The Lochbrow Landscape Project 2010-2011

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Summary/Abstract

Geophysical and topographic surveys were undertaken in short seasons in November 2010 and September 2011 across the location of an early Neolithic–Bronze Age monument complex recorded as cropmarks at Lochbrow, near Lockerbie, Dumfries and Galloway. The aims of these surveys were to investigate the nature and extent of the sites and monuments recorded here, as well as their wider context and topographic location. The gradiometer survey identified several anomalies of interest, including some possible post-pits of a cursus, a previously unidentified round barrow, and a rectilinear magnetic anomaly of unknown origin.

Introduction

Aims and Objectives

The two seasons of work undertaken in 2010 and 2011 were undertaken by project members from the RCAHMS, University of Edinburgh and the University of York. This survey was carried out with the aim of investigating the nature of multi-period activity in this area, and providing complementary survey data to what was already known from aerial photography. The season aimed to survey for any further activity in areas that might not be conducive to cropmarks, and to test whether geophysical and topographic methods were suitable for prospection of this type.

The site represents a rare opportunity to explore the integration of many different non-destructive research techniques within a landscape project. Utilizing GIS, predictive modelling and geophysical survey, this project aims to elucidate the nature and character of the monuments at Lochbrow by considering their relationships to their physical location and the surrounding landscape.

The first stage of the project concentrates on the earliest monuments as the likely initial focus for prehistoric activity in this location. In the summer of 2010, the locations of a number of cropmark sites were investigated as part of desk-based assessments on the validity of previously published GIS-based predictive models of areas of Neolithic activity (Graves 2009; 2011; Graves McEwan 2012). The desk-based assessment indicated a very high probability of Neolithic activity at Lochbrow, which subsequently became targeted for a pilot gradiometry survey in November 2010. The pilot survey indicated higher resolution geophysical surveys might improve our understanding of the area. Therefore, detailed topographic, gradiometry and resistivity surveys followed in September 2011 (Goodchild et. al. 2012). The second stage of the project proposes to broaden the investigation to consider the subsequent development of the monuments at Lochbrow within their wider surrounding landscape. This will involve the expansion of the geophysical and topographic surveys to investigate additional cropmarks, of probable later date, to the south of the initial survey area.

This project aims to contribute to the knowledge of timber-built Neolithic structures which, although important elements of Neolithic monumental repertoire, have tended to receive less attention than structures of other materials (Millican 2009). By widening the focus beyond the recorded monuments, it will add to the understanding of relationships between archaeological sites and their wider contexts, and the changing use and development of the landscape. Specifically, it will
build upon and add to knowledge of the development of landscape, monuments and place in this region (e.g. Thomas 2007), enriching the regional picture in addition to wider narratives.

Figure 1. Location of the 2011 survey (contains Ordnance Survey data © Crown copyright and database rights 2010)
Location, geology, and topography

The area under study is centred at NY 09514 89350, approximately 2.5 kilometres south of the village of Johnstonebridge, and around 10 kilometres north of Lockerbie, in Dumfries and Galloway. The site is situated on the west bank within a loop of the River Annan, and concentrated around the location of crop marks known from aerial photography dating to the Neolithic period (figure 1). The crop mark sites are NY08NE 26, 34, 36, 37 in the NMRS. The present land use is farmland, currently under silage and has been subject to ploughing in the past.

The solid geology of the area is the Corncockle Sandstone Formation, a fine-medium grained, well-sorted red quartz sandstone with large scale Aeolian cross bedding (British Geological Survey 2012; Brookfield, 1978). This is overlain by the Kirkbean sand and gravel formation of between 4-10m thickness (British Geological Survey 2012), which forms a terrace to the west of the river.

The topography of the area is fairly gentle, with the exception of a large palaeochannel of the River Annan bisecting the field, and the steep terrace slope towards the river (discussed below). The soils are primarily eutric cambisols, which are generally productive agricultural land, and are typical of alluvial environments with undulating or hilly terrain (European Commission and the European Soil Bureau Network 2004; Driessen and Deckers 2001).

