

# **Tibbers Castle**

## **Geophysical Survey**



### **Data Structure Report**

### *Flux-gate Gradiometer*

### *Electrical Resistance*

**(Revised February 2015)**

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## REPORT INFORMATION SHEET

|                                |   |
|--------------------------------|---|
| <i>National Grid Reference</i> | NX 8625 9821  |
| <i>Address</i>                 | Tibbers Castle, Drumlanrig  |
| <i>Parish</i>                  | Penpont   |
| <i>Council</i>                 | Dumfries and Galloway   |
| <i>NMRS</i>                    | NX89NE 2  |
| <i>Client</i>                  | RCAHMS  |
| <i>Project Manager</i>         | Dr Oliver J T O'Grady   |
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| <i>Schedule</i>                |   |
| <i>Fieldwork</i>               | May-October 2014, February 2015   |
| <i>Report</i>                  | December 2014 (Revised February 2015)   |

## CONTENTS

|                                 |       |
|---------------------------------|-------|
| 1.0 INTRODUCTION.....           | 3     |
| 2.0 LOCATION.....               | 3     |
| 3.0 GEOLOGICAL CONSTRAINTS..... | 3-4   |
| 4.0 METHODOLOGY.....            | 4-5   |
| 5.0 RESULTS.....                | 5-25  |
| 6.0 CONCLUSION.....             | 26-27 |
| 7.0 STATEMENT OF INDEMNITY..... | 27    |
| 8.0 BIBLIOGRAPHY.....           | 27    |
| 9.0 APPENDIX.....               | 28-32 |

## **1.0 Introduction**

1.1 The RCAHMS commissioned Oliver O’Grady (OJT Heritage) to undertake resistance and flux-gate gradiometer surveys at Tibbers Castle as part of an AHRC-funded research project in collaboration with the University of Stirling. This report provides technical presentation of the data and interpretation of the significant geophysical anomalies. The survey has revealed a series of archaeologically significant anomalies in the outer bailey. These appear to be indicative of possible building and occupation remains, and a previously unrecorded system of boundary ditches and banks across the bailies. Based on the survey results it is concluded that the outer and outermost bailies contains fragmentary remains of significant archaeological deposits, which relate to the enclosure’s defences and potentially also remains of auxiliary settlement associated with the castle.

1.2 This report is a revision of a report initially presented in December 2014 and now includes data from the complete resistance survey.

## **2.0 Location**

2.1 Tibbers Castle is located at NX 8625 982 on a prominent glacial moraine at approximately 70m OD and overlooking the River Nith, which is located to the east. The town of Thornhill is 2.5km SE, in Dumfries and Galloway, Scotland. The substantial remains of the stone castle are located on a prominent elevation at the NE end of the moraine and detached from an extensive bailey area to the SW. The enclosed area of the bailey occupies a field approximately 300m in length that is surrounded by a forest planation on three sides, but is open to the south. Previous topographical survey by the RCAHMS has identified the earthwork remains of defensive banks relating to at least two adjoining baileys, here referred to as the outer and outermost bailey.

## **3.0 Geological Constraints**

3.1 The drift geology are glaciofluvial deposits (gravel, sand and silt), which are superficial deposits formed up to three million years ago in the Quaternary Period in an environment previously dominated by Ice Age conditions. These deposits overlay the Carron Basalt Formation / Olivine-basalt, which is igneous bedrock formed approximately 271 to 299 million years ago in the Permian

Period (British Geological Survey [www.bgs.ac.uk](http://www.bgs.ac.uk)). Variable depth of the glacial gravels and till is common with igneous dykes closer to the surface at specific locations. This proved to be the case at Tibbers castle.

3.2 The presence of igneous geology did disrupt the flux-gate gradiometer and resistance survey in the area of the outermost bailey, but this was not a constraint encountered within in the outer bailey where the drift geology was presumably deeper.

