are recorded as being within the survey area. However, the Derbyshire HER lists seven post medieval heritage assets within a 1km radius of the site, these include two Listed Buildings (SMR Number: 8407- MDR2727, 8412- MDR12603), two toll roads (SMR Number: 99046-MDR11610, 99047-MDR11619), a Wesleyan Methodist Chapel in Hulland village (SMR Number: 8409- MDR11828), the site of a Primitive Methodist Chapel built in the late 19th century (SMR Number: 1507- MDR12604), and a Victorian wall-post-box on the wall of the north stable block at Hulland Hall (SMR Number: 8413-MDR12985).

2.2. Proposed Fieldwork

2.2.1. In order to evaluate the potential archaeological remains in this area, the following fieldwork investigation was proposed:

- Geophysics – Geomagnetic survey at standard (1m x 0.25m) sampling density across an area totalling c. 2.13 ha.

3. OBJECTIVES

3.1. The aim of the present work is to provide an evaluation and understanding of any potential archaeological remains through an evaluation by geophysical survey (geomagnetic) to determine the presence and location of any sub-surface remains, in accordance with NPPF para' 128, prior to submission and determination of a planning application for up to 48 dwellings on the site (ref: 14/00698/OUT).

3.2. The survey results will be used to inform the planning application and the necessity or otherwise of any further archaeological conditions.

4. METHODOLOGY

4.1. Geophysical Survey: Geomagnetic

4.1.1. The decision to use magnetic gradiometry to survey the site was based on its efficiency as a survey technique suitable for detecting the buried remains of a range of materials based on differences in their magnetic characteristics as compared to the geological background of the area (Gaffney et al. 1991, 6; 2003).

4.1.2. The results of this method are, however, severely restricted in areas of modern disturbance and by the presence of ferrous material (Scollar et al. 1990, 362ff). Because of the presence of metal fencing within the field boundaries, these features were given a wide-berth with an average distance of 3m being allowed to limit their effect on the archaeological data. Although a number of alternative geophysical survey techniques could be applied to the site (Appendix B), magnetometry represented the best compromise between speed and quality of data retrieval for an initial investigation.

4.1.3. The magnetometer survey was undertaken, within the guidelines advocated by English Heritage (David et al. 2008), by a two-person team using a Bartington Instruments Grad 601-2 fluxgate gradiometer. This equipment allowed the survey to be conducted rapidly as the area was relatively free of obstructions. Readings were taken at 0.25m intervals along traverses of 1m spacing walking east. This enabled a sufficiently high density of data for the purposes of archaeological evaluation to be collected across the site in the relatively short time allotted for the survey to be completed.

4.1.4. The geophysical survey grids of 30m by 30m were set out using a Leica GS15 GPS with SmartNet, in the Ordnance Survey National Grid coordinate system. The use of a north-south orientation for the survey grids was employed in the expectation that any surviving remains would be intersected by the survey traverses at an angle of approximately 30°.

4.1.5. The geophysical survey data were processed in Geoplot 3.0 software to remove any environmental disturbances or variations produced in the course of the survey. Firstly data were manipulated to remove any distorting 'spikes' from the survey results. A high-pass filter was then also used to reduce the effect of geological anomalies in the data-set. Low-pass filtering was then used to improve the resolution of larger archaeologically derived anomalies. Finally the data were interpolated to produce uniform data-densities equivalent to 0.25m x 0.25m.

4.1.6. The results were exported as greyscale, raster images and inserted into the AutoCAD plan of the site, generated from Ordnance Survey data, for georeferencing and production of a descriptive, vector overlay. The anomalies presented here were identified visually and manually digitised to produce the vectorised plans which are discussed in the results section of this report. The final print-versions of these plans were elaborated and prepared for printing in Adobe Illustrator CS4.

Ground Conditions

4.1.7. Ground conditions for the survey were generally good. The site was used as pasture at the time of the survey.

5. RESULTS
(Figures 2-4)

5.1. Geomagnetic Survey
5.1.1. Within the area surveyed, the site exhibited a generally good response to the geomagnetic survey, geophysical anomalies can be observed across the whole area surveyed, and buried features can be clearly discerned against the geological background, there is however, significant noise in the dataset, particularly to the south of the site. The overall magnetic response is low, although spikes within the dataset extend the range of unfiltered values to $^{+}/_{-}$ 100nT the standard deviation of the raw-data remained within c. 6nT of the mean. Any cut features are likely to show against this background as areas of positive magnetism. Positively magnetic anomalies are likely to result from the presence of settlement activity and deposition of thermo-remanent, or depositionally-remanent magnetised material.