Archaeological History

The sites at Lochbrow were first recorded as cropmarks during an aerial survey by RCAHMS in 1992. The timber cursus is plotted on a distribution map of Neolithic monuments in Southern Scotland (RCAHMS 1997, 115) and has been discussed by Brophy (2007) and Millican (2009; 2012). However, other than a site visit by Millican (2009), no other work been undertaken at Lochbrow. The recorded cropmarks indicate the presence of a long post-defined cursus monument, at least 175m in length by around 20m, and two timber circles. Only the northern, v-shaped, terminal of the cursus has been recorded and the cropmarks suggest that the cursus may widen slightly to the south. One internal division has been recorded within the northern section of the cursus, around 57m from the northern terminal. Of the two timber circles, one lies only around 10m to the east of the cursus terminal, while the other has been recorded around 75m southwest of the south end of the cursus. A round barrow and a small section of curving ditch, which may be part of a second barrow, appear to lie on the line of the cursus to the south. A Roman temporary camp, palisaded settlement and rectilinear enclosure have been recorded a short distance to the northeast on the opposite side of the River Annan, while the cropmarks of two palisaded enclosures and a ring-ditch are known less than 300m to the south of the site (see figure 2).

Timber cursus monuments are an Early Neolithic monument form exclusive to Scotland (Thomas 2006), with around 26 known to date. None have been investigated using geophysical methods. Timber circles and round barrows are more common phenomena found throughout the British Isles, dating from the later Neolithic to the Bronze Age (Millican 2007). As the formation of cropmarks varies considerably at Lochbrow, due to the presence of palaeochannels and other deeper areas of soil, unresponsive areas may mask additional features. This makes it likely that additional archaeological features lie within these areas. Consequently this is a monument complex that will benefit from intensive investigation.

The terrace on which this group of sites lies is defined by fairly sharp and steep edges and has a series of old stream beds cutting across it, giving these sites a very distinctive location (figure 3). These stream beds are clearly visible as cropmarks and are very distinctive features on the ground. However, the cropmarks also record a series of probable palaeochannels, which have no apparent surface topography, on the terrace itself. These are likely to represent glacial outwash or subsurface streams, though further study is required to elucidate their true nature. Nevertheless, along with
other patches of deeper soil, they serve to prevent the formation of cropmarks, though do not appear to add significantly to the topographic differentiation at this location.

The cursus terminates close to the northern terrace edge, which is directly above a meander in the River Annan. Today, the river itself can be glimpsed through the trees on the northern edge of the terrace. An old stream bed, which can be seen on the aerial photographs as a darker area of crop, cuts northeast-southwest through the corner of the terrace, narrowing and constraining the northern section of the terrace, which then forms a curved, slightly pointed end. The terminal of the cursus and adjacent pit-enclosure have been placed just at this most narrow point and the form of the cursus terminal seems to mirror the form of the terrace edge (figure 4). The timber circle to the southwest of the cursus also seems to have been located on the very edge of the terrace, close to the break of slope and on a slight promontory overlooking the old stream bed and a very wet patch of ground (which may have formed a small pond in the past).

Figure 2. (1) General location of the Lochbrow cropmarks with nearby sites (Map © Crown Copyright/database right 2008. An Ordnance Survey/EDINA supplied service). (2) Lochbrow from the south showing the distinctive nature of the terrace.

Therefore, it could be argued that the forms of these monuments seem to reflect their location and that they drew upon the local topography in which they have been constructed. Moreover, the topography of the terrace serves to constrain and direct access to these sites as access is easiest by far from the south, on the same axis as the cursus monument. The sharp nature of the terrace edges defines a very distinct area around the monuments recorded here (see figures 2.2 and 3), and it is possible to suggest that the terrace itself may have served to define the boundaries of this place and the limits of the activity that took place here. The terrace edges may also have limited the number of people who could approach the monuments at one time, particularly at the northern extent of the site where the terrace edge becomes much more constrained. They may also have served to distance certain people from the monuments and whatever took place at this location, with some individuals only able to view the sites from a distance from the other side of the relict stream beds. In other words, it is possible to suggest that the monuments did not finish at the boundaries of the
ground plan as we see it today, but incorporated the surrounding topography in their use and meaning.

![Figure 3 Lochbrow showing extent of the terrace and relict stream beds (Cropmark interpretation Kirsty Millican; Map © Crown Copyright/database right 2008. An Ordnance Survey/EDINA supplied service).](image)

**Methodology**

In 2010 a pilot geophysical survey was carried out in order to test the potential of geophysical techniques in this area. A Bartington fluxgate gradiometer was used in grids of 30 x 30m over an area of approximately 1.2 hectares. The sample resolution was 1 x 0.25m (3600 samples per grid). Preliminary results indicated that, whilst large scale features were clear (e.g. the rectangular structure, palaeochannel and barrow discussed below), this resolution was not sufficient to identify the smaller features likely to be associated with monuments of the type identified through aerial photographs (figure 4).

