# Geophysical investigation around the sites of the former monastic settlement, Killeigh, Co. Offaly

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**Report No: EGU 01/05**

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**2005**

# Site summary sheet

**Site Name:**
Former monastic settlement and associated archeological features, Killeigh, Co. Offaly. Irish Grid Reference approximately 236445 (E) 218238 (N).

**Survey type:**
Magnetometry using a Bartington 601 fluxgate gradiometer. Data collected in a zig-zag pattern at 1m traverse interval and 0.25m sample interval. Approximately 160,000 data points obtained mainly in 30 x 30m grids.
Resistance using a TRCIA twin electrode resistance meter with 0.5m electrode spacing. Data collected in a zig-zag pattern at 1m traverse interval and 1m sample interval. Approximately 40,000 data points obtained mainly in 30 x 30m grids.
Resistivity using a multi-core Campus Geopulse. Data collected for 10 parallel lines 1.5m apart..
Ground penetrating radar using Sensors & Software Ltd. equipment with an operating frequency of 200Mhz. Data collected at 0.1m spacing for 18 lines.

**Processing software:**
Data were processed using Geoplot, Surfer, Res2dinv, Res3dinv, Ekko-Mapper, pulseEKKO Ekko-View and Transform computer programs.

**Summary of results**
Six locations were investigated:

**Location 1:**
The magnetic data for this location showed 2 main concentrations of anomalous readings. One is a coherent regular region with parallel sides and right angles. It forms an L-shape is up to 40m in length and over 20m wide. This feature is close to the river and may be related to some type of mill working which would need access to water. This feature is partially parallel to another regular feature, 5. This is about 25m long and about 12m wide. Irish grid reference for centre of area 4 is 236445 (E) 218238 (N) and for area 5 (236467 (E) 218200 (N).
The most prominent features on the resistance plots are the pale arcuate lineaments which delineate the western enclosure boundary. These have been mapped in locations where the remaining visible embankments have been ploughed out though their subsurface presence for a distance of at least 50m can still be observed. They have been mapped northwards as far as Irish grid references 236366 (E) 218213 (N) and 236351 (E) 218213 (N). A second arcuate set of lineaments within this enclosure boundary is evident on the resistance data, indicating the possible existence of an inner enclosure boundary. The inner one also encompasses Abbey Farm, the generally accepted monastic centre in this part of Killeigh.

**Location 2:**
The resistance data for location 2 shows a number of well-defined resistance linear features, one of which apparently forms some type of enclosure. Others show very

prominent sharp angles suggesting that they may be the corners of buildings or plots of land. The south half of the image generally has a higher resistance than the northern part. This is a very magnetically noisy field and most likely the observed signatures are due to relatively recent activity or the burial of magnetic objects. A large circular anomaly about 10m in diameter is located in the western end of the field. This is most likely a singular metal object. Towards the east, there is an obvious broad linear zone of magnetic anomalies which may be related to trenching and the laying of pipes in this locality.

**Location 3**:
The resistance data, in this locality shows the presence of linear features which may represent other walls of the abbey. These are parallel or at right angles to existing boundaries. They appear to indicate an east west aligned building which may be 40-50 m in length (east-west) and up to 20m wide (north-south direction). A number of major arcuate linear features are also apparent on the resistance plot, mainly in the northeast part of the field up to 170m in length. A slightly undulating pale band can also be determined which may possibly be the course of an old filled in river.

**Location 4**:
A number of linear features were discovered though some are of recent origin. However, the possibility of a wall being present and other archeological features cannot be ruled out.

**Location 5:**
A number of resistivity plots were taken across the banks in order to determine if they were cored by stone or consisted of earth. The resistivity for the banks is of the order of 200-300 ohm m. This is far too low to be caused by stones or masonry.

**Location 6: Abbey Farm back garden.**
.The radar depth slices clearly show an anomaly zone coming in at a depth of about 58 cm which is about 2m long, is about 1m wide and continues to a depth of about 1.45m. There is a strong possibility that this may be a wall or path associated with the Chapter House. Resistivity depth slices were also obtained for the same area and they also support the presence of a feature at this locality.

**Survey details:**
Survey undertaken in the period January-August 2005 by Paul Gibson, Dorothy George, Lorraine O'Reilly, Aisling Creevey and Maria Byrne from the Environmental Geophysics Unit, Department of Geography, National University of Ireland, Maynooth, Co. Kildare. License Number: 05R015.

**Acknowledgements**
The authors would like to thank Offaly County Council and Caimin O'Brien from the Archaeological Survey of Ireland. Also, the land-owners of the Killeigh area for the courtesy they extended us and for permission to enter their land.

# Geophysical investigation around the sites of the former monastic settlement, Killeigh, Co. Offaly

## Introduction

Killeigh, is a small village situated about 10 km from Tullamore in Co. Offaly. However, within this village there is evidence of one of the largest (and relatively unknown) concentrations of ecclesiastical settlements in Ireland. The town gets its name from the Irish "the church of the field of the long ridge". An early Christian monastery existed here in the 9th century though was reputedly founded in the 6th century by St. Sincheal whose blessed well and associated "rag tree" is still visited today. Adjacent to the well (west of the town) is the remains of a double earthen bank and fosse which is seen to curve in a major arc. This matches up with an arcuate boundary to the north of the town and appears to form an enclosure that is over 500m in diameter. At the centre of this enclosure is Abbey Farm and the present day Church of Ireland church. A well-preserved 13th century barrel vaulted chapter house is located within Abbey Farm though architectural evidence indicates that it has been modified in the 14th and 15th centuries. Over 100 architectural fragments which have been discovered in the adjacent fields are housed in the Chapter House including arch spandrels, piers, statues and cross fragments. The remains of a cloister are preserved within the present plan of Abbey Farm.
A Franciscan Priory was founded in Killeigh in the 13th century and historical and architectural evidence indicates that it was located at Abbey farm.
In addition to the Franciscan Priory, an Augustinian Priory was founded at Killeigh in the second half of the 12th century. It is believed to be located just to the north of the Tullamore – Killeigh road where today a later bawn wall can be observed. Near the same location, an Augustinian nunnery was founded around the same time and this is supported by the discovery of a medieval stone head of a female at this site which, it has been suggested, represents a prioress or benefactress.
A greater understanding of this important ecclesiastical centre is only possible if the location of associated features can be determined. The project will entail a geophysical investigation of the fields around Abbey Farm which most records and maps indicate was the focus for the Franciscan Priory. In addition, a geophysical study will be undertaken to the north of the town where a ruined abbey is marked on early maps and which is believed to be the location of the Augustinian Priory and Nunnery.
This work was undertaken in the period January-August 2005 under permit number 05R015. Data were mainly collected by Paul Gibson, Dot George and Lorraine O'Reilly but Maria Byrne and Aisling O'Reilly also contributed. The authors of this report would like to thank the following for supporting this research:
Amanda Pedlow, Heritage Officer, Offaly County Council and Caimin O'Brien from the Archaeological Survey of Ireland.
In addition, this work could not have been undertaken without the full co-operation of the landowners who allowed access to the relevant areas. An especial thanks goes to them:

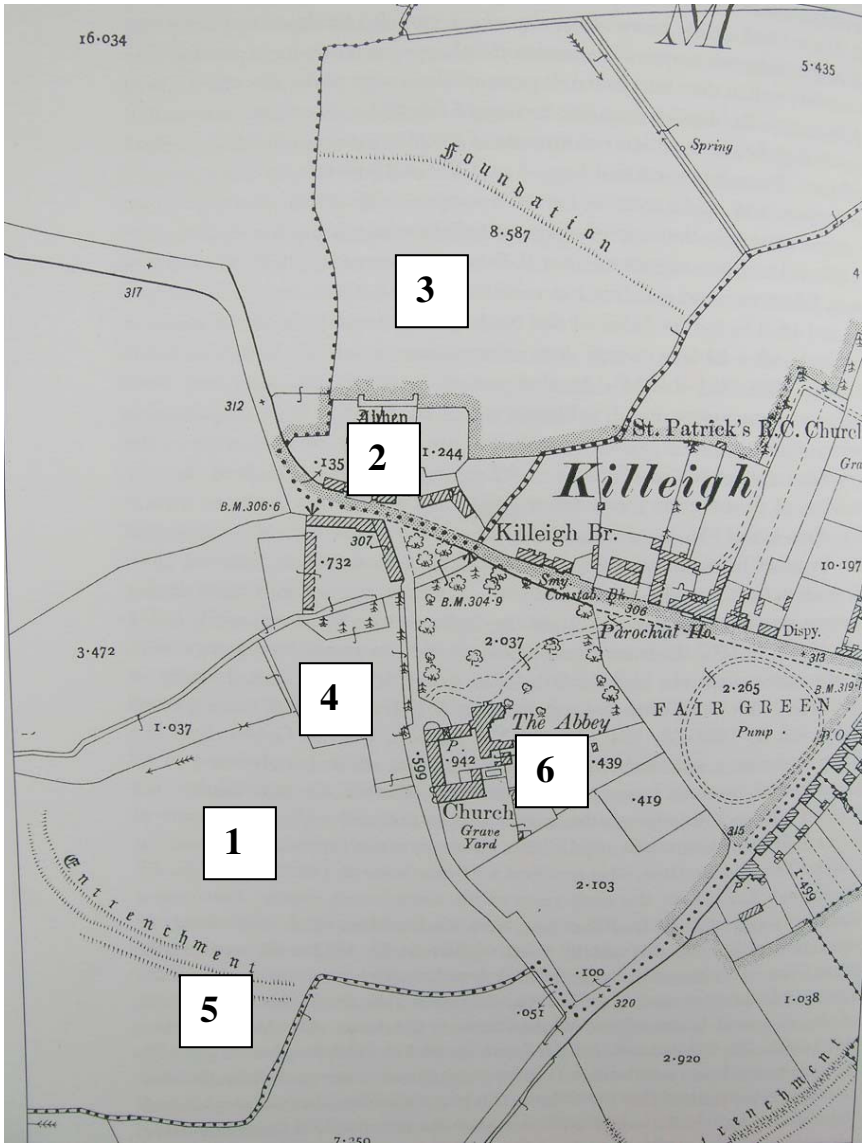


Figure 1: Killeigh village and locations geophysically investigated. Figure courtesy of Ordnance Survey.

## Geophysical techniques

Geophysical data were collected at the Killeigh monastic site in the period January-August 2005 using ground penetrating radar, resistance, magnetics and resistivity. Magnetic data were collected for 30 x 30m grids with a traverse spacing of 1m and a station spacing of 0.25m. Resistance data were collected for 30 x 30m grids with a traverse spacing of 1m and a station spacing of 1m.
In all:

- 11 lines of electrically imaged resistivity data were collected.
- 18 ground penetrating radar lines were collected.
- Magnetic gradiometry data for a number of areas were collected which were of various sizes, mainly 30x30m grids. In all 160,000 data points were collected.
- Resistance data for a number of areas were collected. These were of various sizes mainly 30x30m grids. In all 40,000 data points were collected.

A short outline of the theoretical principles behind each of these techniques is followed by sections considering:

1. Geophysical characteristics within area 1, Figure 1.
2. Geophysical characteristics within area 2, Figure 1.
3. Geophysical characteristics within area 3, Figure 1.
4. Geophysical characteristics within area 4, Figure 1.
5. Geophysical characteristics within area 5, Figure 1.
6. Geophysical characteristics within area 6, Figure 1.

## Resistance and Resistivity theory

Resistance surveying has been employed for a long time in archaeological investigations because anthropogenic features are often very regular in shape and provide good resistance contrasts with the background. The variation in subsurface moisture content dictates to a large extent the changes in resistance. Infilled defensive ditches are often wetter than surrounding regions and are associated with low resistivity values whereas buried walls or foundations may appear as high resistance features. It should be stressed though that features detected by resistivity means cannot be unambiguously identified until excavated, as each site is different. For example, a ditch may have been infilled with stones and it may then have a relatively high resistance and water can collect under buried walls resulting in low resistance. A TRCIA twin electrode resistance meter was employed in this study (see Figure 2).
Resistivity data were also collected using a 2D electrical resistivity imaging technique. A Campus Geopulse resistivity meter was employed in this instance. Two-dimensional electrical imaging (also termed tomography) allows the acquisition of apparent resistivity variations in both the vertical and horizontal directions. Electrical imaging was undertaken using an insulated multi-core cable with a number of fixed interval take off points to which electrodes are connected. The cable is connected to the resistivity meter

which in turn is connected to a laptop computer which contains the relevant software to run the process. A parameter file was written to instruct the computer which sets of 4 electrodes to use and the currents to apply. For this study the data lines were obtained with an electrode spacing of between 0.25 and 2m which gave greater detail in the upper layers of the subsurface.
In order to determine how the true resistivity varies with depth the data must be modelled using a computer program. One such program that is widely used in resistivity work is the inversion program RED2DINV.

**Measuring the Earth's magnetic field**
A magnetometer is a device used to measure the intensity of the Earth's magnetic field at a specific location. There are various types of magnetometer which operate using different physical principles, though the one employed in this study was a fluxgate magnetometer.
The fluxgate magnetometer consists of two short ferromagnetic bars around which identical primary coils are wound though in opposite directions. This array is surrounded by a secondary coil. An alternating current is applied to the primary coils which in the absence of an external magnetic field produces zero output in the secondary cool because the primary coils are oppositely wound. However, when positioned such that the cores are aligned with the component of the Earth's magnetic field which is of interest, a voltage is induced in the secondary coil because the Earth's field is increased by one core and decreased by the one whose windings are in the opposite direction. This induced voltage is proportional to the strength of the component of the Earth's magnetic field to which the cores are parallel. It is possible, by changing the orientation of the fluxgate magnetometer, to measure the total field (F), the horizontal field (H) or the vertical field (Z). However, very accurate alignments are required in order to obtain accurate readings of H and Z. These high accuracies can be obtained at base stations where three fluxgate magnetometers can be permanently fixed such that one obtains values of Z and the other two measure the northerly and easterly components of the horizontal field.
When a magnetic reading is obtained using a magnetometer, this represents the resultant of the addition of the Earth's magnetic field vector and the anomaly due to all the subsurface sources. However, it is shallow sources that are of most importance in archaeological investigations but the relative contribution of shallow and deep sources cannot be determined from a single magnetic reading. However, this problem can be overcome by using the magnetometer in gradiometer mode and acquiring two simultaneous readings from two sensors located at different heights. This is accomplished by placing sensors a fixed vertical distance apart. In this study a Bartington Grad-601 gradiometer was employed with a vertical separation of 1 m between the two sensors.

**Ground penetrating radar**
Ground penetrating radar (GPR) is an electromagnetic geophysical technique which can, under certain circumstances, provide a very detailed image of the subsurface. In essence, GPR consists of transmitting electromagnetic (EM) pulses into the ground and measuring the signals that are reflected back from subsurface interfaces or bodies and the times at which these signals are acquired at the receiver. GPR systems are designed to operate at different frequencies ranging from about 10 MHz to 1500 MHz. The GPR data will be

collected with a Sensors & Software pulseEKKO 100 system. The main power supply is typically a 12 V rechargeable battery which is used to power the control console. A high voltage electrical pulse is sent from the console to the transmitter by means of fibre optic cable and the pulse is injected into the ground via the transmitter antenna which has a designated central operating frequency. As the input energy wave travels down, it encounters discontinuities in the subsurface such as changes in rock type, water content or grain size and a fraction of the input energy is reflected back towards the surface. The receiver records the reflected signal and the results are shown on a display unit that is often the screen of a laptop computer. The data are stored digitally on the computer which also contains the software programs used to control the collection of the data and also the processing of the radar data.

The GPR system will be used in constant separation mode. In constant separation mode, the receiver and transmitter antenna are kept a fixed distance apart and an initial reading obtained. The two-antenna set-up is then moved a set distance and a second reading obtained and so on.

(a)

(b)

(c)

Figure 2: (a) Twin electrode resistance equipment; (b) Bartington magnetic gradiometer; (c) Sensors and Software Inc. ground penetrating radar equipment.

**Location 1: Field west of Abbey Farm (Choiseul Field)**

Abbey Farm and the associated Church of Ireland Church have been the focus of a possible ecclesiastical centre. Twenty-two grids, each with dimensions 30 x 30 m of magnetic and resistance data were collected in the large field west Abbey farm and enclosed by the double rampart in the west. This field is owned by J. Choiseul and will be referred to as the Choiseul field.