3.3 Mixed glacialfluvial deposits can complicate the interpretation of resistance survey data due to differential accretion and drainage of moisture in subsurface mixed deposits. The severity of this constraint can dependent on the extent of site-specific contrasts between the natural subsoils and the composition of archaeological deposits. At Tibbers Castle this geological setting appears to account for general background readings of mixed high and low resistance, which resulted in a ‘mottled’ effect visible across the data plots. This phenomenon complicates the archaeological interpretation and requires experience and expertise to mitigate; it reduces the certainty of archaeological interpretation and the analytical value of the resistance results. This caveat aside, clear archaeologically significant anomalies have been identified in the Tibbers Castle survey despite the geological constraints.

## **4.0 Methodology**

4.1 The resistance survey used an RM15 advanced Geoscan resistance meter with a PA5 probe frame and 0.5m separated parallel probes. Sample density was 1m x 1m and survey grids 20m<sup>2</sup>. The area surveyed was 17,230m<sup>2</sup>. Survey was completed in two intervals. The first, during autumn 2014 encountered raised ground moisture levels. These conditions resulted in some disruption of the data. The second during February 2015 was undertaken in good conditions, but due to a change in the environmental conditions it proved impossible to re-establish the same background reading from the initial survey period. Therefore a new background reading was taken and the difference between the data from the two survey areas was mitigated as far as possible through data processing. Though some ‘edging’ affects between the data could not be avoided, the dataset proved successfully coherent. Processing used Geoplot and involved background removal using despiking and highpass filter functions followed by the application of an interpolation algorithm.

4.2 Flux-gate gradiometer survey was undertaken using a Bartington Grad-601 dual sensor. The sample density was 1m x 0.25m with 20m<sup>2</sup> survey grids. The gradiometer survey was 17,230m<sup>2</sup> in area and covered the entire bailey field.

4.3 The gradiometer fieldwork was undertaken during spring in bright conditions after heavy rain and the resistance survey was undertaken in autumn in dry overcast conditions.

## **5.0 Results: Resistance Survey**

5.1 The resistance survey covered the entire bailey field and has revealed important new archaeological findings from the outer bailey and significant variation across the site into the outermost bailies.

5.2 This section presents descriptive entries for each significant anomaly identified in the resistance data. The anomaly descriptions should be read with reference to figures 1 and 2. See the appendix for raw data.

### **5.3 Anomaly 1:**

A low resistance curvilinear anomaly comprising two sections that cross the outer bailey area from WNW to ESE. These are interrupted at the centre point of the bailey by an area of poorly defined higher resistance disturbance. Anomaly 1 may indicate the course of a defensive ditch that bisected the outer bailey. The edges of the anomaly are poorly resolved, but the correlating feature may be approximately 4m to 6m wide.

### **5.4 Anomaly 2:**

This is a relatively well resolved low resistance curvilinear anomaly that is located middle way down the west side of the outer bailey and abutting the field boundary. The anomaly adjoins anomaly 1 on the north side and extends southward, until apparently turning sharply west where it meets anomaly 8. Anomaly 17 is enclosed on the east and south by anomaly 2. Anomaly 2 may be the remains of a ditch that conjoined the possible ditches identified by anomalies 1 and 8. As the anomaly appears to encircle an area abutting the bailey's main defensive bank this may also suggest an outwork enclosing some form of building platform or defensive structure indicated by anomaly 17.

#### 5.5 Anomaly 3:

A rectilinear and low resistance anomaly abuts the NW edge of the outer bailey. The longer axis of the anomaly is NE to SW. This might indicate the remains of a building, potentially comprising of a timber structure defined by foundation trenches or timber slots.

#### 5.6 Anomaly 4:

A pronounced low resistance anomaly near the base of sloping ground between the outer and outermost baileys and at the east side of the field. When interpreted with anomalies 9 and 32 this may represent a large band of raised moisture along the base of slope between baileys. This may be the disrupted readings from the eastern end of a boundary / defensive ditch between the outer and outermost baileys.