In 2011 it was therefore decided to carry out a topographic survey as well as a higher resolution gradiometry survey. The topographic survey utilized a Leica Differential GPS (GPS900) to produce a detailed contour survey in OS national grid at a resolution of approximately 1m. The survey covered an irregular area of just over six hectares. Surface profiles of features were also created. All the data was processed and analysed within Leica GeoOffice and ESRI ArcGIS.
The 2011 geophysical survey was also carried out with a Bartington fluxgate gradiometer in grids of 30 x 30m, but this time at a resolution of 0.5 x 0.125m (giving a total of 14,400 sample measurements per grid). Forty-seven grids were completed, covering a total area of 4.23 hectares (figure 5). Key areas were then targeted with an RM15 twin probe resistance meter at 0.5x0.5m. Ground conditions were generally good: the field was under silage, which enabled relatively easy data collection. The only areas of difficulty were the slopes of the relict stream channel. The 30m grid was laid out and tied into the British National Grid using the Leica GPS900, and a zig-zag traverse scheme used. Instrument sensitivity was set to 0.1nT. Data was downloaded and processed using Geoplot 3, and incorporated into the project GIS.
Results

Topographic Survey

Visual survey had located a possible ploughed-out barrow mound in the centre, and this was recorded topographically along with a focus upon the relict stream channel. The topographic survey showed the gravel terrace to be situated 57-67m above sea level. The relict stream channel is clearly visible cutting through the centre of the field and oriented towards the south-west. The potential barrow is the central white mound feature at the bottom of the survey: the highest point in the area (figure 6).
Figure 6. Elevation map derived from the GPS survey showing 1m classes (background map © Crown Copyright / database right 2012. An Ordnance Survey/EDINA supplied service).

Figure 7. Topographic survey of the mound showing 0.5m classes. The black line indicates the location of the profile.
On comparison with the geophysical survey, however, the lack of magnetic anomalies around the mound suggest that it may be a natural drumlin feature rather than the result of human activity (figure 8). Further work is required to clarify this. Nevertheless, if natural, it is still likely to have played a role in the area as it is situated directly to the west of the cursus (figure 9).

Figure 8. Magnetic anomalies from the gradiometry survey overlying the mound feature

Figure 9. Cropmark interpretation overlying the topographic survey (cropmark interpretation Kirsty Millican; background map © Crown Copyright / database right 2012. An Ordnance Survey/EDINA supplied service).
The relict stream bed, of unknown age, bisects the field from roughly north-east to south-west, essentially cutting off the loop of the modern river course. It is 36-50m wide at its northern end, leading into a larger hollow of approximately 60 metres width to the south. It is clear from satellite images, that it is one of several relict stream courses in the area. The channel surveyed appears to branch directly from the modern stream course (see figure 10). The channel would therefore benefit from some environmental study in order to ascertain its age, and therefore relationship with the Neolithic features in the area.

Figure 10. Aerial photograph showing river activity in the area with the topographic survey overlaid. Palaeochannels are distinct in many areas, some indicated by the black arrows (aerial photograph © 2011 DigitalGlobe, GeoEye, Getmapping plc, Infoterra Ltd & Bluesky, Terrametrics).
Geophysical survey

The gradiometer survey primarily targeted the areas of the known cropmarks (Millican 2009, 462). It identified several anomalies of interest, including some possible post-pits of the cursus, a previously unidentified round barrow, a rectilinear magnetic anomaly of unknown origin, scattered pits, and magnetic anomalies likely of modern origin. Data was processed using standard procedures outlined in Table 1.

Table 1: Processes applied to the geophysical data (after Walker (2005))

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero mean traverse</td>
<td>This process sets the background mean of each traverse within each grid to zero, thereby removing striping effects and edge discontinuities over the whole of the data set.</td>
</tr>
<tr>
<td>Destaggering</td>
<td>Destaggering corrects staggered data which arises due to irregularities in walking during collection by shifting traverses, and are applied on a line-by-line basis as and where needed.</td>
</tr>
<tr>
<td>Clipping</td>
<td>Clipping improves data display and statistical calculations by removing outlying high or low values from strong ferrous responses.</td>
</tr>
<tr>
<td>Low pass filter</td>
<td>The low pass filter removes high frequency, small scale spatial detail, useful for smoothing data or for enhancing larger weak features.</td>
</tr>
<tr>
<td>Interpolation</td>
<td>Interpolation can also be used to give a smoother appearance to the data and can improve the visibility of larger, weak archaeological features. However, it does this at the expense of increasing the number of data points and is purely a cosmetic change</td>
</tr>
</tbody>
</table>