**Magnetic results of the Choiseul field.**

In all, 79,200 magnetic data points were collected in this field. The data were collected in a zig-zag manner and processed in Geoplot and Surfer software. Figure 3 shows the location of the magnetic grids and Figure 4 is a more detailed version of the results. A number of distinct magnetic zones were located on the survey. There are 2 adjacent areas which show clear evidence of ploughing patterns with markedly different trends, 1, 2, Figure 4. Area 1 is about 30m wide and is clearly bounded by 2 parallel field boundaries. This field trends NNE-SSW. There is no evidence in the field for the prominent field patterns in the SE part of the study area (area 2, Figure 4). These extend for a least 60 m in both direction and are characterised by a NW-SE trend. A very prominent later linear feature cuts across the plough patterns. The boundary enclosure ridges and ditch in the west are not associated with a magnetic signature.

There are 3 areas where very varied and anomalously high and low magnetic values indicated the presence of anthropogenic activity, 3, 4 and 5, Figure 4. The linear blue signature, 3 Figure 4 is due to a metal magnetic fence and the other scattered signatures in the same vicinity, which is near the road, probably represent wire, nails etc. Area 4 is a coherent regular region with parallel sides and right angles. It forms an L-shape is up to 40m in length and over 20m wide. This feature is close to the river and may be related to some type of mill working which would need access to water. This feature is partially parallel to another regular feature, 5, Figure 4. This is about 25m long and about 12m wide. Irish grid reference for centre of area 4 is 236445 (E) 218238 (N) and for area 5 (236467 (E) 218200 (N).

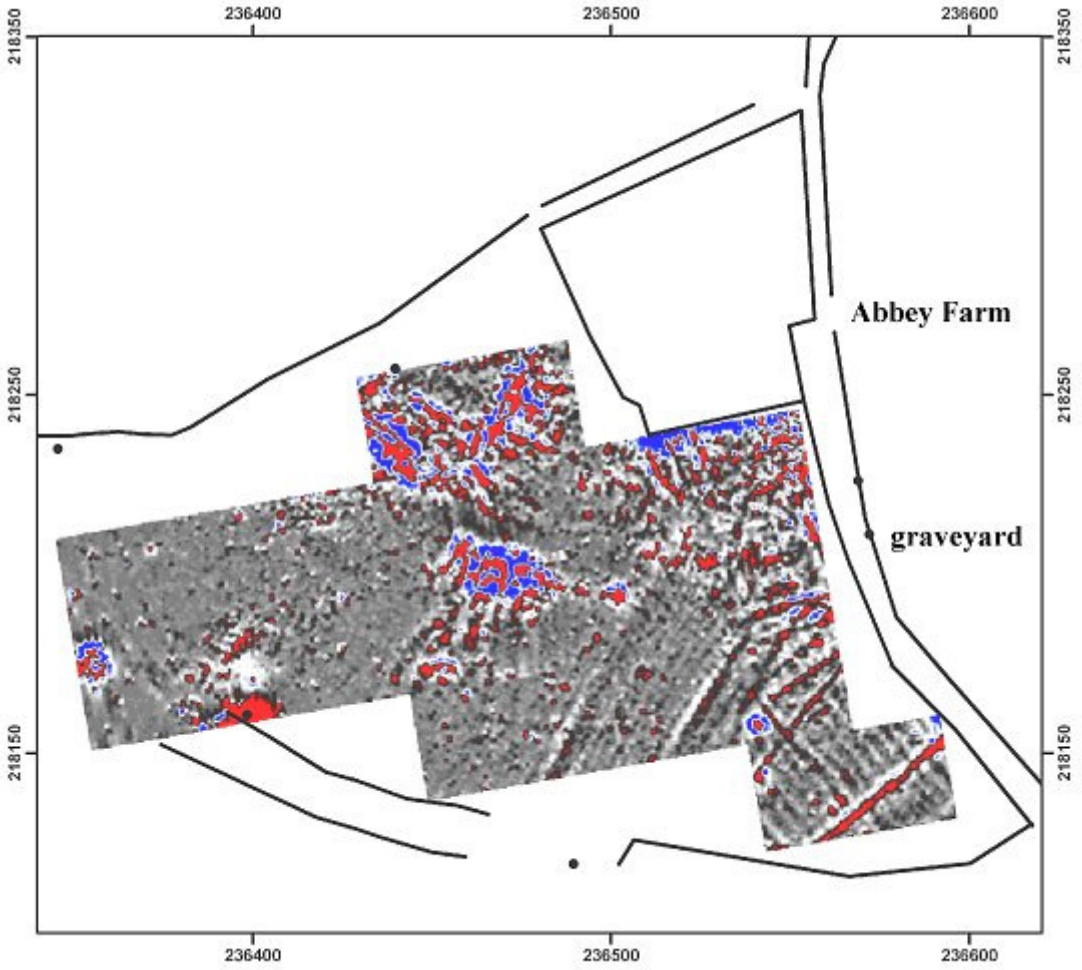


Figure 3: Location of magnetic data

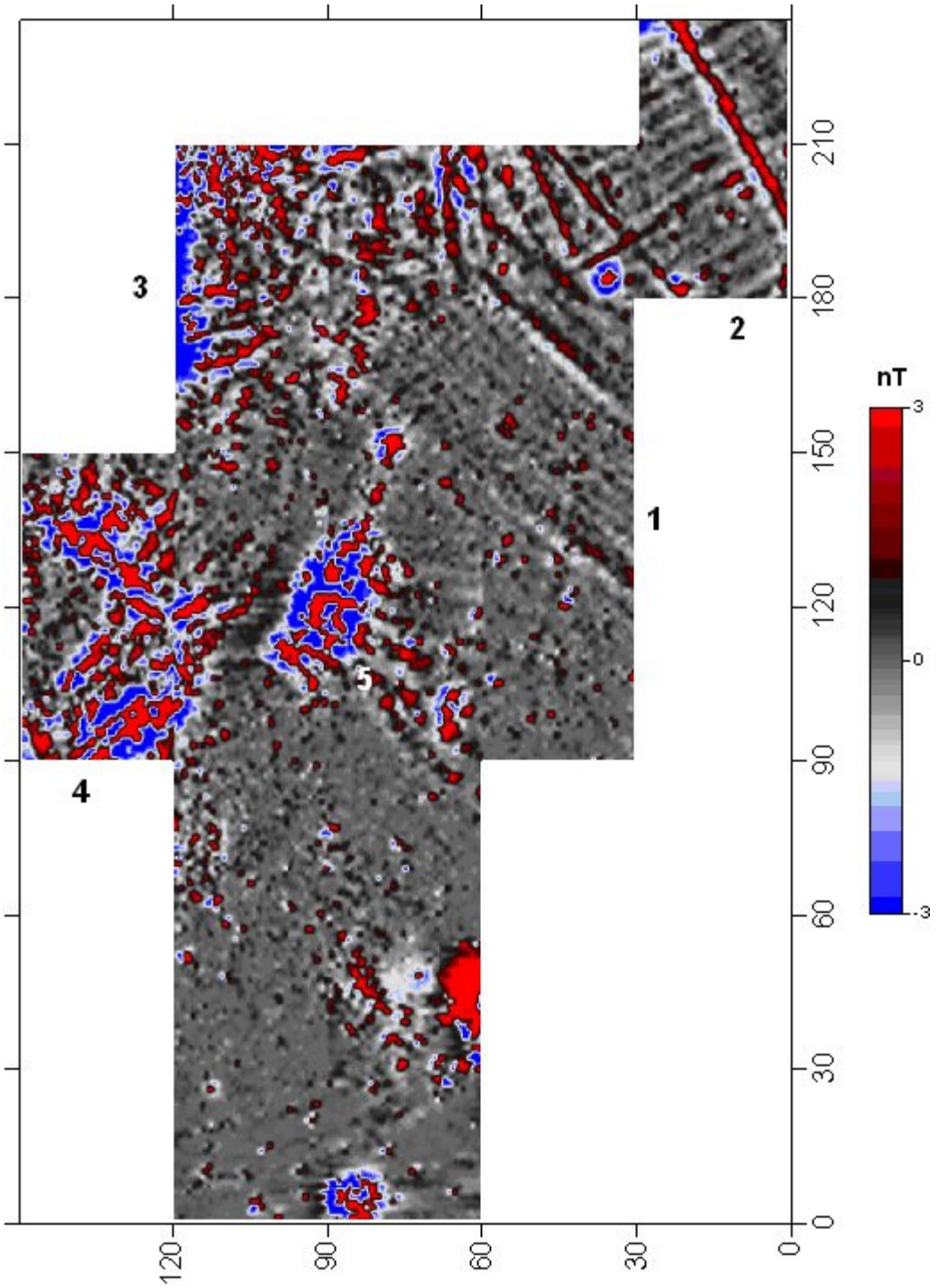


Figure 4: Deatails of magnetic data results in Choiseul field.

**Resistance results of the Choiseul field**

In all, approximately 20,000 data points were collected in this field. The data were collected in a zig-zag manner and processed in Geoplot and Surfer software. Figure 5 shows the location of the resistance grids and Figure 6 is a more detailed high pass filtered version of the resistance results. Figure 7 shows an interpretation of the resistance data whilst Figures 8 and 9 show direction-filtered versions of the results. The distinct NNE-SSW ploughing pattern so obvious in the magnetic data is also prominent in the resistance data, 1, Figure 6, but the NW-SE ploughing pattern, which is clearly defined on the magnetic data is totally absent on the resistance plots.

The most prominent features on the resistance plots are the pale arcuate lineaments which delineate the western enclosure boundary, (2 and 3, Figure 6). These have been mapped in locations where the remaining visible embankments have been ploughed out though their subsurface presence for a distance of at least 50m can still be observed. The continuation of one of these embankments can be seen at 2a, Figure 6). They have been mapped northwards as far as Irish grid references 236366 (E) 218213 (N) for (2) and 236351 (E) 218213 (n) for (3). About 5m west of the 2 main embankments, another outer parallel lineament has been mapped for 50m, 4, Figure 6. This feature is however considerably narrower than the other two.

A second arcuate set of lineaments within this enclosure boundary is evident on the resistance data, indicating the possible existence of an inner enclosure boundary, 5 and 6, Figure 6. Figure 5 shows the geographical context of both the inner and outer boundaries and it can be seen that the inner one also encompasses Abbey Farm, the generally accepted monastic centre in this part of Killeigh. This situation is not uncommon, as different people may have been allowed access to different parts of the monastic settlement. The inner boundaries extend for distances of over 70m and are apparently terminated in the east by the field with a distinct ploughing pattern, 7 Figure 6. However, subtle features can be seen beneath the ploughing pattern suggesting that the inner boundaries continue as far as the road, 8, Figure 6. Other features can be same in the same locality, part of a possible enclosure (9, Figure 6 and other linear features, 10, Figure 6). Little can be discerned for the centre of Choiseul's field, though a series of converging linear features are apparent which may represent paths or field boundaries (11, Figure 6).

The main features shown on the resistance plot are delineated as red lines on Figure 7. A modified version of this plot is shown in Figure 8 in which the high and low extremes are shown in red and blue respectively. This has shown a sharply defined change at 1, Figure 8.

Filtered versions of the resistance plot are displayed in Figures 9 and 10 and these allow the illumination direction to be varied which often results in the enhancement of subtle features.

Figure 11 shows a radar image across the inner boundaries and it is interpreted in Figure 12. There appears to be an undulating subsurface feature at a depth of about 1 m which supports the view that these are banks and an intervening fosse.

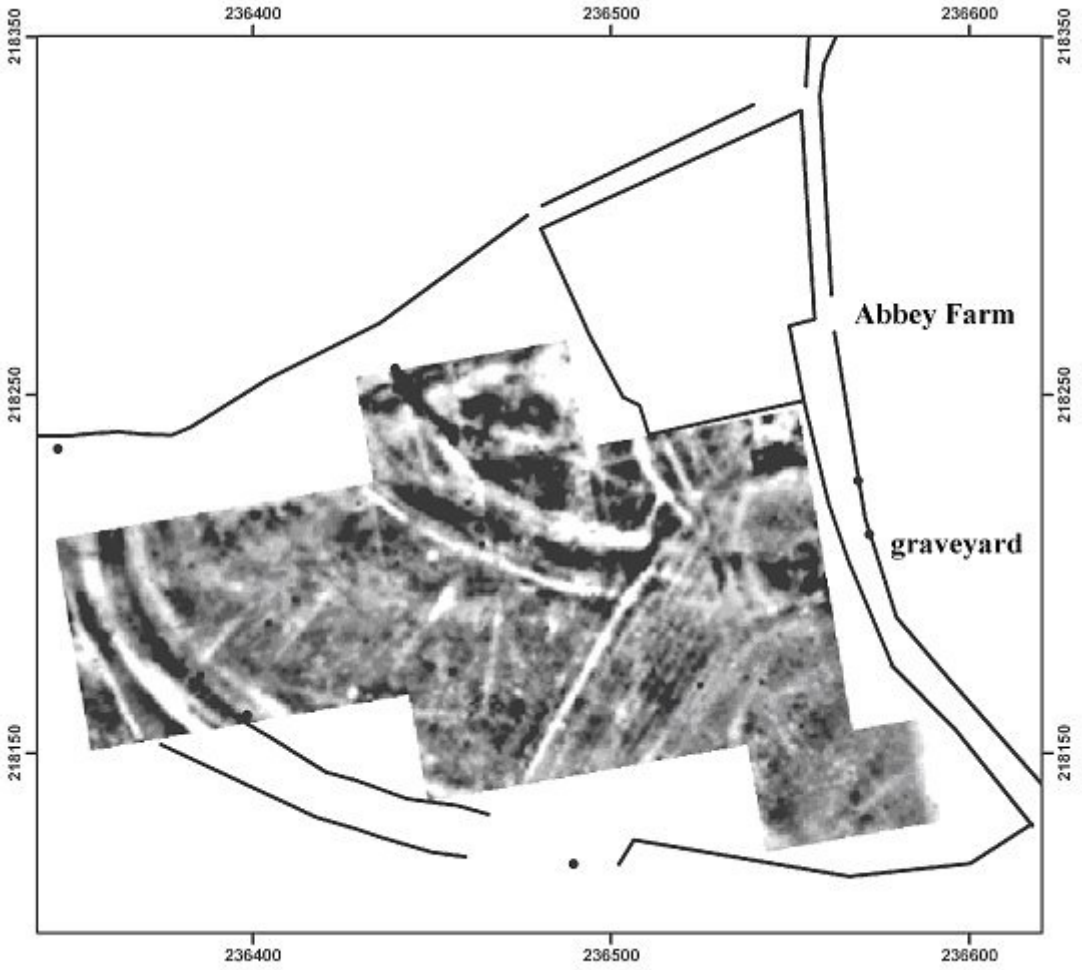


Figure 5: Geographic location of resistance data in Choiseul field.