5.1.2. The results are presented below as a greyscale image of the processed data (Fig. 2), and a complementary numbered interpretative plan to which the following description relates (Fig. 3), this description is organised broadly from southwest to northeast. And the survey area is divided, by a modern hedge-line into two fields, the southern of which comprises approximately 1/3 of the total area surveyed and the northern comprising the remaining 2/3 of the area. Unprocessed survey data are also presented below (Fig. 5), these data are unfiltered and hence show striping resulting from slight but consistent imbalances between the two sensors used for the survey.

5.1.3. The southern end of the survey area contains a number of large dipolar anomalies which represent superficial disturbances in the geomagnetic data. Approximately 12m from the southern corner of the survey area is an arc extending from the southwestern edge of the survey c. 7m in length, defined by five, small positive maculae [1]. Approximately 16.5m to the northeast of this feature is a small, curvilinear, positive anomaly [2], approximately 3.5m-long oriented northeast–southwest. Approximately 4.5m to the east of this feature is a positive macula [3], measuring approximately 2m by 1m and orientated northwest–southeast. A series of large positive maculae [4], [5], & [6], resulting from the presence of metal within the field boundary, are present along the southeastern boundary of the area surveyed. Approximately 14m from the field boundary and orientated parallel to it, is a 15.5m-long linear, positive anomaly [7], which may align to the previously discussed positive anomalies [2] & [3].

5.1.4. The northwestern part of the southern field contains a higher density of anomalies than the are to the southeast. A small, 2m diameter, positive macula [8] is located adjacent to the western edge of the survey. Approximately 12m to the northeast of this feature is a group of positive maculae [9], covering approximately 23m^2. Approximately 5.5m to the east of these maculae is a negatively magnetic, linear anomaly [10], orientated north-northwest–south-southeast, and c. 9m in length. Located 10m to the northeast of [9], and c. 8m to the north of [10], is another positive macula [11] of 8.5m^2, which appears to broadly respect the alignment defined by [8] & [9]. Approximately 2.5m to the northeast of this feature is an irregular, elongated, strongly positive macula [12] which, along with a "T-shaped" negative anomaly [13] and second positive anomaly [14] appear to define a feature running for approximately 20m on a broadly west–southwest–east-northeast orientation. A negatively magnetic anomaly [15], is located immediately to the north of [14], running for c. 7.5m southwest–northeast. Approximately 5m to the east of [15] is an irregular positive anomaly [16], which along with another positive anomaly [17] located to its northeast appears to define a 3.5m-wide area of enhanced magnetisation running for approximately 16.5m in a southwest–northeast direction. Aligned with this band of high magnetism is an apparently irregular, rectilinear positive anomaly [18], measuring c. 5.5m by 4m and located adjacent to the hedge/boundary defining the northeastern edge of the southern part of the survey. The alignment suggested by [8], [9] & [10] appears to be continued for c. 29.5m from a point immediately to the north of [13] by a series of irregular positive anomalies [19], [20] & [21]. This alignment of anomalies furthermore, appears to be

parallel to that defined by [16], [17] & [18]. Approximately 3m to the northwest of [18] is a short (c. 3m-long) positive anomaly [22] orientated northwest–southeast and aligned with the northeastern edge of [18]. Approximately 6m from the previously discussed major-alignment of features [8], [11], [19], [20] & [21], is a similar, parallel, linear-series of positive maculae [23], [24], [25] & [26] which define a band of positive-magnetism c. 40m long and 4m wide. Aligned with this band of positive magnetism, but apparently separate from it and adjacent to the northern edge of the survey, is a pair of small, 1m-diameter, positive maculae [27].

5.1.5. The southeastern edge of the northern field is characterised by a series of strongly positive anomalies [28], [29], [30], [31], [32] & [33] extending for c. 70m along the edge of the survey area. The terminus of this band of strong, positive magnetism is coincident with a large amorphous area of dipolar anomalies [34], running across the field perpendicular to the southeastern hedge-line and consistent with anecdotal reports of a former field-boundary (another hedge) which had previously divided the northern field into two approximately equal-sized parts. The line of this former field-boundary is continued to the northwest by further clusters of positive and dipolar anomalies [35], [36], [37], and appears to terminate at the northwestern field boundary where a strongly positive anomaly [38], with characteristics similar to those along the southeastern edge of the survey, is located.