The magnetic results show a lot of disturbance, evident from the many small dipoles. Dipoles are very strong readings caused either by iron-rich objects or burned features. These result in a large spike in the data consisting of very high and low readings, which appear as strong black and white anomalies. In this context it is difficult to ascertain whether the anomalies are modern agricultural debris, or relate to burning events from the cursus and related features. A general NNW-SSE trend across the majority of the data reflects the dominant direction of modern ploughing. However, there are also many older features, some of which complement the aerial photo survey.

Large-scale faint trends can be observed across the site. Some of these may relate to river activity, but others seem to correspond with the extents of prehistoric activity (figure 11). For example, a sub-triangular region at the northern end of the site does seem to correspond with the terminus of the cursus (though slightly offset). Likewise, the large area emanating from the western limits is an area of distinctly different activity, and assuming an offset, could be truncated by the edge of the cursus. Other smaller trends are possibly associated with river activity in the area or the underlying geology. In order to assess activity more fully, the results have been broken down into seven areas for discussion (figure 12).
Figure 11. (1) Processed gradiometry results, and (2) trends alongside the cropmark interpretation. The arrows identify those areas discussed in the text.

Figure 12. Gradiometry plot showing areas 1-7
Area 1

Area 1 is to the far north of the study area, and results show a medium strength rectilinear magnetic response with surrounding small anomalies with archaeological potential (figure 13). This feature was later targeted by resistance survey, but problems with the equipment means that the area will need to be resurveyed in a future season. The feature, which measures 14m across, does not seem to tally with any known structures from historical periods, but also does not fit with the prehistoric activity. Further work is required to elucidate the nature of this feature.

Interpretation

- Weak magnetic response
- Strong Magnetic response
- Dipoles
- Negative magnetic response
- Modern disturbance
- Trends

**Figure 13.** (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data, (4) Processed data, (5) Interpretation
Area 2

Area 2 consists of a magnetic anomaly which is highly likely to represent the ditch of a ploughed out barrow. There is no indication of the barrow topographically. The circular ditch has a diameter of six metres, and the response indicating the ditch itself is approximately one metre wide.

An additional anomaly to the north could potentially represent another partially destroyed barrow, though this is far more tenuous. Were it to be a barrow, the internal diameter would be approximately 8 metres (figure 14 and 16 overleaf).

![Figure 14. Gradiometry plot showing the probable barrow feature in the bottom corner, plus the tenuous barrow in the upper left. The dotted black line indicates the internal circumference.](image)

Area 3

Area 3 lies across the known relict stream bed. As well as some dipoles, the area also shows a medium strength anomaly that was thought to roughly correspond with the edge of the old stream channel. There are two sections that do not join up, and on comparison with the topographic survey it appears that both parts do seem to follow the shape of the land (figure 15). However, the larger, more northerly anomaly might possibly indicate a previous channel extending beyond the current one, and may have become filled with organic deposits. Only the very edge of the channel shows a response, and the bottom (where surveyed) contained no significant anomalies (figure 17).

![Figure 15 Comparison of anomalies from 2010 and 2011 with topographic survey](image)
Interpretation

- Weak magnetic response
- Strong Magnetic response
- Dipoles
- Negative magnetic response
- Modern disturbance

Figure 16. (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data, (4) Processed data, (5) Interpretation
Interpretation

- Weak magnetic response
- Strong magnetic response
- Dipoles
- Negative magnetic response
- Modern disturbance
- Trends

Figure 17. (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data, (4) Processed data, (5) Interpretation
Area 4

Area 4 is the largest of those discussed, and covers the main area of cropmark activity related to the cursus. In order to view the results effectively this area has been split into two areas: north and south. The whole area is littered with small magnetic anomalies. Many of these are likely to be modern ferrous debris, but there are a significant number of probable small cut features which have a strong, but not dipolar, response. Due to the difficulties of interpreting such features, the data was compared to what was known from the aerial photographs (figures 18 and 19).