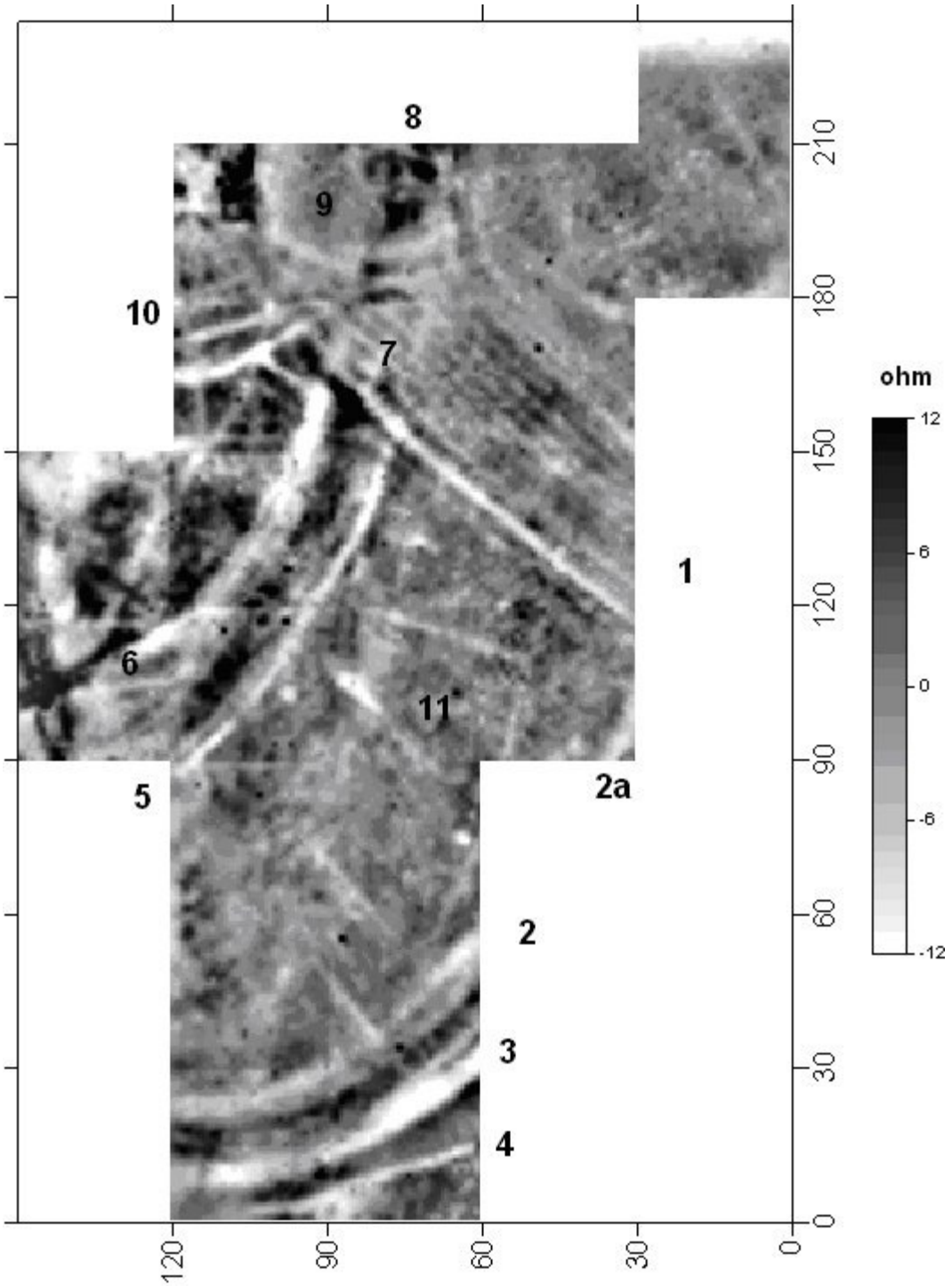


Figure 6: High pass filtered resistance data for Choiseul field.

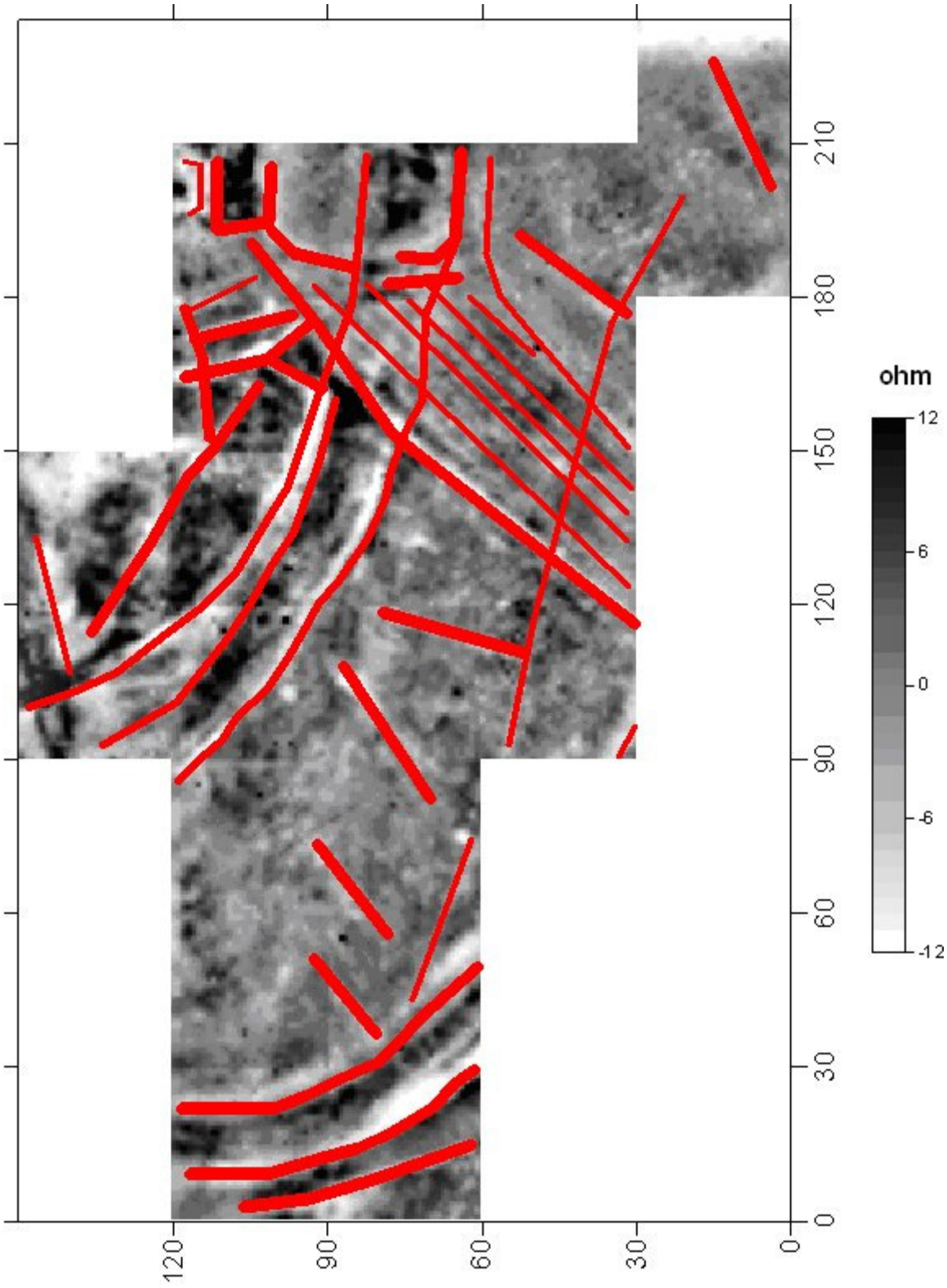


Figure 7: Interpretation of resistance data.

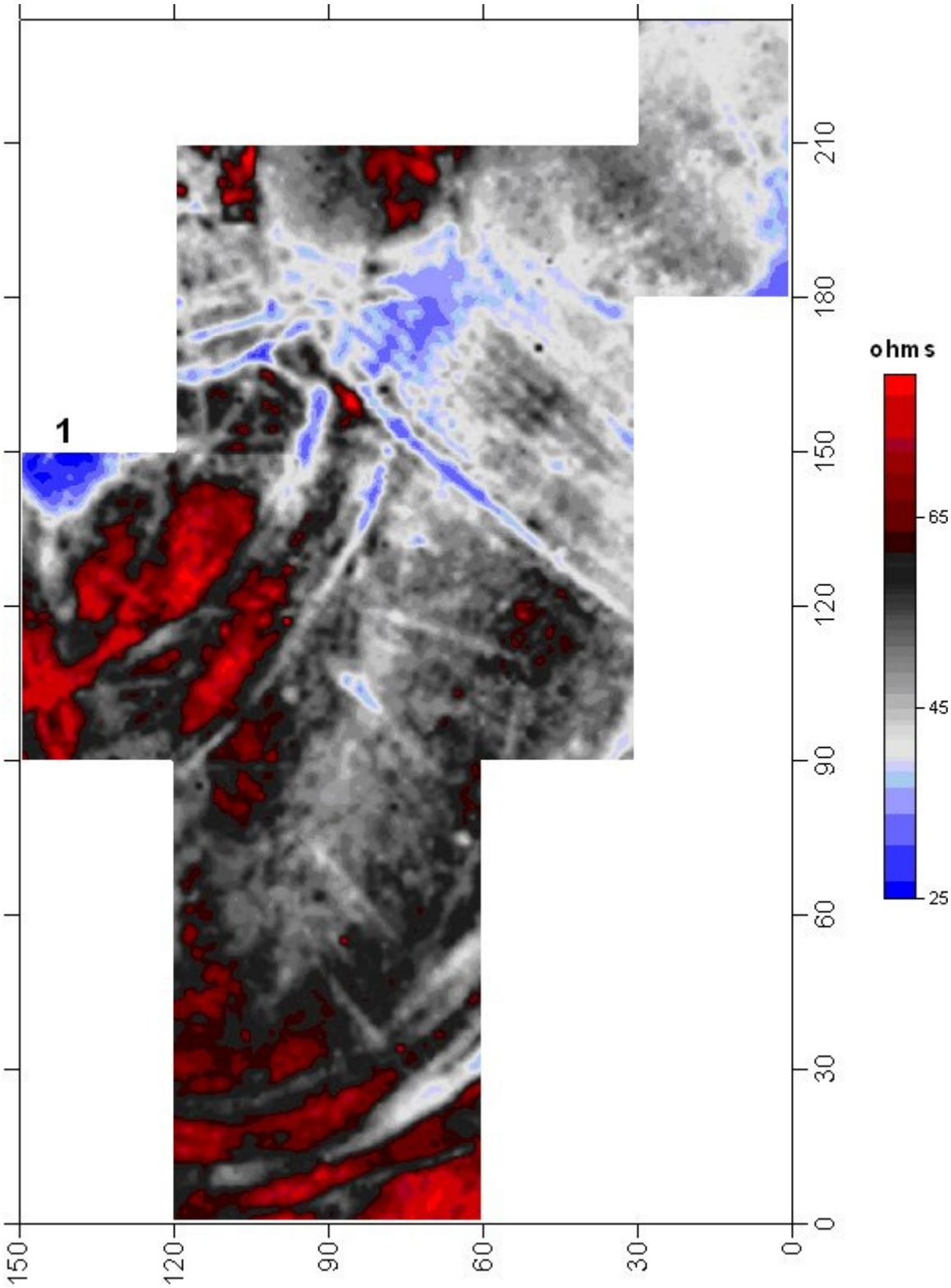


Figure 8: Colour version of resistance data.

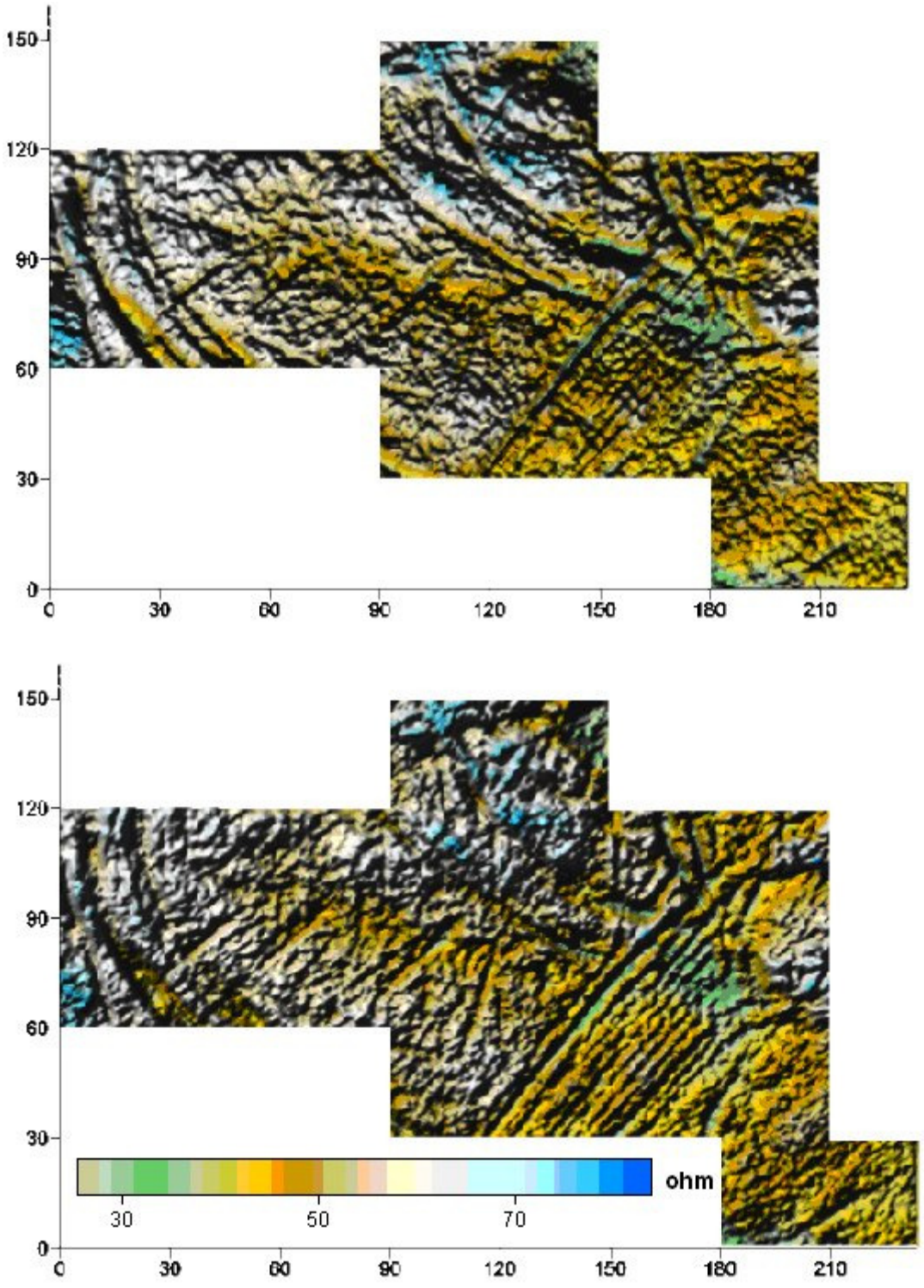


Figure 9: Directionally filtered versions of the resistance data.

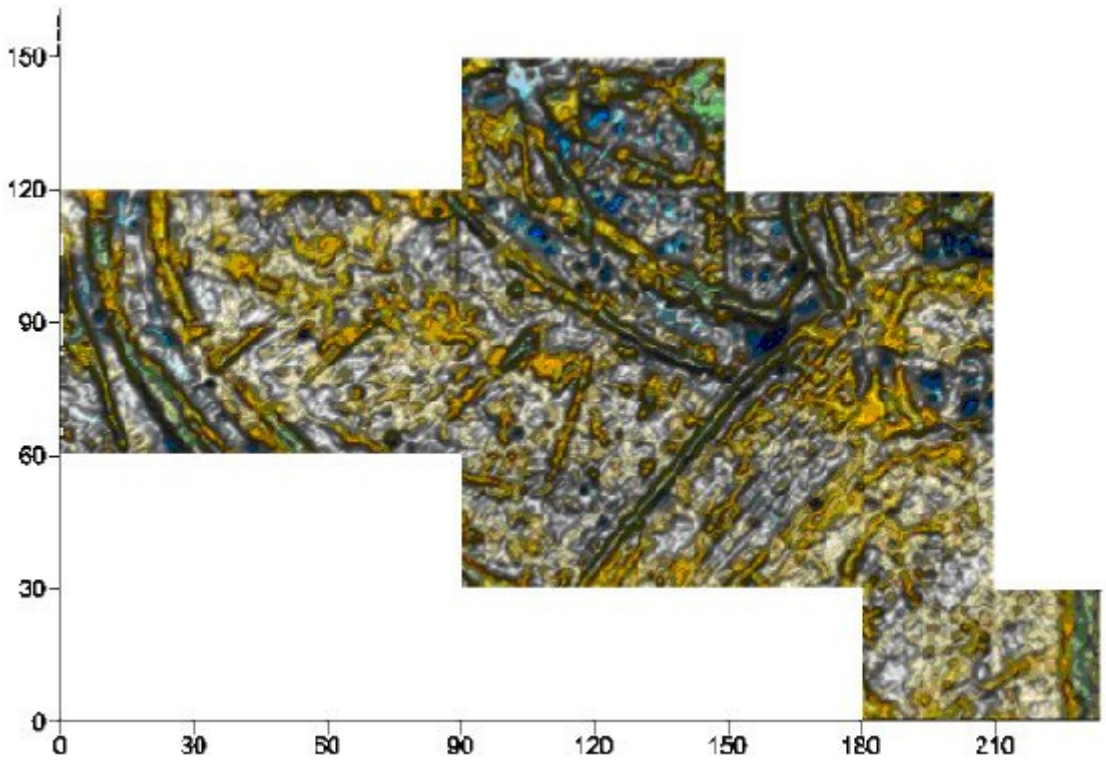


Figure 10: Directionally filtered versions of the resistance data.