#### 5.7 Anomaly 5:

This is an irregular area of low resistance disturbance located along the north end of the outer bailey. This poorly defined anomaly is interspersed with higher resistance readings and could indicate fragmented building remains along the inner face of the bailey. This area has been used for modern livestock enclosure and the poorly resolved readings could simply derive from surface disturbance by modern animal feeding.

#### 5.8 Anomaly 6:

A roughly L-shaped area of low resistance readings is located near the NW side of the outer bailey. This area is characterised by a series of rectilinear anomalies aligned NW-SE and NE-SW. These may indicate slot features for the remains of a timber building or buildings within the outer bailey.

#### 5.9 Anomaly 7:

A roughly triangular area of low resistance readings that is located near the centre of the outer bailey and beside anomaly 1. This may be related to the feature indicated by anomaly 1 and could be a cutting forming part of an entranceway or gate feature.

#### 5.10 Anomaly 8:

This is a poorly resolved band of low resistance readings that crosses the outer bailey from WNW-ESE. It may be the remains of a ditch bisecting the outer bailey, which if taken with anomaly 1 would suggest the possibility of a double-ditch arrangement.

#### 5.11 Anomaly 9:

A pronounced and wide band of low resistance readings located at the north-west end of the outermost bailey. This is probably the western half of a large ditch separating the outer and outermost baileys.

#### 5.12 Anomaly 10:

A poorly resolved low resistance anomaly is aligned north to south and located at the north end of the outermost bailey. This may be related to anomalies 9 and 32, and therefore this may be part of a large ditch, but the high resistance disturbances associated with anomalies 25 and 26 that flank this reading appear to call this possibility into question. Alternatively, this could still be the central part of a ditch, but the signal may have been disrupted at this location due to the presence of some form of causeway; the remains of a simple bridge foundation; or, perhaps more likely the deposition of material over the surface of the ditch by the action of post-medieval ploughing.

#### 5.13 Anomaly 11:

High resistance readings in an irregular area at the NW corner of the outer bailey. This could be indicative of a prepared surface such as a cobbled area within the bailey.

#### 5.14 Anomaly 12:

A group of high resistance readings in the NE area of the outer bailey, which if interpreted together may outline a roughly rectilinear shape. This could indicate the stone footings of a small building in the inner bailey or perhaps more probably given the poorly resolved readings, fragmented remains of a prepared surface.

#### 5.15 Anomaly 13:

A series of irregular high resistance readings at the NE corner of the outer bailey. This may be the diffuse readings from a prepared surface or spread material from the adjacent bailey bank.

#### 5.16 Anomaly 14:

Two irregular areas of high resistance beside the E side of the outer bailey. This may be the spread remains of a defensive bank that crossed the inner bailey to the west and may have conjoined the bailey's defensive bank.



#### 5.17 Anomaly 15:

An extended linear high resistance anomaly along the E side of the outer bailey; this is located at the upper edge of a natural slope. This pronounced reading is likely to have derived from the glacial terrace. Alternatively this may indicate the poorly preserved footing of a bank or wall at the top of the slope that delineates the topography of the outer bailey's east side.

#### 5.18 Anomaly 16:

This is an irregular zone of high resistance readings at the NW side of the outer bailey. These may indicate the west end of a bank that crossed the outer bailey to the east. A smaller area of nearby readings on the north side beside anomaly 3 could also be part of a prepared surface.

#### 5.19 Anomaly 17:

An irregular high resistance anomaly is located beside the west enclosure of the outer bailey. Interpretation of this anomaly is informed by its proximity to anomaly 2, which may indicate that this reading is from the remains of a building platform or part of the bailey's main defensive enclosure.

#### 5.20 Anomaly 18:

A pronounced, irregular and extensive high resistance anomaly located at the east side of sloping land at the north-east side of the outermost bailey. The position of this anomaly on steeply sloping ground down to the outermost bailey may suggest this derived from a moisture gradient down the slope, but this may also be remains of a metalled surface leading up the slope or remains of a spread rampart from further up the gradient.