On comparison it was noted that many of the small anomalies were on a similar alignment to the cropmark features. They were, however, offset. This is likely a reflection of the relative inaccuracies of aerial photograph rectification and transcription which, due to factors such as the difficulties of transforming an oblique image to a plan view, the quality of available control, and possible offsets due to crop movement, cannot provide fully accurate spatial data (Wilson 2000, 227). This can result in an error margin of up to several metres. Additionally, survey drift within the geophysical results is likely to have an impact on the correspondence of the cropmarks to the recorded anomalies. It is therefore unlikely that the mapped cropmarks will match the geophysical results exactly. This means that it is possible that some of the alignments of anomalies do represent post-pits of the cursus. Of note is an alignment of probable cut features to the east of the mapped cropmarks and also immediately south of the mapped cursus terminal, which appear to reflect the cropmarks. Additionally, further cut features may extend the known cursus post-pits into the gap in the cropmarks on the western side of the cursus. If these represent cursus post-pits, this would suggest that the cursus continues to join the second length of the boundary, recorded by cropmarks, a short distance to the south.

The general scatter of probable cut features, many of which cannot be connected to an alignment, could be explained by pit digging either prior to the construction of the cursus monument or during the life of the monument itself. It has been speculated that Neolithic pit-digging episodes may represent a type of 'softening of the ground' technique to facilitate claim to an area or territory prior to the insertion of monuments or possible settlement activity (Barclay and Russell-White 1993, 167-168; Graves 2011). The database driving the predictive models that formed part of the desk-based assessments in 2010 includes all of the currently known pit-digging sites from the Scottish mainland. It is impossible to know for certain without excavation whether any of the pits at Lochbrow are of similar type to that found in the predictive database, or are natural or modern pits. The sheer number of anomalies also makes them difficult to interpret.

Medium strength linear anomalies, most oriented roughly NE-SW and visible across much of the survey area, probably represent the palaeochannels recorded by the cropmarks.
Figure 18. Area 4 north (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data.

Area 4 south (4) Raw data, (5) XY trace plot of raw data, (6) Dot density plot of processed data.
Figure 19. (1) Processed gradiometry data from Area 4, (2) gradiometry with cropmark interpretation, (3) Geophysics interpretation and cropmark interpretation
Area 5

Area 5 lies in the location of the possible timber circle. Again a scattering of small magnetic anomalies are obvious, some of which are likely to represent modern ferrous remains and others small cut features. Few appear to correspond to the features recorded by the cropmarks, though it is possible that the anomalies represent additional features not identified from the air. A clear alignment of cut features extends NNW-SSE through this area. This is not in the correct location or quite the right alignment for the cursus, but could represent an additional post-alignment (figure 20).

Interpretation

![Interpretation](image)

Figure 20. (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data, (4) Processed data, (5) Interpretation
Area 6

Area 6, at the southwest of the survey area, covers a linear magnetic anomaly caused by an overhead power line. A few small anomalies of medium strength, probably representing cut features, have also been recorded in this area including some apparently forming a small arc, just to the east of the power line (figure 21). Although significantly offset from the mapped postholes of the timber circle, it is possible that they are related to this archaeological feature and may in fact represent boundary post-pits. This may be given further weight by the fact that comparison of the location of the power line on aerial photographs with the location of the anomalies created by the power line may suggest that the mapped cropmarks here are significantly offset to the northeast (figure 22). If this is the case, this problem need not affect all of the mapped cropmarks. The number and quality of the control points were greater along the northern and eastern side of the field, meaning that the rectification and mapping of features recorded in these sections of the survey area are likely to be more accurate than features recorded to the west. Further work with the aerial photographs may help to resolve and clarify this issue.

Figure 21. Area 6. (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data, (4) Processed data, (5) Interpretation
Area 7

Area 7 covers the expected location of the round barrows recorded on the aerial photographs. Some anomalies corresponding to the cropmark barrow and probable barrow ditch were potentially identified here (figures 23 and 24). Of further note are several small anomalies, probably representing cut features. Three appear to form a small alignment extending northeast to southwest, while a further two lie on a similar alignment to the eastern side of the cursus. Very tentatively, it is possible to suggest that some of these could relate to the southern end of the cursus, which is not known from cropmarks. Those to the east align with the anomalies identified as possibly representing the eastern post-pits of the cursus, and it may be possible to connect additional anomalies on this alignment. The small alignment running northeast to southwest does not quite fit with the known alignment of the cursus, though as the cropmarks suggest that the western side of the cursus may start to curve at its known southern extent, it may be that the cursus does not follow an entirely linear path along its entire length. These cannot yet be definitely connected with the cursus, though considering the number of pit-defined features of archaeological significance in this field, it is relevant to take note of them.
Figure 23. Area 7. (1) Raw data, (2) XY trace plot of raw data, (3) Dot density plot of processed data, (4) Processed data, (5) Interpretation
Conclusions