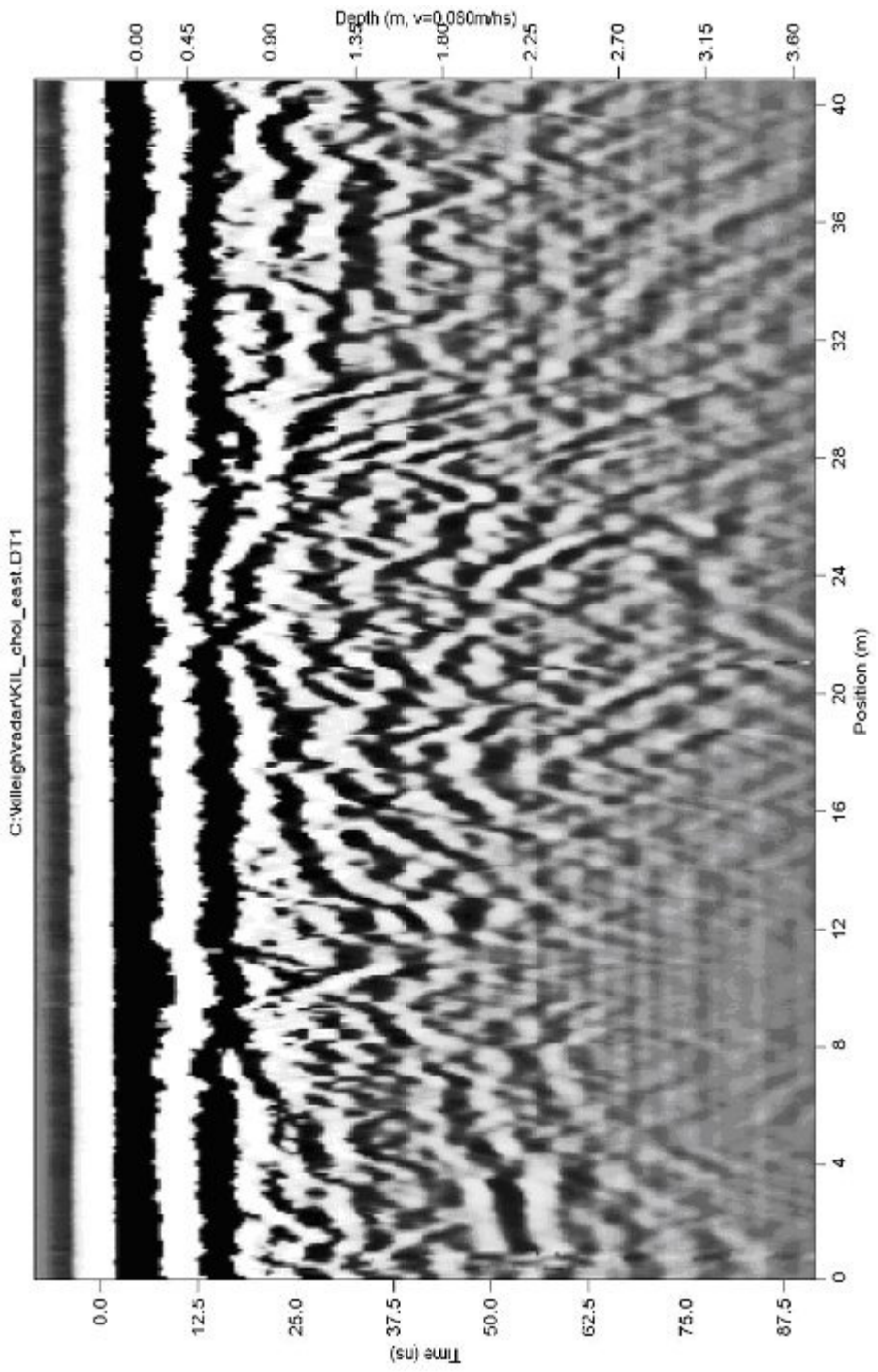


Figure 11: Radar image across inner boundaries from SW-NE.

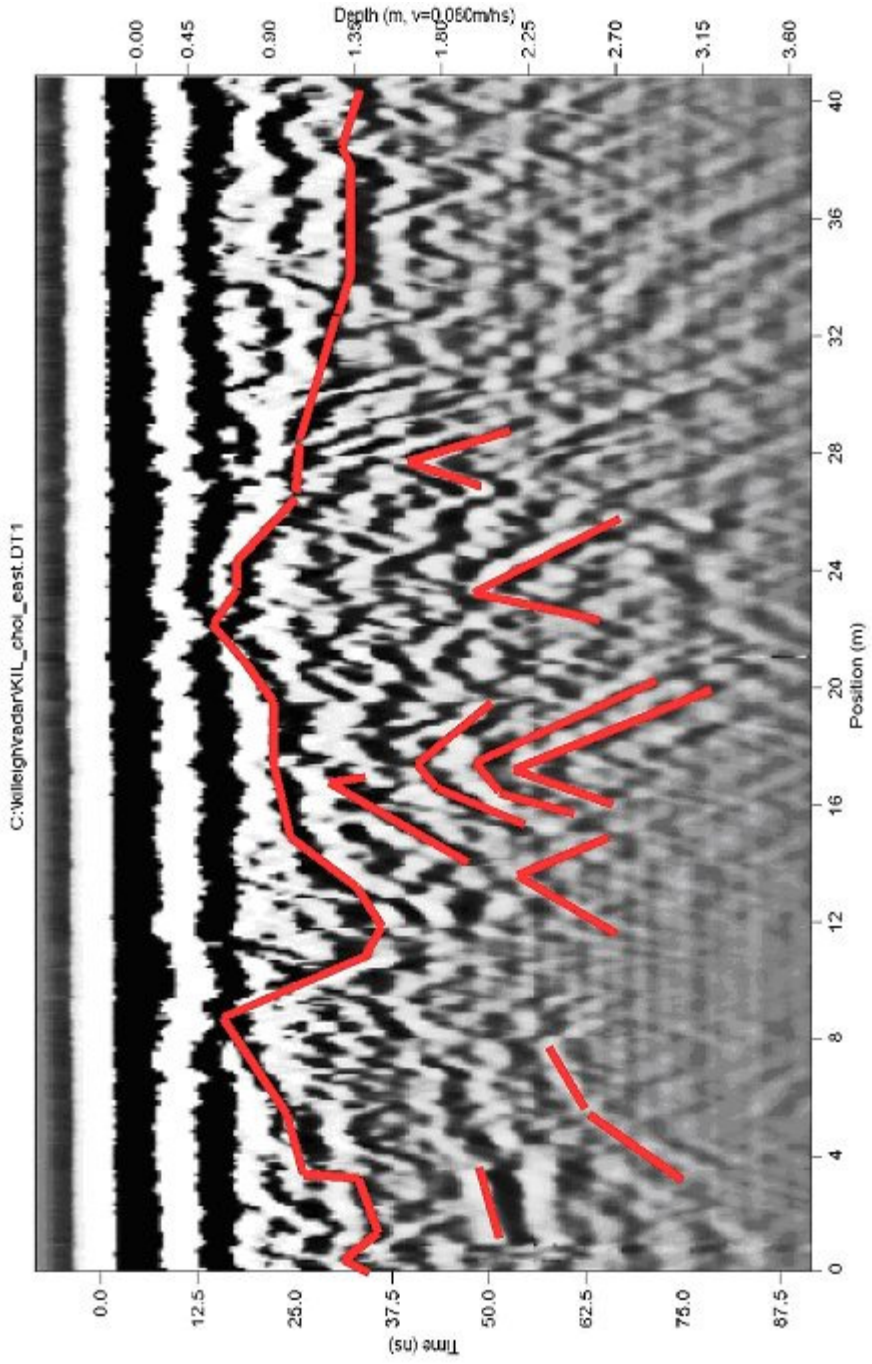


Figure 12: Interpretation of radar image.

**Location 2**
The second area investigated is north of the Tullamore – Killeigh road where Ordnance Survey maps show the wall of an abbey and also indicate the presence of “foundations. However, the latter is more likely to be a boundary.


Figure 13: Fields 1 and 2 at locations 2 and 3 respectively, Killeigh.

Figure 13 shows an oblique aerial photograph of the area investigated. The wall of the “abbey" separates fields 1 and 2. The outer boundary is clearly defined in field 2 though it was not so prominent on the ground. It is also unlike the boundary in location 1. Initially field 1 was investigated using a Bartington magnetic gradiometer– see Figure 14 for location map and Figure 15 for detailed magnetic plot. This is a very magnetically noisy field and most likely the observed signatures are due to relatively recent activity or the burial of magnetic objects. There is also a number of metal manhole covers and consequently underground pipe work. The linear blue signature along the right hand edge of Figure 15 is due to a metal fence. A large circular anomaly about 10m in diameter is located in the western end of the field, 1, Figure 15. This is most likely a singular metal object. Towards the east (2, Figure 15) there is an obvious broad linear zone of magnetic anomalies which may be related to trenching and the laying of pipes in this locality. It should be noted that ordnance Survey maps of the 1840s show a number of small buildings in this locality.
The resistance data for location 2 is shown in Figure 16 and a colour version of resistance data for field 1 is given in Figure 17 (along with an interpretation. Figure 17 shows a number of well-defined resistance linear features, one of which apparently forms some type of enclosure. Others show very prominent sharp angles suggesting that they may be the corners of buildings or plots of land. Interestingly, the south half of the image generally has a higher resistance than the northern part.

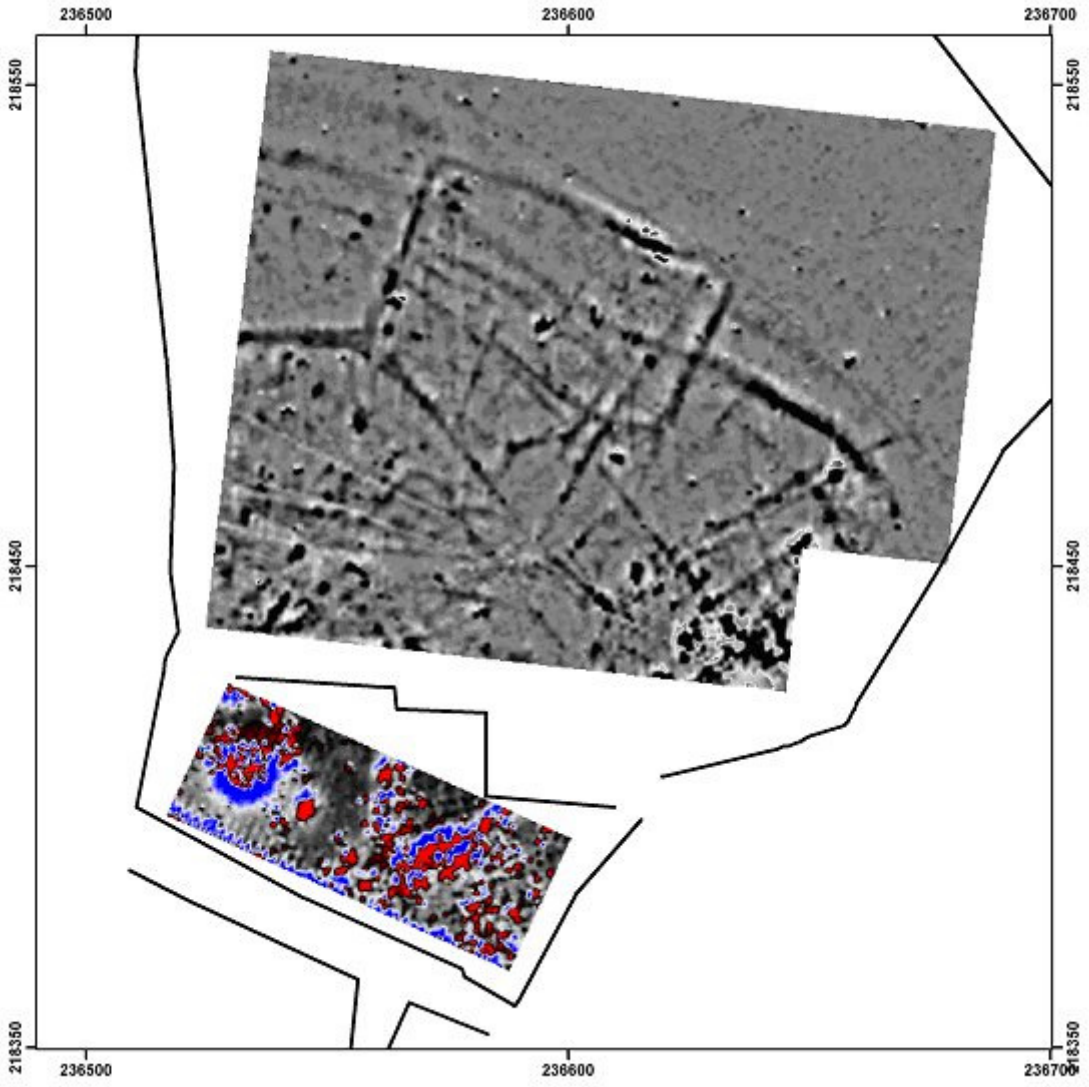


Figure12: Magnetic data for locations 2 and 3.

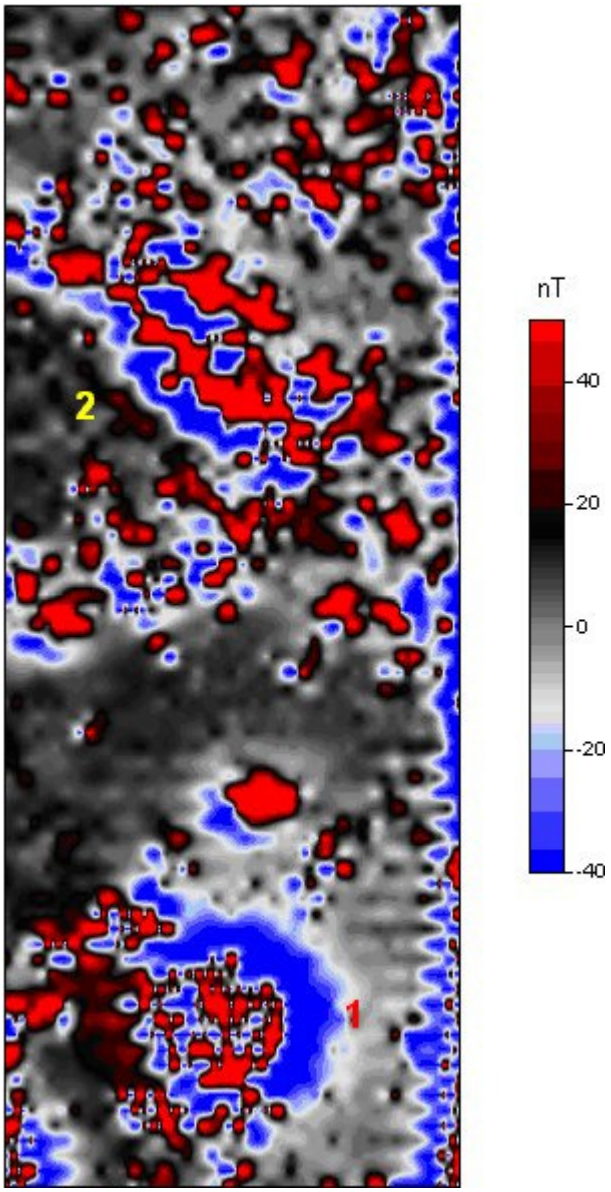


Figure 15: Magnetic data for field 1 in location 2.