#### 5.21 Anomaly 19:

This is an irregular area of high resistance disturbance that extends across the north part of the outer bailey from west to east. The readings are poorly resolved and interpretation is problematic, but this may indicate the truncated and spread remains of a bank that crossed the outer bailey and was associated with a possible ditch (see anomaly 1).

#### 5.22 Anomaly 20:

This is a somewhat diffuse linear high resistance anomaly that extends along the centre of the outer bailey from north to south. At the north end, this appears to bisect the readings associated with anomaly 8, and is also aligned with the apparent gap in anomaly 1. The location and type of readings indicate that this may be derived from the remains of a roadway, perhaps comprising of a solid and compacted material such as

paving or metalled rubble. Alternatively the anomaly could also be part of a post-medieval field system, but this may not account for the anomaly's particular location (see anomaly 22).

#### 5.23 Anomaly 21:

A short section of linear high resistance readings that is located at the west edge of the outer bailey. Interpretation of this anomaly is not clear, but it could relate to building remains along the inner face of the bailey enclosure, or part of a later boundary wall or spread material from the bailey enclosure itself.

#### 5.24 Anomaly 22:

A linear section of high resistance located at the west side of the outer bailey. This may be the line of a boundary wall, a large lined-drain or a historic rig. The anomaly also runs parallel to anomaly 20, which may be coincidental, but could imply the need for interpretation of anomaly 20 as a post-medieval feature.

#### 5.25 Anomaly 23:

This is a roughly rectilinear area of high resistance readings at the SW corner of the outer bailey. This could relate to a stone building platform, but this interpretation is made less probable by the proximity of linear anomalies 22 and 24, which may be part of post-medieval features.

#### 5.26 Anomaly 24:

This high resistance linear anomaly is likely to be the continuation of anomaly 22 and derived from a post-medieval feature, such as a minor boundary wall or plough rig.

#### 5.27 Anomaly 25:

An irregular area of high resistance readings located at the northern edge of the outermost bailey. This is on sloping ground and may indicate differential moisture accretion on the gradient or slumped material from a bank to the north.

#### 5.28 Anomaly 26:

This is an irregular high resistance reading. This may be related to the same feature as anomaly 25 and the sloping ground at this location; part of spread material from a defensive bank to the north or a metalled surface that bisected this area.

#### 5.29 Anomaly 27:

A large irregular area of low resistance readings located at the east side of the outer bailey. This prominent area of disturbance indicates the relative accumulation of ground moisture across this area. A

compacted surface, such as a metallised surface or clay-bonded cobbling could account for this reading, but given the close proximity of an eroded natural slope to the east, this irregular shaped anomaly may more probably derive from a natural deposit of clay and gravel till in the glacial terrace.

#### 5.30 Anomaly 28:

A large irregular area of high resistance readings located across the north and east side of the outermost bailey. This extensive reading was derived from natural geology, part of igneous dyke feature that crosses the outmost bailey and prominently represented in the gradiometer data.

#### 5.31 Anomaly 29:

A large low resistance reading that crossed the entire outermost bailey from the north-west corner to the south-east fence. This is derived from the natural geology and part of prominent subsurface declivity formed by an igneous dyke.

#### 5.32 Anomaly 30:

This is a high resistance anomaly aligned from west to east located at the north-west edge of the outermost bailey. The anomaly may be associated with anomaly 18 and remains of a spread rampart or material deposited from the higher up the adjacent sloping ground.

#### 5.33 Anomaly 31:

A high resistance anomaly at the north-east corner of the outermost bailey located at the base of gradually sloping. This reading may be related to anomaly 18 and possibly part of an access causeway into the outer bailey, though adjacent low resistance anomalies reduce the certainty of this interpretation. Alternatively gravel deposited by gravity from further up the slope may have induced a high resistance reading.

#### 5.34 Anomaly 32:

Low resistance readings at the north-east side of the outermost bailey, which is aligned west to east. This may be related to anomaly 9 and part of the remains of a boundary / defensive ditch.