5.1.6. The western corner of the northern field exhibits a number of geomagnetic responses. Parallel to the northwestern field-boundary are a series of positive anomalies [39] & [40], extending for c. 14m, which appear to represent a continuation of the alignment of features [23]–[27] previously discussed within the southern field. This alignment may be continued c. 30m further to the northeast by a 4m-long linear, positive anomaly [41], located within, or adjacent to, the band of magnetic anomalies associated with the former field-boundary understood to have existed across this part of the site. A parallel alignment of positive anomalies [42], [43], [44], [45 & [46], extend from the southwestern field-boundary for c. 59m, in this case seemingly coaxial to [8]–[11] & [19]–[21]. Immediately to the southeast of [42], and south of [43], is a 6.5m-long, irregular positive macula [47], orientated broadly parallel to the previously described alignment of anomalies. Immediately to the south of [44] is a broadly linear, 4.5m-long, positive anomaly [48]. The line suggested by the orientation of [48] may be picked up c. 30m to the northeast by a linear series of three positive maculae [49], which expend for c. 8m before intersecting the area of enhanced magnetisation where the former field-boundary was located. Immediately adjacent to the southwestern field-boundary, and possibly demonstrating a continuation of the alignment defined by [16], [17] & [18], is a 2.5m-long positive anomaly [50]. Similarly aligned to these features is an "L-shaped" positive anomaly [51], measuring approximately 2.5m by 3m and located approximately 37m to the northeast of [50]. Approximately 5m to the east of this feature is a pair of curvilinear positive anomalies [52] & [53], which appear to define a sub-circular feature of approximately 7m diameter. Approximately 10m to the northeast of this feature is a pair of positive maculae [54] & [55] which appear to respect the alignment of [51]. Approximately mid-way along the southwestern field-boundary, two groups of positive anomalies [56] & [57] appear to demonstrate the presence of a feature, extending over 17.5m from a point 9.5m from the southwestern edge of the survey area, aligned parallel to those previously discussed. Approximately 6m to the northeast of this alignment is a highly-irregular "L-shaped" negative anomaly [58], seemingly orientated east–west, and measuring 6.5m by 3m. The alignment of this negative anomaly appears to be continued for a further 9.5m by an irregular, sinuous, negative anomaly [59], located 4m to the east of [58]. Approximately 2m to the south of the eastern end of [59], is an 8m-long negative anomaly [60], parallel to the dominant alignments of features observed within the data, and the boundaries of the survey area. Approximately 11m to the southwest of [60], is a broadly rectilinear, positive anomaly [61], orientated north–south and measuring c. 6.5m by 8m.

5.1.7. The northern end of the survey area is characterised by a moderate density of anomalies of a similar nature to those previously discussed. A small, c. 5m^2, positive macula is located adjacent to the northwestern edge of the survey area. A broadly linear,