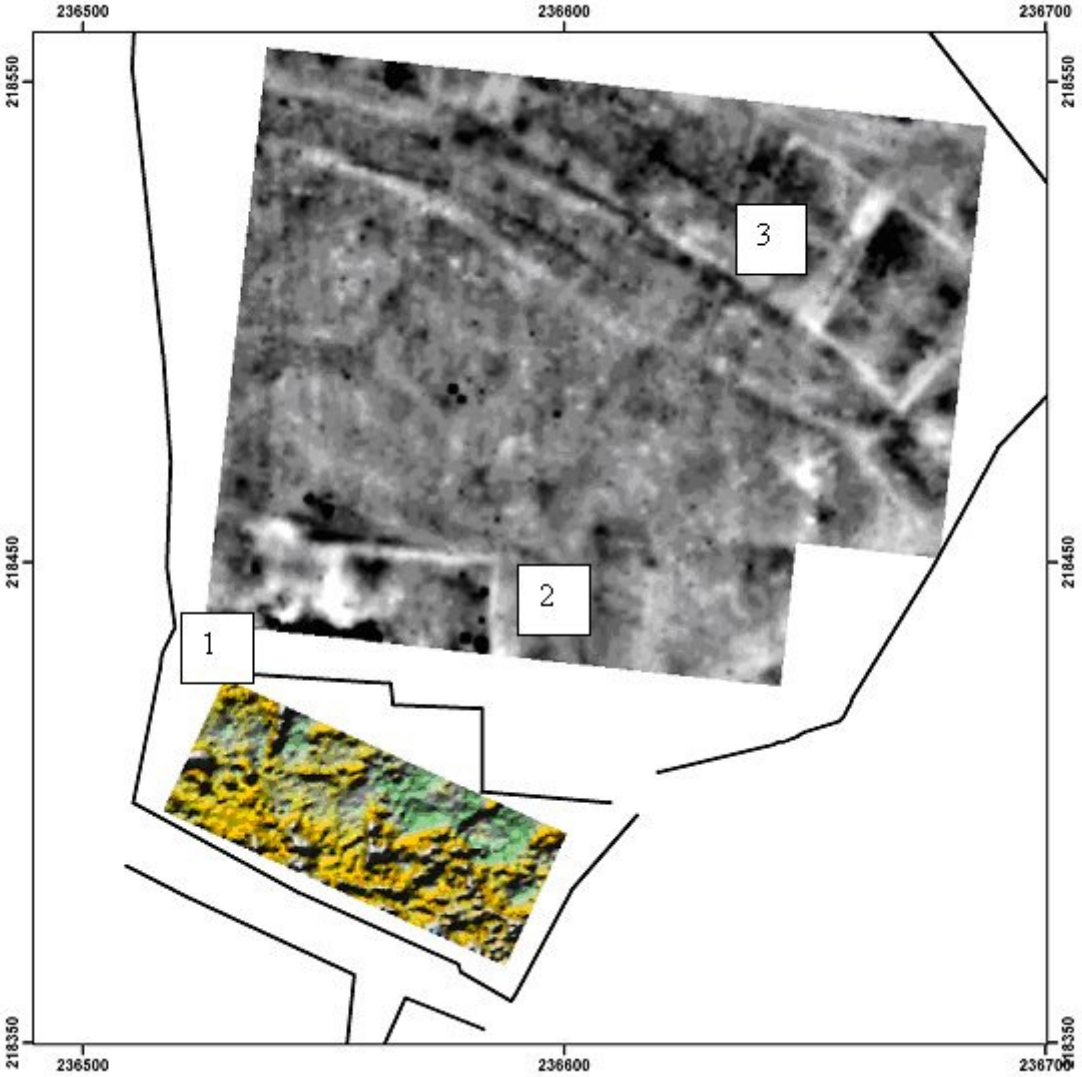


Figure 16: Resistance data for locations 2 and 3.

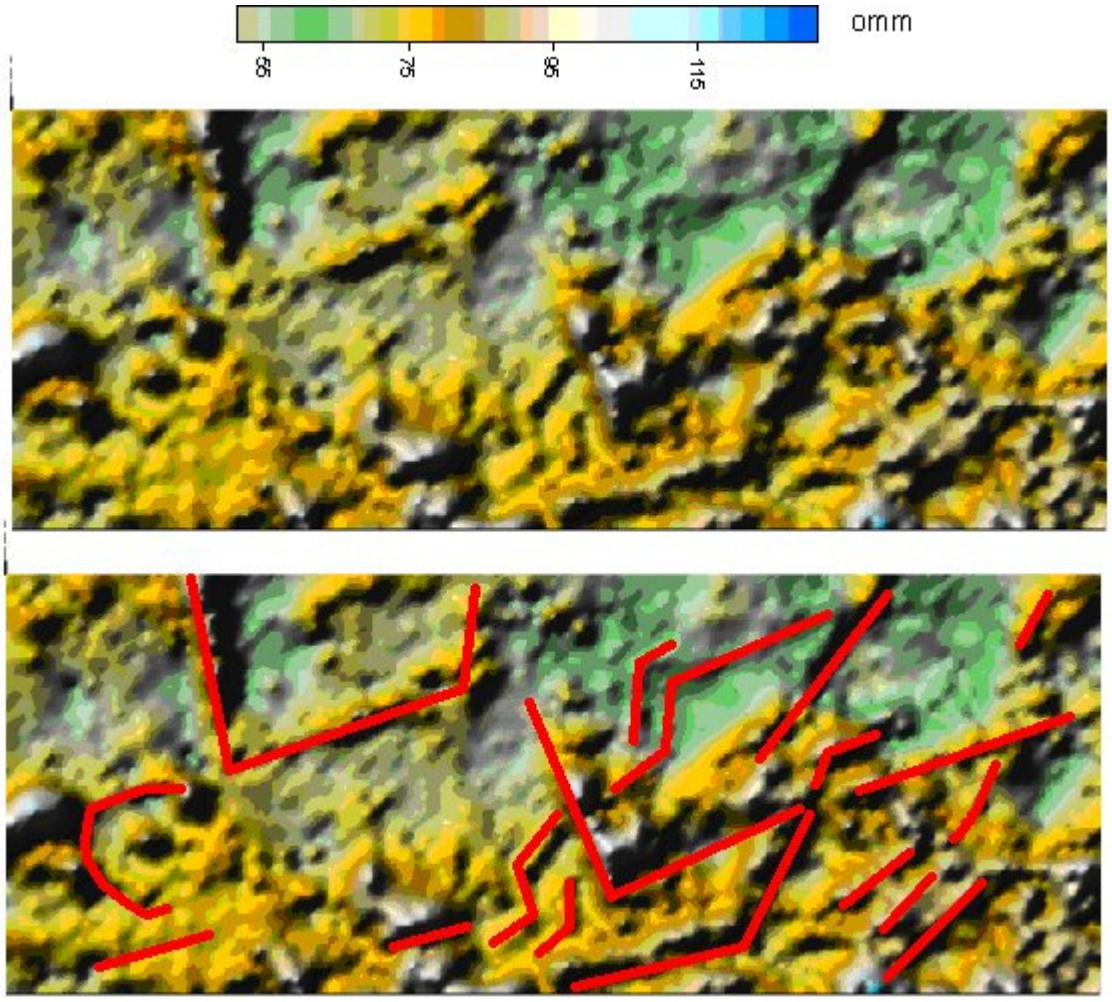


Figure 17: Resistance data for field 1, location 2.

**Location 3**

19 grids of magnetic and resistance data, each 30 x 30m in size were obtained in Field 2, location 2 (see Figure 13 for aerial photograph). Thus 17,100 resistance points and 68400 magnetic data points were acquired. Major features were located on both magnetic and resistance plots and the two techniques complemented each other to a significant degree. The bawn wall shown in Figure 16 (1) is generally taken to have formed at some stage part of the abbey. The resistance data, in this locality shows the presence of linear features which may represent other walls of the abbey, 2, Figure 16 and 1, Figure 18. These are parallel or at right angles to existing boundaries. The low high pass filtered results suggest that the walls have been robbed out and they are associated with low resistance values. They appear to indicate an east west aligned building which may be 40-50 m in length (east-west) and up to 20m wide (north-south direction). A concentration of dark signatures (2, Figure 18) suggests rocks or masonry beneath the surface.

A number of major arcuate linear features are also apparent on the resistance plot, mainly in the northeast part of the field. The boundary indicated by a 170m long arcuate lineament (3, Figure 18) is the features shown on the aerial photograph (Figure 13). The boundary is geophysically totally unlike the one seen in Choiseul field and may not be contemporary. There is a parallel outer boundary to the northeast (4, Figure 18) with clear evidence of connecting anomalies (5, Figure 180 possibly forming different field plots. A slightly undulating pale band can also be determined (6, Figure 18) which may possibly be the course of an old filled in river. Faint ploughing patterns can also be discerned, 7, Figure 18).

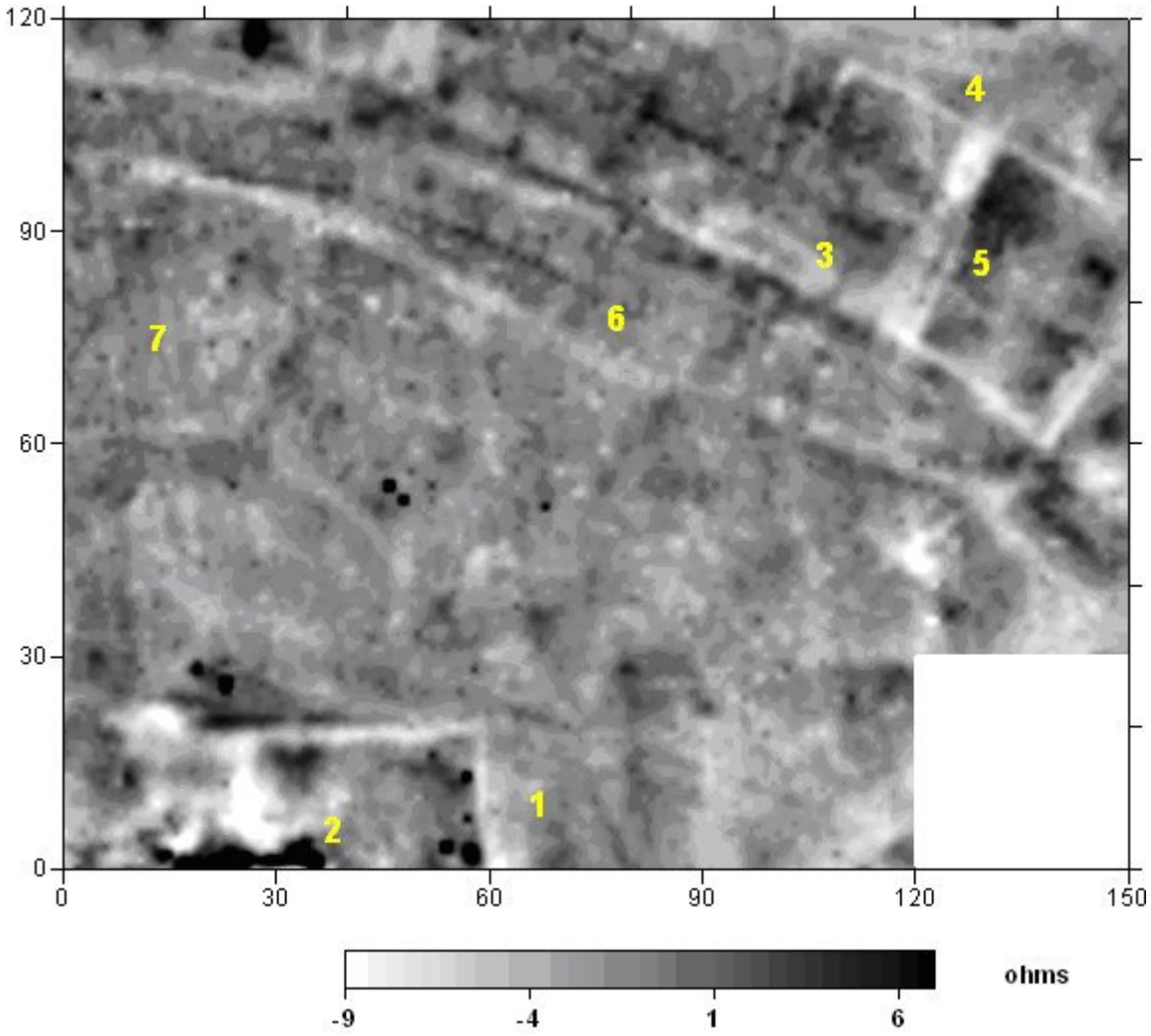


Figure 18

**Location 3 – results of magnetometer survey**

A magnetic survey was undertaken covering the same area as covered by the resistance survey – see Figure 14 for location. The results of this magnetic survey are given in Figure 19 and an interpretation shown in Figure 20. Many features are shown on the magnetic plot which do not feature on the resistance plot. There is a clear difference northeast and southwest of the arcuate boundary shown in Figure 18 (3). Northeast of this boundary, the area is magnetically homogenous with very little information being revealed (1, Figure 19) whereas to the southwest many features can be observed (2, Figure 19). The boundary itself is not well displayed on the magnetic plot.

The most obvious feature is a large "open" rectangular feature which is at least 60m wide, 3, Figure 19.This feature clearly respects the northeast boundary as it terminates against it. Another feature is seen to continue westward. A very distinct "3 armed" divergent pattern can be observed with a possible entrance at 5, Figure 19. Note this feature is also just visible on the resistance plot which re-enforces its archaeological importance.

The area is crisscrossed by linear anomalies which are essentially of 2 types. Very thin ones (6, Figure 19) trend towards an area of disturbance in the southeast corner of the field. This is caused by metallic manhole covers and these features most likely represent recent drains that have been laid in the field. The others are concentrated in the rectangular feature, have high magnetic signatures, are broader and have different trends, 7, Figure 19. In all probability the geophysical techniques are displaying features of different ages which have been overlain. The undulating broad lineament is also clearly displayed on the magnetic data, 8, Figure 19.

An attempt has been made to display the magnetic and resistance data simultaneously. In order to achieve this a number of steps were undertaken.

- The magnetic resistance and ratio of magnetic to resistance data were normalized so that the magnetic and resistance data ranged from 0-1 and the ratio from 0-2.
- The data were rescaled 0-255 and converted into tiff files.
- The tiff files were combined and converted into an ERDAS imaging image file.
- A principal component transform were applied to the data and the resultant 3 principal component images were displayed in red, green and blue.

The results are shown in Figure 21. In this display the magnetic data are shown in green and purple whereas the resistance data are in black/ grey/ white. The clear control of the main boundary is very obvious by the lack of colour to the northeast. This display has also revealed a lot of subtle information and allows the viewing of all features revealed in this region.