The significance of the archaeology

The interpretation of the geophysical results have proven difficult because of the subtle nature of the anomalies recorded. This is not entirely surprising as the majority of the recorded cropmarks represent the post-pits of timber monuments rather than substantial cut or ditched features. Nevertheless, the surveys conducted at Lochbrow have added considerably to the knowledge of this site, as well as demonstrating the value of conducting geophysical and topographic surveys at a cropmark site.

Several previously unknown features have been identified; the barrow, the possible second barrow, and the rectilinear feature in the north of the survey area. This rectilinear feature is intriguing, though no obvious explanation is yet forthcoming. It lies within an unresponsive area of crop on the aerial photographs, and so the cropmarks cannot help resolve the interpretation. Further work will be required to elucidate the nature of this feature. The discovery of the barrow and possible barrow are significant and add to the impression that this location was used and re-used over a long period of time. The co-location of later curvilinear features (timber circles and round barrows) with a cursus monument is not unique to the site at Lochbrow (Millican 2009, 70-1), and the features recorded at Lochbrow further add to this picture. It is significant that none of these features were visible on the aerial photographs.

Although difficult to interpret, the survey may also have recorded some of the post-pits of the cursus. It was known that such small features may prove difficult to record by geophysical survey. Yet the survey appears to have had some limited success with this. In particular it may indicate the continuation of the post-pits into the gap in the cropmarks recording the western side of the cursus.
This is significant as this gap is a consequence of unresponsive soil. It was assumed that the post-pits would continue across this area to join the second length of post-pits, but this could not be demonstrated from the cropmarks. The survey results suggest that this may indeed be the case, strengthening the interpretation of the post-pit alignments at Lochbrow as a single cursus. The survey may also have recorded the continuation of the cursus post-pits to the south of the currently known extent. One question this project set out to resolve was whether the cropmarks record the full extent of the cursus, or if it continues further to the south. It is difficult to definitively connect the anomalies recorded with the cursus, but the alignment of some of these features make this a strong possibility, suggesting that the cursus does indeed extend beyond that known from the interpretation of the cropmarks.

The results also suggest the possible presence of additional alignments, though whether they can be associated with the cursus is difficult to determine. This is most obvious in the north of the survey area, within area 5. Multiple alignments have been identified at some post-defined cursus monuments (Thomas 2007; Millican 2009, 68), perhaps representing the movement of these monuments over time as they were re-built and reconstructed. It is possible that that those recorded by the survey at Lochbrow represent similar post-alignments. If this is the case, this could suggest that Lochbrow was built and reconstructed over a period of time, rather than representing a unitary monument built in one event. Additionally, the general scatter of probable pits obvious across much of the survey area may suggest pit-digging activity, either connected with the construction and use of the monuments or pre- or post-dating this activity. However, it is very difficult to distinguish, from geophysical results alone, between pits of natural or modern origin and those of archaeological significance.

It is currently difficult to determine if the survey has identified any of the post-pits of the southwestern timber circle as it is recognised that there may be some unresolved issues regarding the rectification of the aerial photograph and transcription of the cropmark here. An arc of small cut features can be clearly seen, but do not correspond very well with the mapped cropmarks. It seems probable that the mapped cropmarks have been located too far to the northeast. If this is the case, the features recorded by the survey are likely to represent some of the post-pits of the timber circle. The relatively strong responses could suggest burning within these features. Further work with the aerial photographs, though, is required to resolve this.

Therefore, the geophysical survey has proven informative and clearly complements the details revealed by cropmarks. It is hoped that completion of the survey will add to this picture and may clarify some of the interpretative issues encountered.

Future work

The completion of the gradiometer and topographic surveys will take place in 2012, and targeted resistance survey will be used to clarify elements of the gradiometry results. Additionally, it is hoped to extend the survey area. The area is archaeologically rich and a wider landscape-based project will enable the team to put these monuments in their wider context. Remote sensing and other techniques will be utilised for a wider regional landscape project. Excavation of the probable barrow and of the unidentified feature in the north of the area would be beneficial, as well as test pits to check many of the small cut/burnt features shown in the magnetometry.

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References