10.5m-long positive anomaly [63], is located parallel to, and 7.5m to the southeast of the northwestern edge of the survey area. This feature appears to respect the alignment of [39]/[40], c. 62m to the southwest within the same field. A number of discrete anomalies can be discerned in the northern corner of the survey area. A 6.5m-long linear, positive anomaly [64], orientated east-northeast–west-southwest is located c. 21m to the northeast of [63] and 15m from the northern edge of the survey. Approximately 11m to the northeast of this feature is a positive macula [65], covering 3m^2. Adjacent to the northern edge of the survey, and c. 6m from [65], is a pair of small, linear positive anomalies [66], orientated northwest–southeast and extending for c. 5m. Approximately 5m to the east of this feature is a pair of positive maculae [67], of 1m and 2m diameter, aligned north–south and situated adjacent to the northern edge of the survey area. Approximately 3.5m to the southeast of [63], and aligned parallel to it, is a linear positive anomaly [68], c. 11m in length. Immediately to the northeast of this feature is a pair of "L-shaped" positive anomalies [69], aligned west–east, measuring 3.5m by 4m and 4m by 2m respectively. Approximately 4.5m to the northeast of this feature is a curvilinear positive anomaly [70], arcing from west to south, approximately 8m in length. Immediately to the north of this curvilinear feature is an "L-shaped" positive anomaly [71], orientated east–west and measuring 3m by 2m. Approximately 3.5m to the northeast of this feature is a "mirrored-h-shaped" positive anomaly [72], measuring 3.5m by 2m and aligned with [68]. Approximately 3.5m to the southeast of this feature is an irregular positive anomaly [73], measuring approximately 7m by 10.5m and covering an area of 23m^2. Approximately 1m to the south of this feature is an "L-shaped" positive anomaly [74], orientated northwest–southeast and measuring 5.5m by 1.5m. Approximately 4.5m to the north of this feature is a strong, positive macula [75], of c. 1.5m diameter. Approximately 3m to the south of [73] is a 3m-long, roughly linear positive anomaly [76], orientated northeast–southwest. Approximately 7m to the southwest of this feature is a 12m-long series of positive maculae [77], on broadly the same orientation but offset by c. 2.5m to the southeast. Seemingly on the same alignment as the previously discussed group of features, and located approximately 9.5m to the southwest of it, is a 4.5m-long linear, positive anomaly [78]. Approximately 5m to the southeast of this feature is a "U-shaped", positive anomaly [79], measuring approximately 4m by 3.5m. Approximately 12m to the south of [79] is a northwest–southeast orientated 7m-long, linear, positive anomaly [80]. The main feature within the central part of the northern end of the survey area is a c. 30.5m-long, linear, positive anomaly [81], running southwest–northeast. Approximately 4m from the northeastern end of this feature is a 4.5m-long linear, positive anomaly [82].

5.1.8. The easternmost part of the survey area displays a lower concentration of geomagnetic anomalies than are present elsewhere in the northern field. Approximately 18m to the east of [82], are a cluster of strongly positive maculae [83], covering an area of c. 13.5m^2. Approximately 13m to the southeast of this magnetically enhanced area is a group of three positive anomalies [84] which appear to be aligned north-south over a distance of c. 9m. Approximately 9m to the southeast and adjacent to the southeastern field-boundary is a positive macula [85], covering an area of 9.5m^2. Approximately 12m from the easternmost edge of the survey area is an interrupted, positive curvilinear anomaly [86], of c. 15m in total length orientated broadly east–west. Possibly continuing this feature, aligned north–south, adjacent to the edge of the survey area is a 4.5m-long linear, positive anomaly [87]. Between [86] & [87] is a series of positive maculae [88] which are aligned east-northeast–west-southwest, over a distance of c. 12.5m. Approximately 20m to the south of [86] is a 6m-long, linear positive anomaly [89], running apparently parallel to the eastern part of [86]. Between this linear feature [89], and the linear alignment of maculae [88], is a group of positive and negative maculae [90] which describe a broadly rectilinear area of approximately 5.5m by 4.5m.

6. DISCUSSION

6.1. Geomagnetic Survey

6.1.1. The geomagnetic response to the survey revealed a very high density of anomalies, several features with archaeological potential could be tentatively recognised within the dataset. The scale of these features is varied, with some possible evidence for agricultural activity, and as such their interpretation is difficult. Likely archaeological features were generally represented by positive magnetic anomalies. The overall character of the geophysical anomalies revealed by the survey suggests a possibility for the presence of archaeological remains within the area surveyed.

6.1.2. The group of features [23], [24], [25], [26]; [39], [40]; [63] appear to suggest the possible presence of buried evidence of ridge/furrow agriculture.

6.1.4. The group of features [8], [9], [11], [19], [20], [21]; [43], [44], [45]; [68], [71], [72] appear to suggest the possible presence of buried evidence of ridge/furrow agriculture.

6.1.5. The group of features [16], [17], [18]; [50], [51], [54], [55] appear to suggest the possible presence of buried evidence of ridge/furrow agriculture.

6.1.6. The group of features [56], [57]; [81] appear to suggest the possible presence of buried evidence of ridge/furrow agriculture.

6.1.7. Features [52], & [53] appear to represent a sub-circular, stratigraphically negative feature such as a ditch or gully, the scale of which would suggest a domestic rather than agricultural purpose.

6.1.8. Features [69], & [70] appear to represent a sub-rectangular, or possibly sub-elliptical, stratigraphically negative feature such as a ditch, the scale of which would suggest a domestic rather than agricultural purpose.