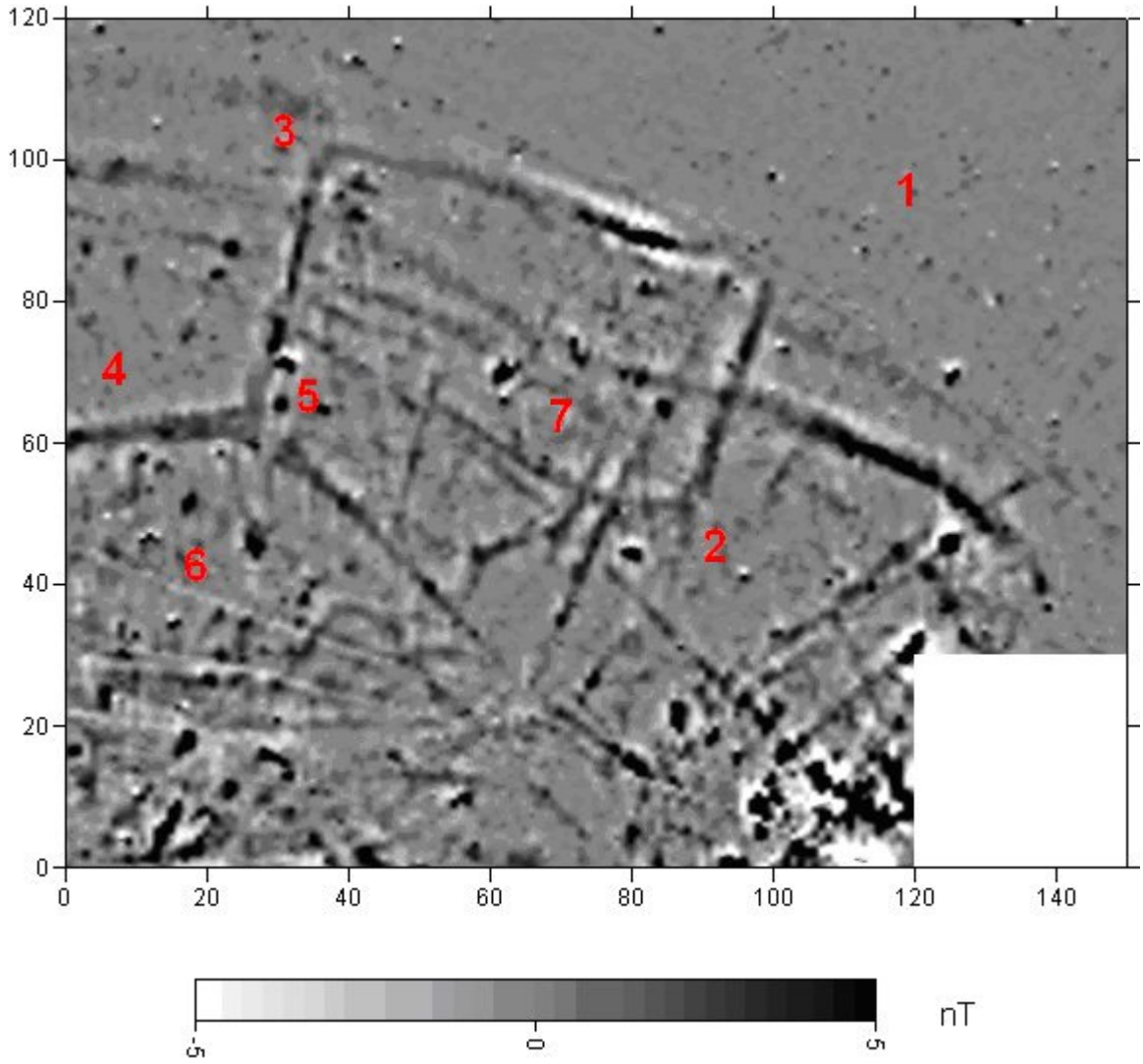


Figure 19: Magnetic plot for location 3.

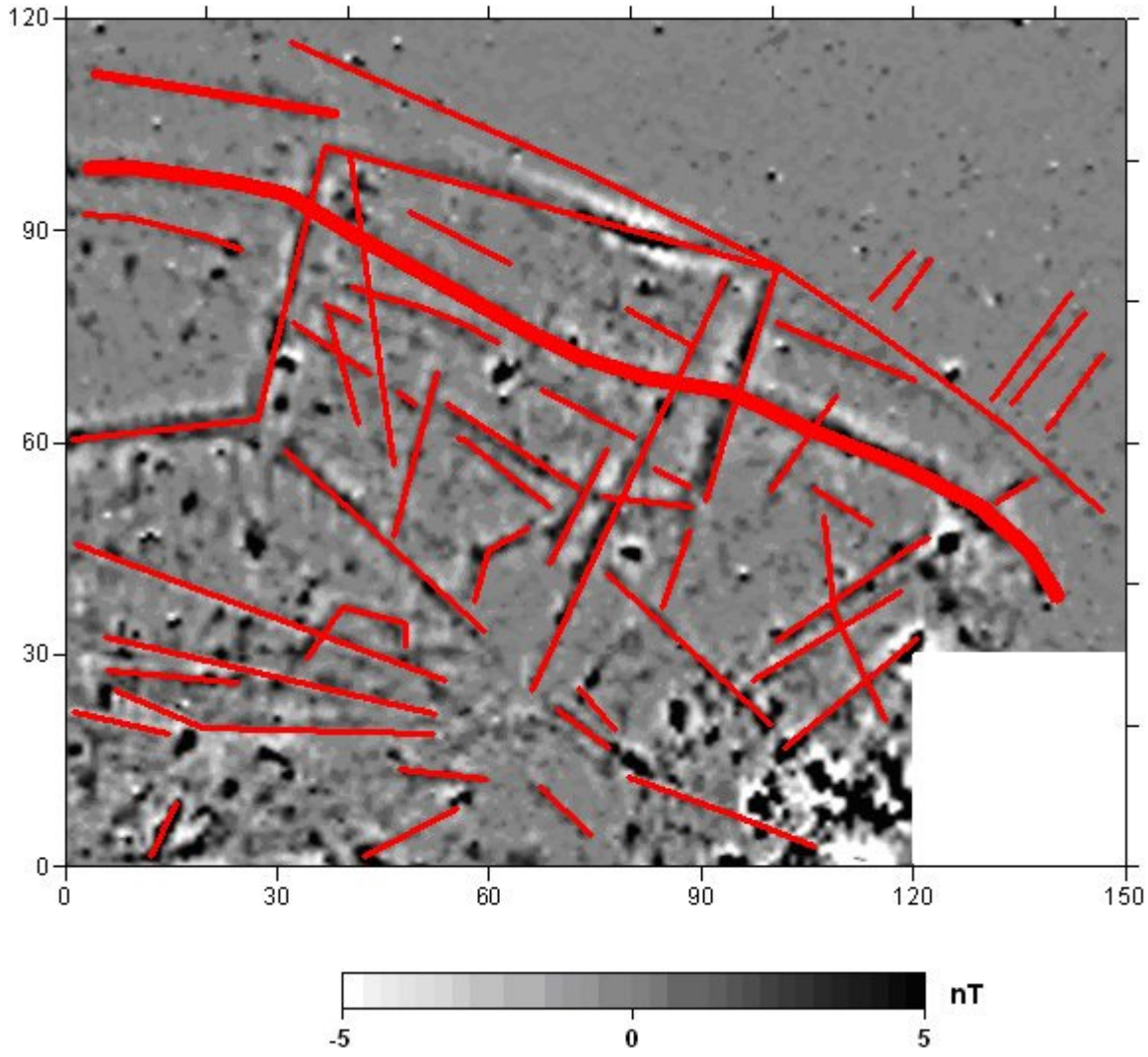


Figure 20: Interpretation of magnetic data for location 3.

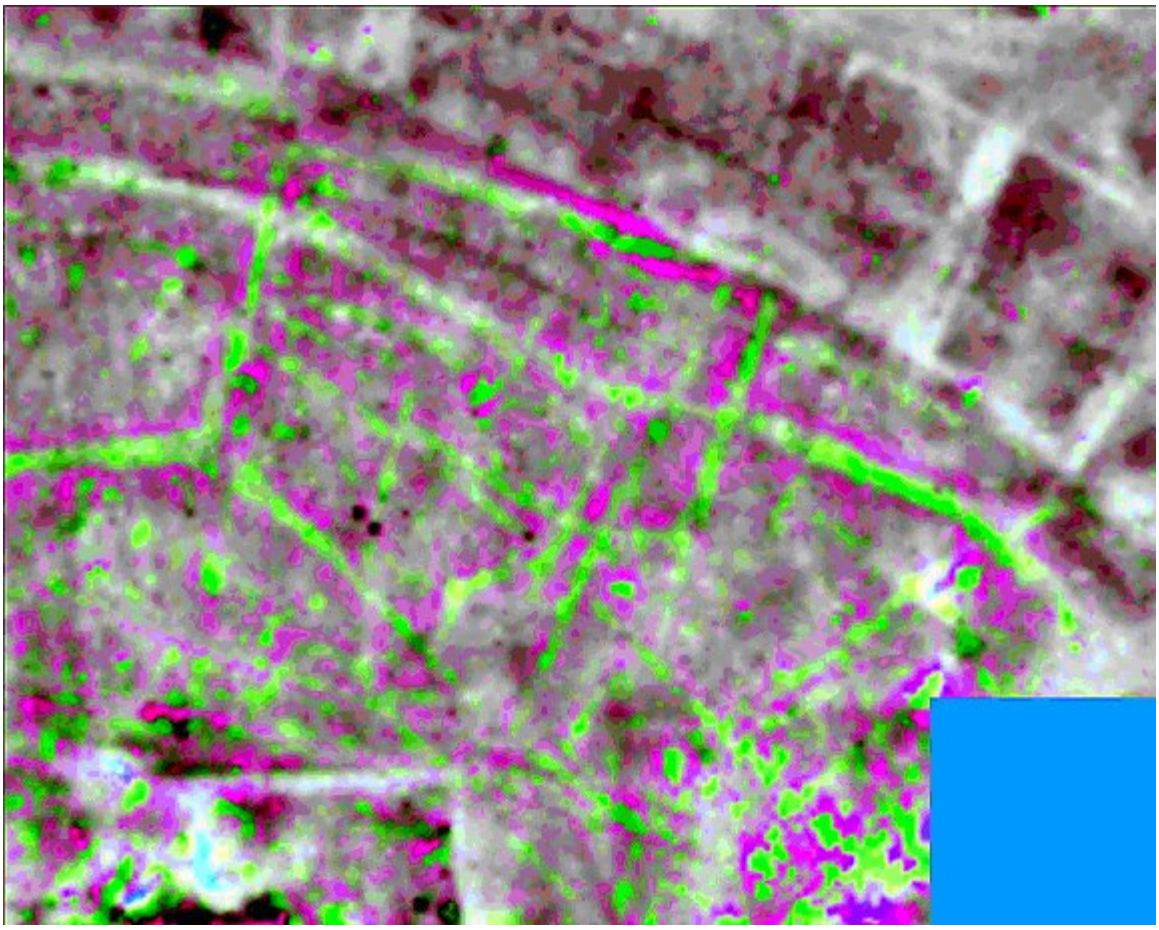

Figure 21: Principal component plot of magnetic and resistance data for location 3.

**Location 4: Small field west (in front of) Abbey Farm**

It was only possible to fit one 30 x 30m grid into this field and the results are shown in Figures 22, 23 and 24. The magnetic data is dominated by 1 long feature, though this is a modern pipe and has no archaeological significance. This pipe is shown on both the magnetic and resistance plots. The resistance data does show some additional information. Along the western edge of the image is a high resistance zone which may represent an old wall. There are also two other slightly curved anomalies whose origin is unknown.

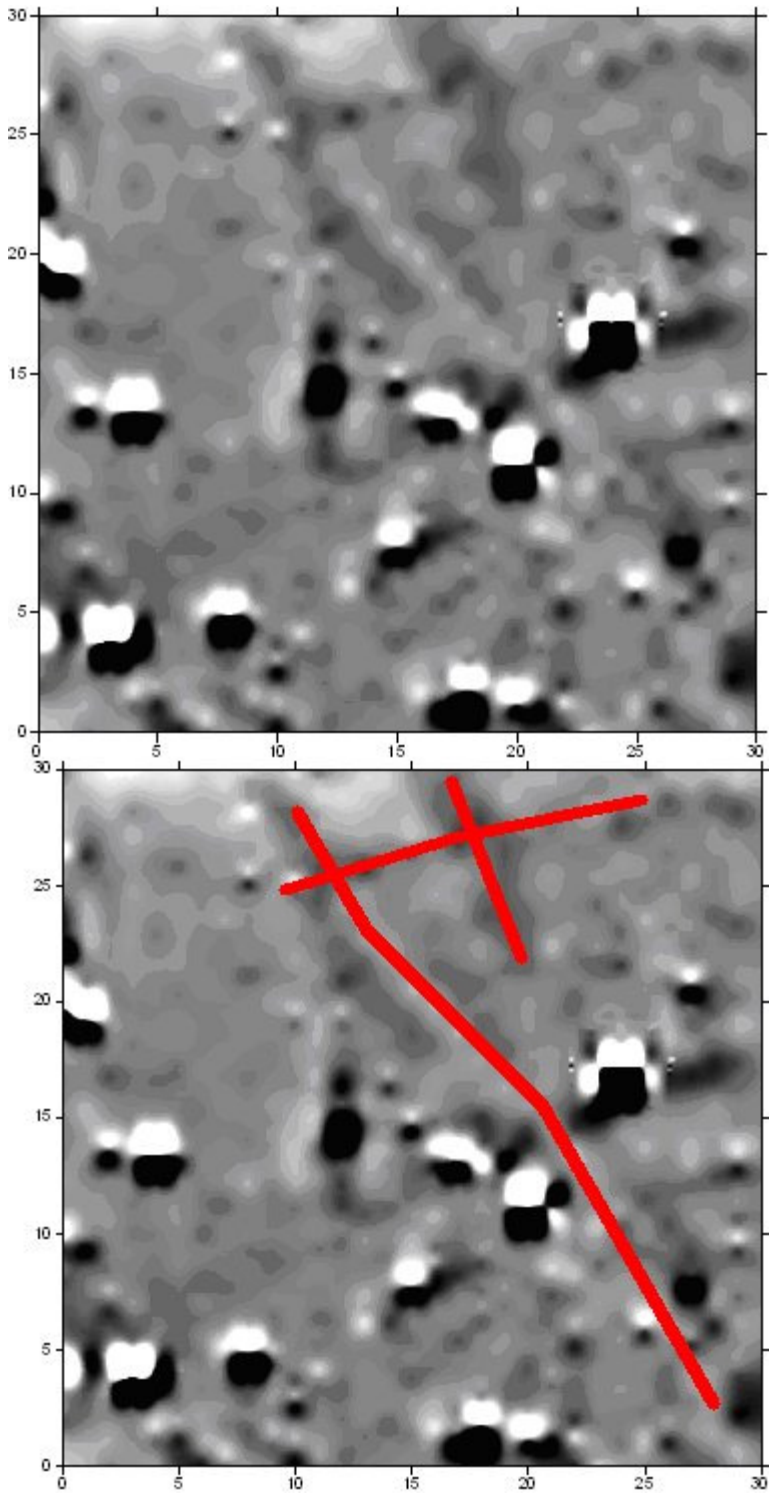


Figure 22: Magnetic data and interpretation for location 4.

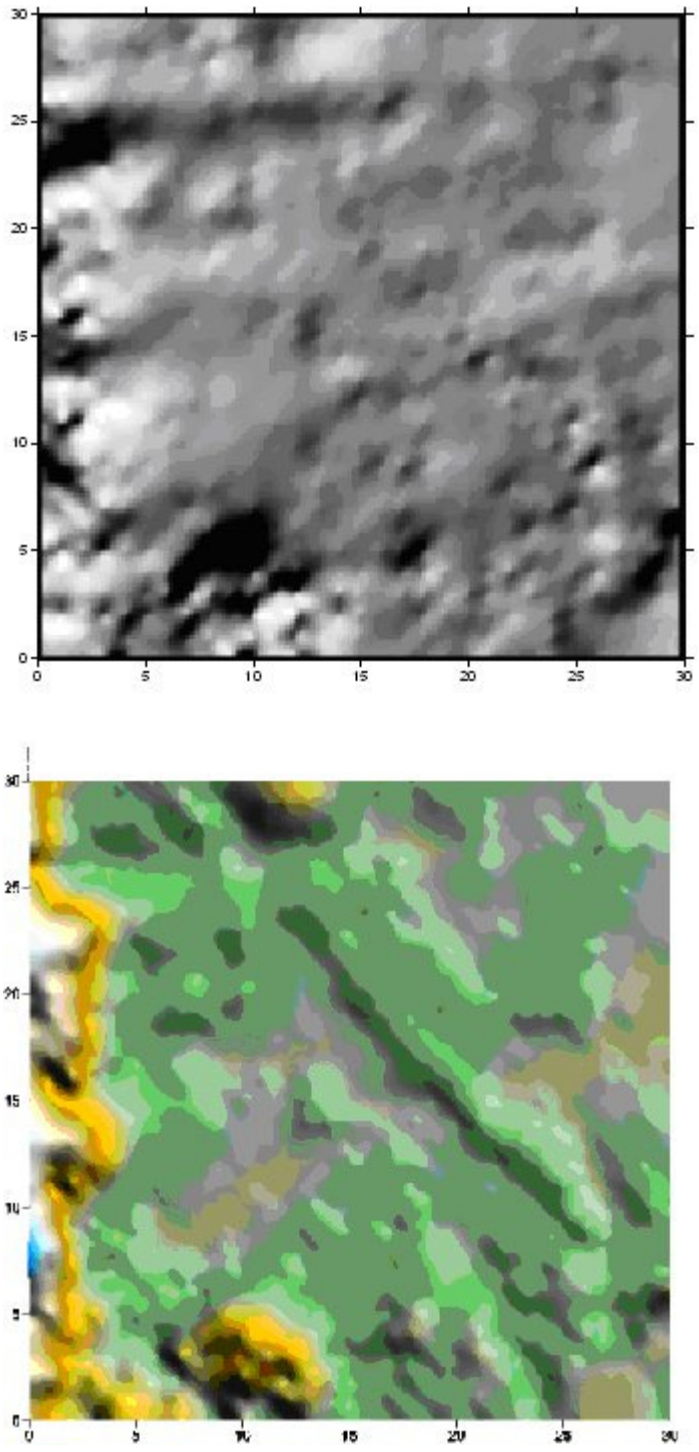


Figure 23: Resistance data for location 4.