#### 5.35 Anomaly 33:

This is a large low resistance linear anomaly at the east side of the outermost bailey and aligned south to north. Interpretation is not certain, but this is likely to be part of the complex of natural geological features highlighted by anomalies 29 and 28.

5.36 Anomaly 34:

An irregular area of high resistance readings located at the north-west side of the outermost bailey, which is most likely part of a geological feature.

5.37 Anomaly 35:

A linear high resistance located along the west side of the outermost bailey. This reading is from the remains of a stone field wall.

5.38 Anomaly 36:

An irregular area of low resistance readings located at the west side of the outermost bailey. This is most likely part of a geological feature superimposed with several low resistance globular readings from tree bowls.

5.39 Anomaly 37:

An irregular area of high resistance readings located at the south side of the outermost bailey. This is most likely part of a geological feature superimposed by readings from tree bowls.

5.40 Anomaly 38:

A zone of prominent high resistance readings located at the south-west corner of the outermost bailey. This may be related to anomaly 35, the remains of a wall, or a superimposed natural reading.

5.41 Anomaly 39:

This is a band of pronounced high resistance readings that ran along the southern edge of the outermost bailey. The position of this anomaly at the top of sloping ground that divides the southernmost area from the outermost bailey, and the alignment of these readings with an upstanding rampart or earthwork, beyond the field fence to the west, support the interpretation of this anomaly as the remains of a rampart or boundary bank.

5.42 Anomaly 40:

A pronounced and clearly resolved linear low resistance anomaly located along the southern edge of the outermost bailey. It is highly probable that this anomaly indicates the remains of a large defensive ditch.

#### 5.43 Anomaly 41:

An irregular zone of high resistance readings were located by the eastern field boundary, in the southernmost area of the survey.

#### 5.44 Anomaly 42:

This is a large low resistance and roughly linear anomaly at the south-west side of the survey area. The large size and irregular outline of this anomaly suggest this is probably a reading from natural geology.

#### 5.45 Anomaly 43:

A section of high resistance readings located at the south-west side of the survey area. This may indicate a section of the remains of a bank, perhaps part of a southernmost bailey enclosure.

#### 5.46 Anomaly 44:

A section of high resistance readings located at the south-west side of the survey area and beside the western fence. This may indicate a section of the remains of a bank, perhaps part of a southernmost bailey enclosure and related to anomaly 43.