6.1.9. Features [86], [87], & [89] appear to represent a sub-elliptical, stratigraphically negative feature such as a ditch, the scale of which would suggest a larger enclosure perhaps relating to past settlement activity.

6.1.10. Feature [90], may represent the remains of some activity relating to the feature discussed in paragraph 6.1.9. above.

6.1.11. Feature [61] may represent the remains of a stratigraphically negative feature relating to the remains of a structure or small enclosure.

7. CONCLUSION

7.1. Geophysical survey suggested the presence of potential buried archaeological features.

These comprised:

- Probable archaeological features indicating past agricultural activities, possible ridge/furrow, ([23], [24], [25], [26]; [39], [40]; [63]); ([8], [9], [11], [19], [20], [21]; [43], [44], [45]; [68], [71], [72]); ([16], [17], [18]; [50], [51], [54], [55]); ([56], [57]; [81])

- Possible boundary/enclosure ditches [86], [87], & [89].

- Linear, rectilinear, and curvilinear features which may possibly represent domestic structures or activities [52], [53], [61], [69], [70], & [90].

7.2. The distribution of geophysical anomalies across the areas surveyed should probably be seen as representative of the presence of archaeological features within the survey area and no significant biases in survival/detection of these remains appear to be present within the dataset.

8. BIBLIOGRAPHY

David, et al. (2008) *Geophysical Survey in Archaeological Field Evaluation*. English Heritage

Gaffney, C., Gater, J. & Ovendon, S. 1991. *The Use of Geophysical Survey Techniques in Archaeological Evaluations*. Institute of Field Archaeologists Technical Paper No. 9.

Scollar et al. (1990) *Archaeological Prospecting and Remote Sensing*. Cambridge: Cambridge University Press.

Cartographic references

BGS British Geological Survey: England and Wales (online) Solid and Drift Geology: 1: 50,000

OS Ordnance Survey 1: 50,000 Landranger Map

Ordnance Survey Maps: All editions 1859-1992

Appendix A: Details of Survey Strategy

Date of Survey: 30th January–3nd February 2015
Site: WWH – Land off Wheeldon Way, Hulland Ward (Derbyshire)
Region: Derbyshire
Grid Reference: NGR SK 25356 47329
Surveyor: Trent and Peak Archaeology
Personnel: Tom Hooley, Povilas Cepauskas
Geology: Bowland Shale Formation/No Superficial Deposits Recorded
Survey Type 1: Geomagnetic, fluxgate gradiometry
Approximate area: 2 hectares
Grid size: 30m
Traverse Interval: 1m
Reading Interval: 0.25m
Instrument: Bartington Instruments Grad 601-2
Resolution: 0.1nT
Traverse mode: Zig-zag

Appendix B: Geophysical Prospection Methods

Magnetic Survey

Magnetic prospection of soils is based on the measurement of differences in magnitudes of the earth's magnetic field at points over a specific area. The iron content of a soil provides the principal basis for its magnetic properties. Presence of magnetite, maghaematite and haematite iron oxides all affect the magnetic properties of soils.

Although variations in the earth's magnetic field which are associated with archaeological features are weak, especially considering the overall strength of the magnetic field of around 48,000 nano-Tesla (nT), they can be detected using specific instruments (Gaffney et al. 1991).

Three basic types of magnetometer are available to the archaeologist; proton magnetometers, fluxgate gradiometers, and alkali vapour magnetometers (also known as caesium magnetometers, or optically pumped magnetometers).

Fluxgate Gradiometer

Fluxgate instruments are based around a highly permeable nickel iron alloy core (Scollar et al. 1990, 456), which is magnetised by the earth's magnetic field, together with an alternating field applied via a primary winding. Due to the fluxgate's directional method of functioning, a single fluxgate cannot be utilised on its own, as it cannot be held at a constant angle to the earth's magnetic field. Gradiometers therefore have two fluxgates positioned vertically to one another on a rigid staff. This reduces the effects of instrument orientation on readings.

Fluxgate gradiometers are sensitive to 0.5nT or below depending on the instrument. However, they can rarely detect features which are located deeper than 1m below the surface of the ground.

Archaeological features such as brick walls, hearths, kilns and disturbed building material will be represented in the results, as well as more ephemeral changes in soil, allowing location of foundation trenches, pits and ditches. The results are however extremely dependent on the geology of the particular area, and whether the archaeological remains are derived from the same materials.

FIGURES