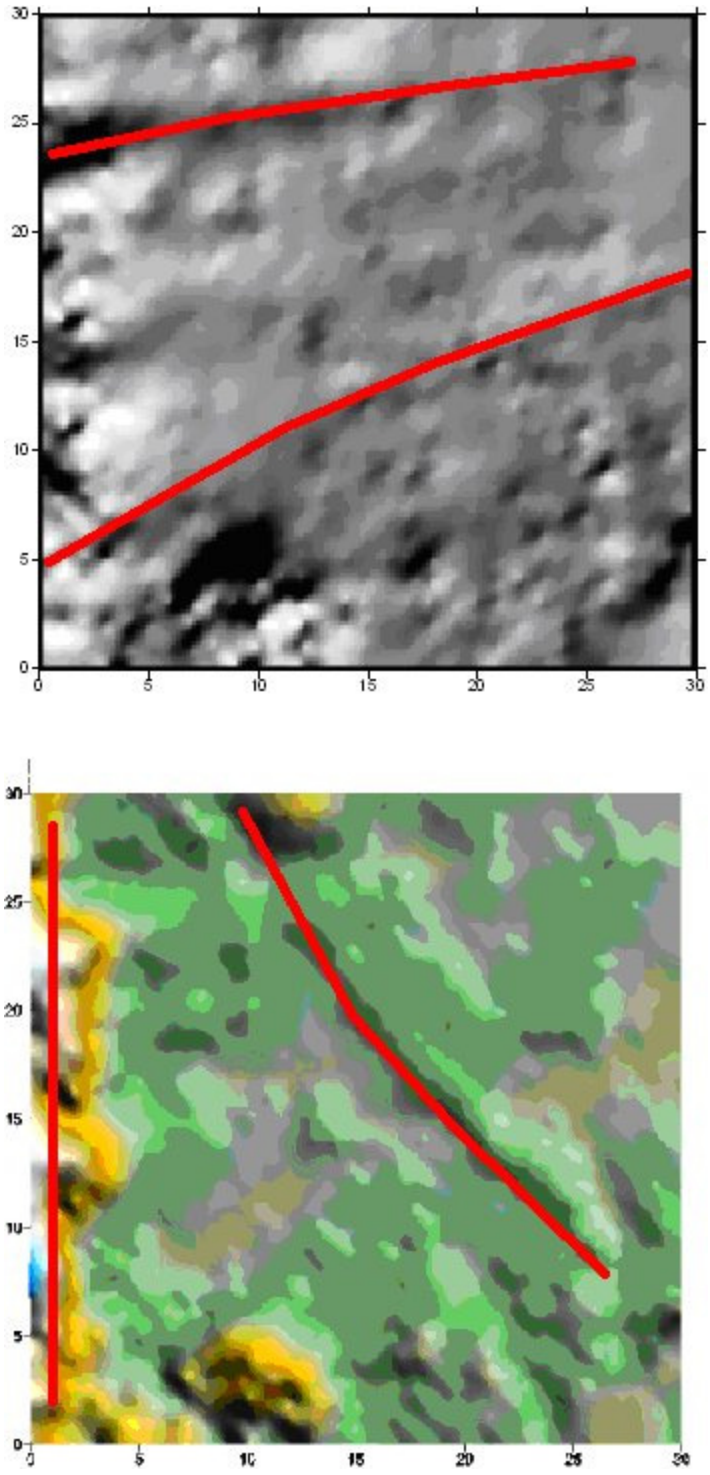


Figure 24: Resistance data interpretation for location 4.

**Location 5: Banks and ditch in Choiseul's field.**
A number of resistivity plots were taken across the banks in order to determine if they were cored by stone or consisted of earth. Three such sections are displayed in Figure 25. In all sections the intervening fosse is associated with lower readings (shown in blue) than the banks. This is most likely due to the gathering of water in the hollow which has given a lower resistivity. The resistivity for the banks is of the order of 200-300 ohm m. This is far too low to be caused by stones or masonry. Other resistivity traverses along the banks, not shown here, confirmed these findings.

**Location 6: Abbey Farm back garden.**
11 radar sections were obtained in the back garden of Abbey farm behind the Chapter House. Figure 26 shows two such sections. The upper one clearly illustrated an anomaly (This is taken parallel to the back of the Chapter House) in the centre of the section and the lower one shows a hyperbola at depth, suggesting a point source.
The radar depth slices in Figures 27, 28, 29 and 30 clearly show an anomaly zone coming in at a depth of about 58 cm. It is shown as the bright red zone which is about 2m long, is about 1m wide and continues to a depth of about 1.45m. There is a strong possibility that this may be a wall or path associated with the Chapter House. Resistivity depth slices were also obtained for the same area, Figure 31 and they also support the presence of a feature at this locality. It is again shown in red and has a very high resistivity suggesting a wall.

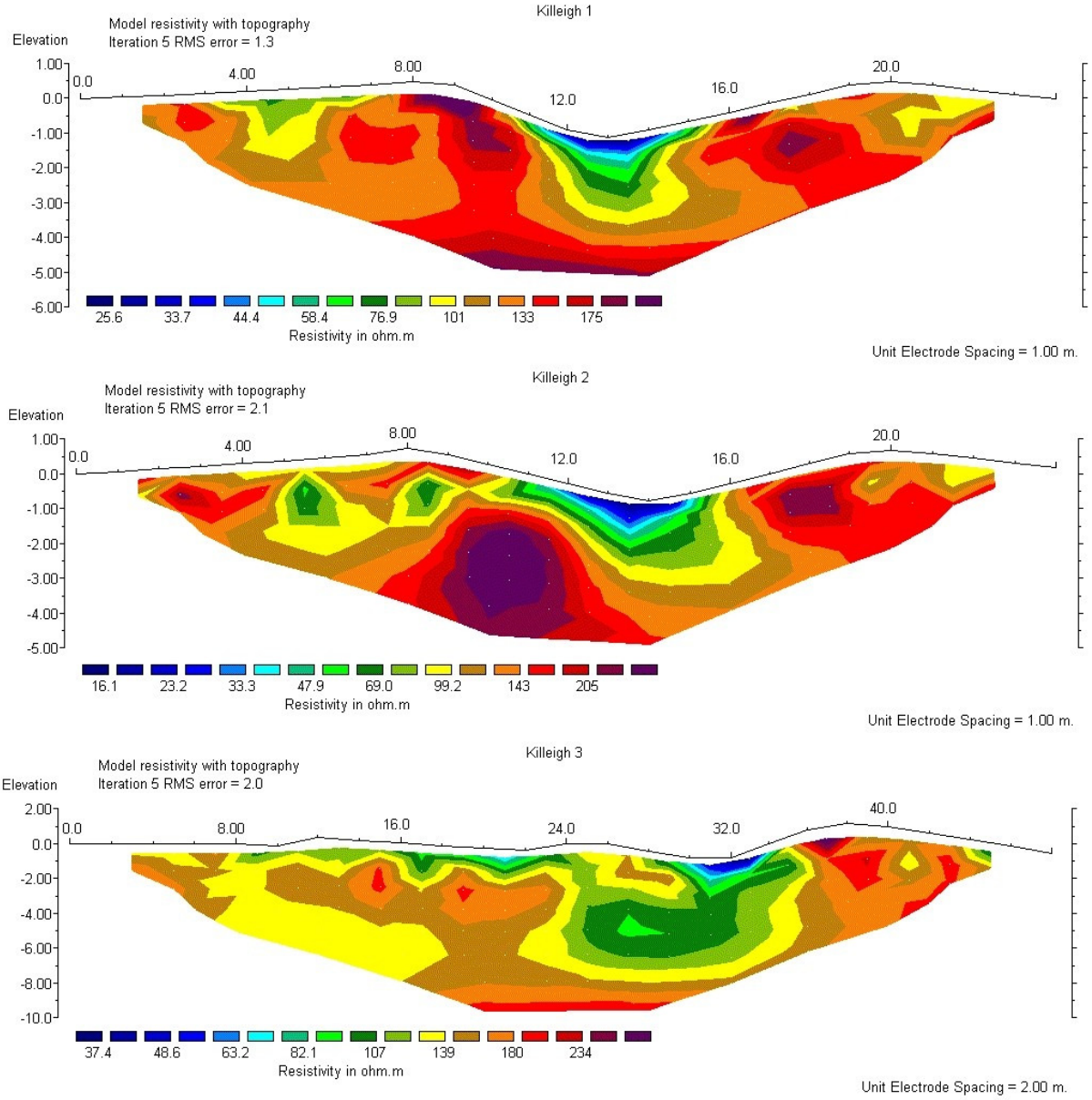


Figure 25: Resistivity sections across outer banks and ditch in Choiseul's field. (Location 5).

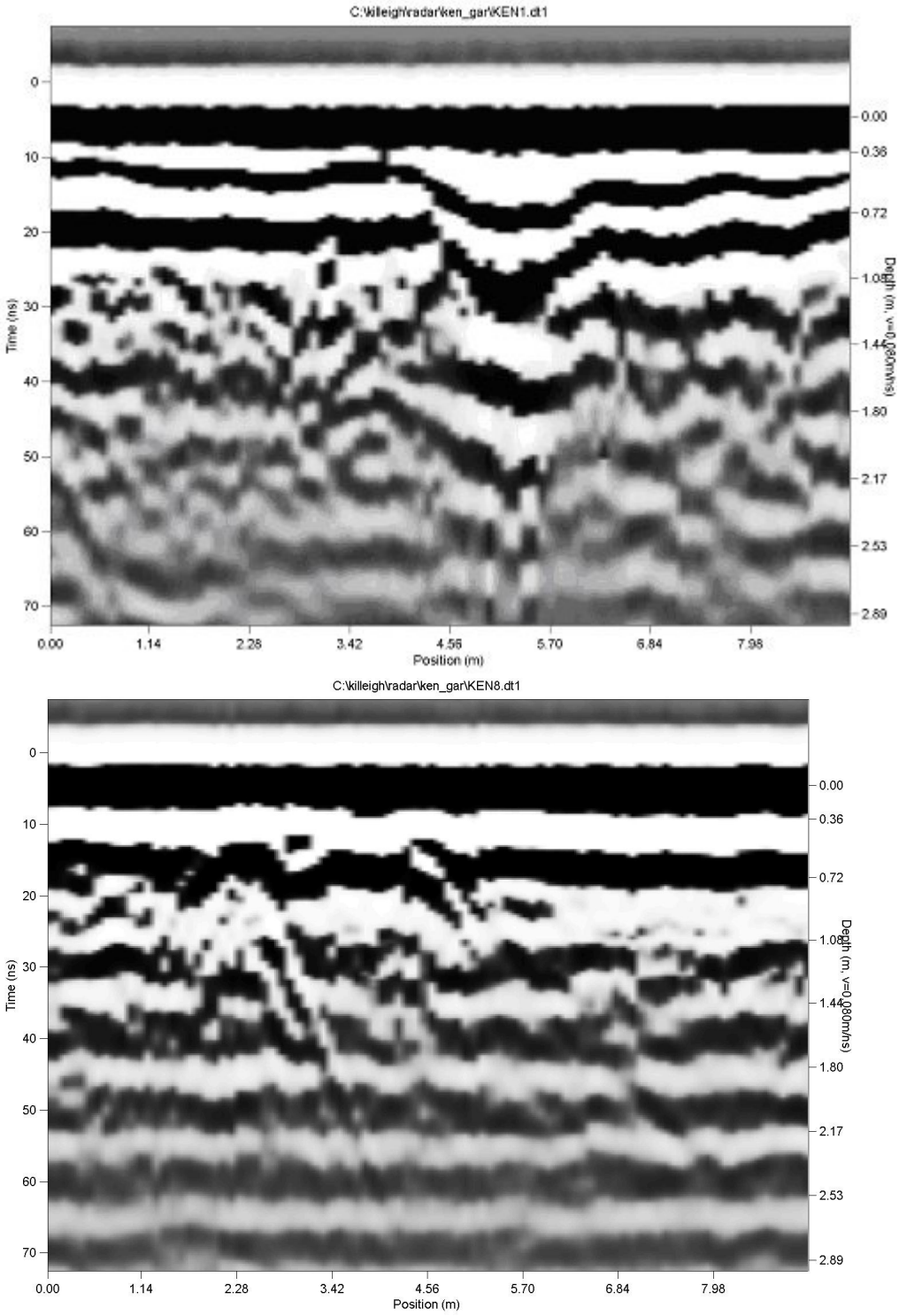


Figure 26: Radar lines in Abbey Farm back garden.

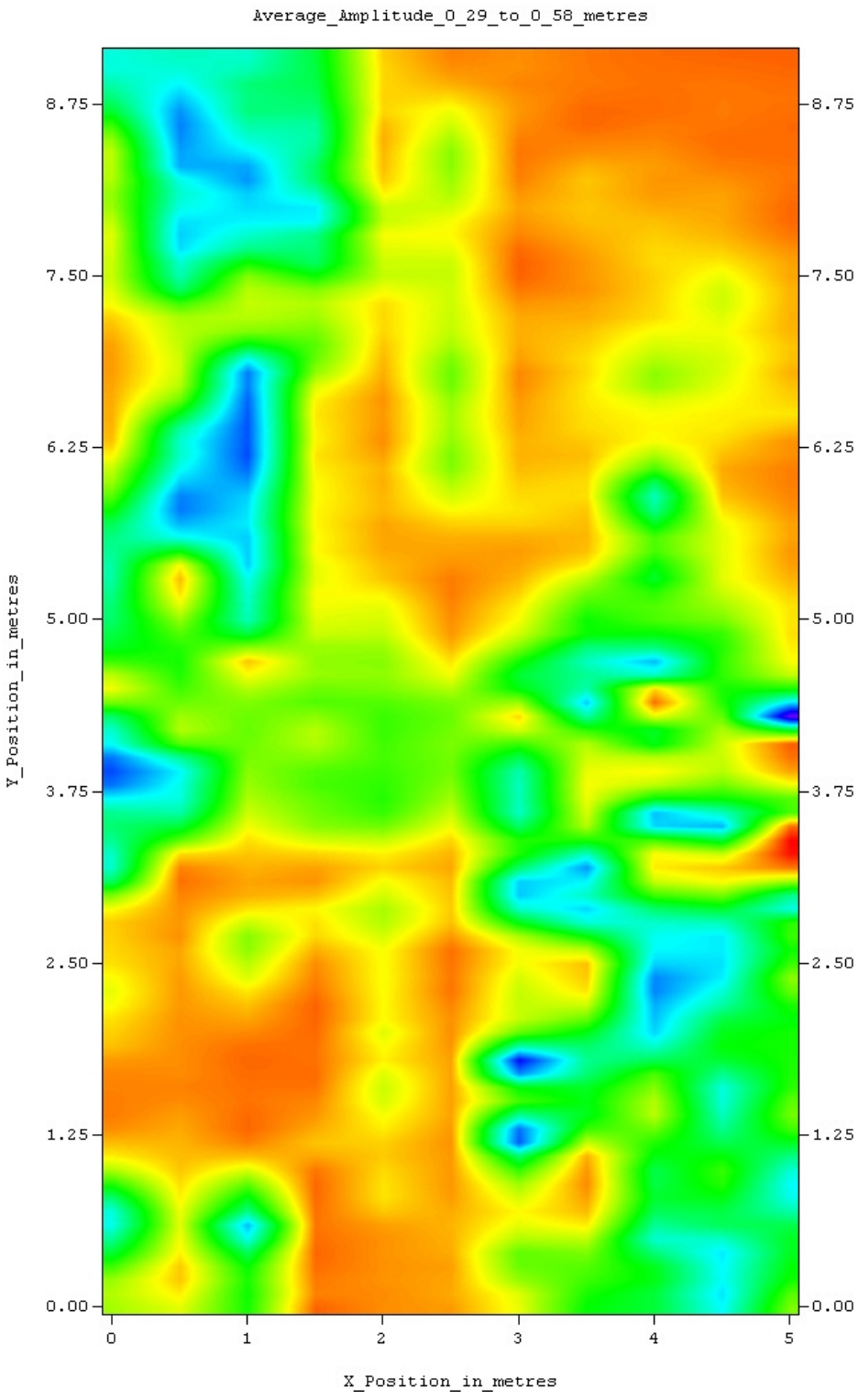


Figure: 27: Depth slice in Abbey farm back garden.

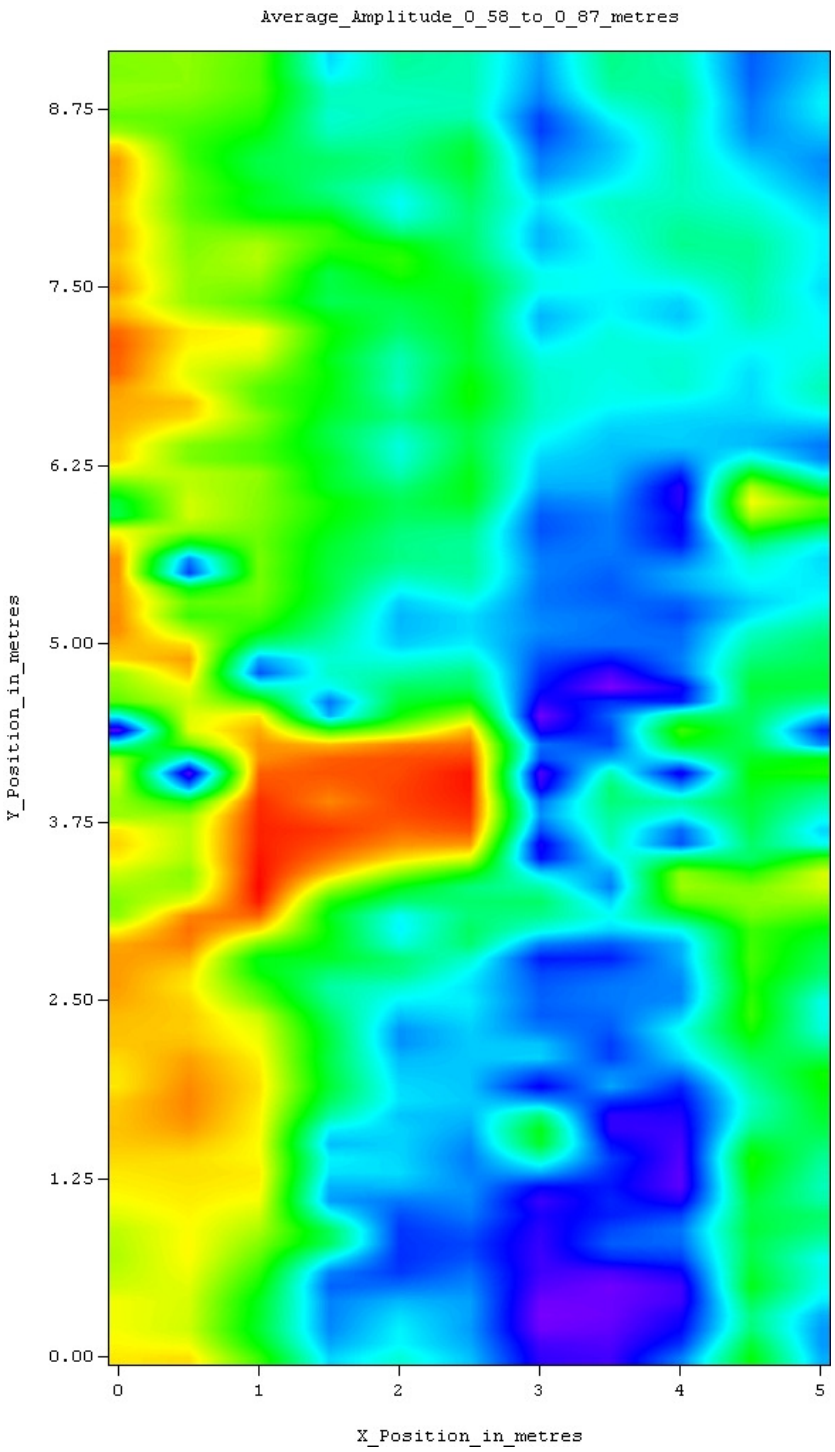


Figure: 28: Depth slice in Abbey farm back garden.

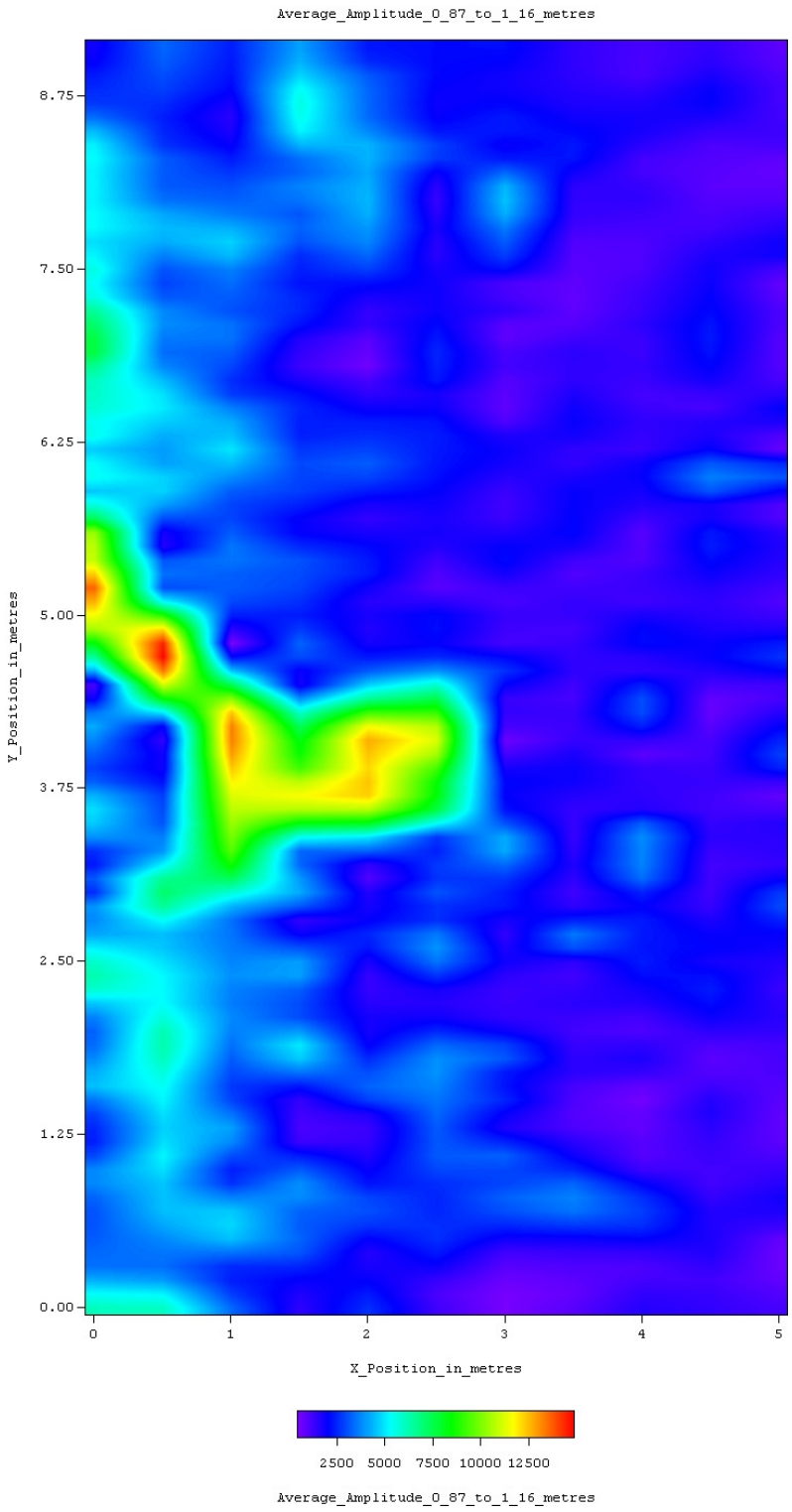


Figure: 29: Depth slice in Abbey farm back garden.

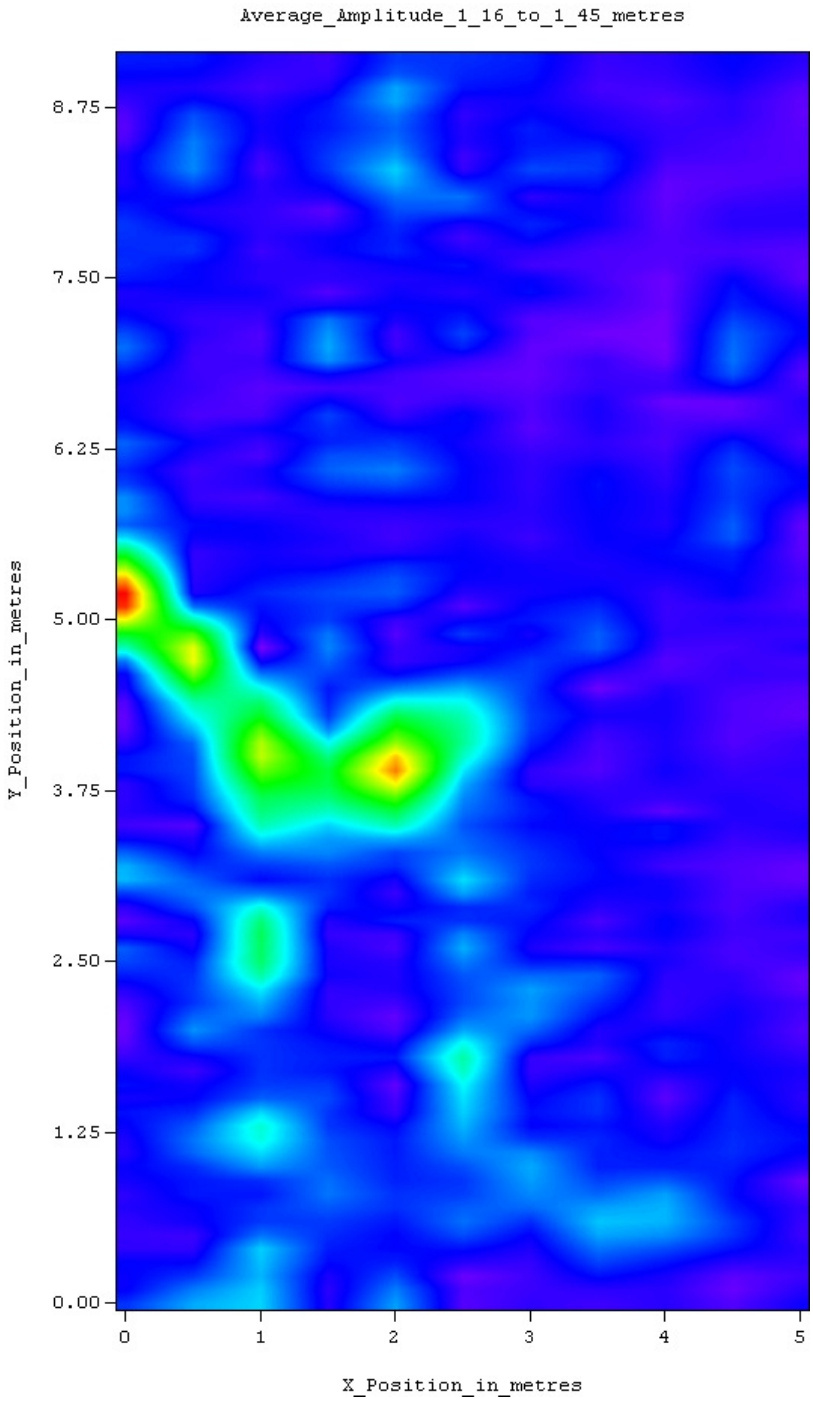


Figure: 30: Depth slice in Abbey farm back garden.

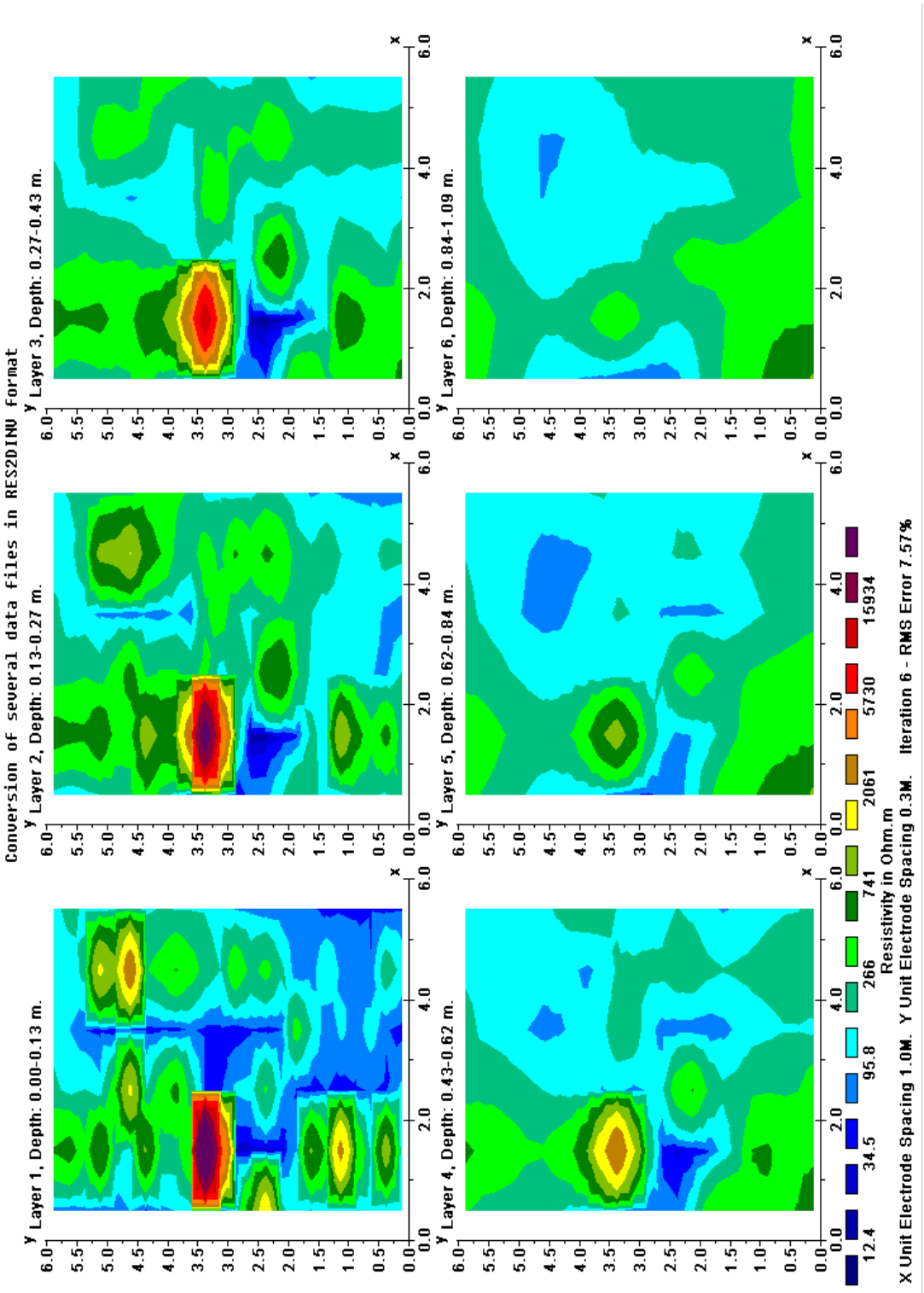


Figure 31: Resistivity depth slices in Abbey Farm back garden.