#### 5.46 Anomaly 45:

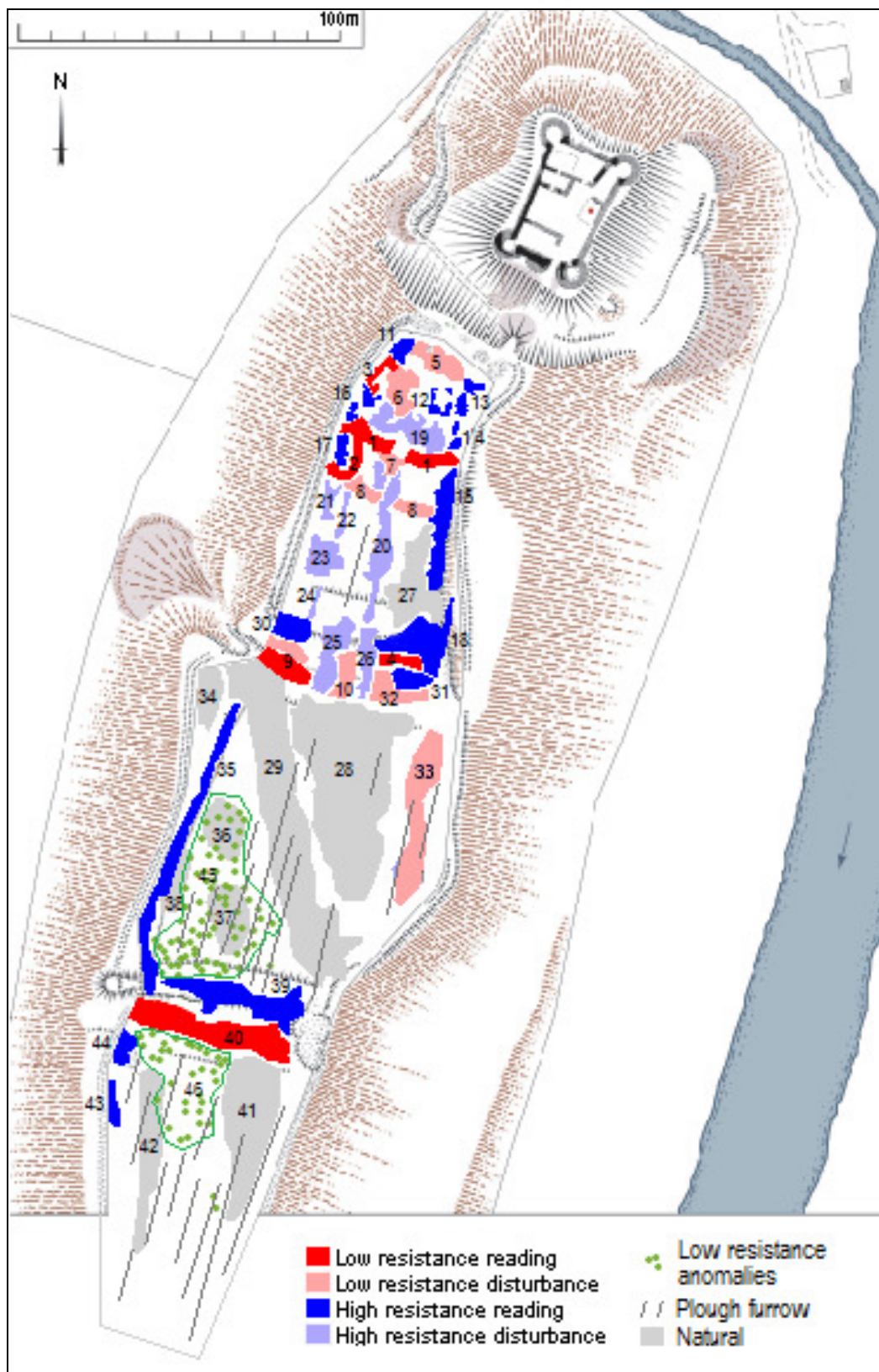
A series of globular low resistance readings spread across a wide area in the south-west side of the outermost bailey. These are indicative of several discrete cur features or in-filled depressions that are concentrated in a wide band from north to south within the outermost bailey. Such anomalies may be indicative of the remains of man-made pits, perhaps associated with short-term and ephemeral occupation activity in the area. These types of features may be associated with the kind of medieval activity that might be expected from ancillary settlement or temporary military activity within an outer castle bailey. Alternatively these readings could also indicate a historic tree plantation, though estate maps from 18<sup>th</sup> and 19<sup>th</sup> centuries do not show forestry extending onto this area (Pers Comm Piers Dixon) and the distribution does not appear to conform to a formal plantation scheme.

#### 5.46 Anomaly 46:

This is a series of globular low resistance readings, very similar to anomaly 45, and which spread across the northern half of the southernmost part of the survey area. These may indicate the remains of occupation pits or perhaps tree bowls of a historic plantation.



**Figure 1.** Processed electrical resistance data at Tibbers Castle bailey.  
(Background map courtesy RCAHMS ©Crown Copyright)



**Figure 2.** Interpretation of the electrical resistance data with the main anomalies annotated.  
 (Background map courtesy RCAHMS ©Crown Copyright)

## **6.0 Results: Flux-gate Gradiometer Survey**

6.1 The flux-gate gradiometer survey covered the entire bailey field and despite disturbance across part of the outermost bailey due to an igneous dyke, important new detail has been uncovered about enclosures and potential settlement remains, particularly within the outer bailey. Spikes of modern disturbance from waste fence wire were encountered around the perimeter beside the modern fence, particularly on the east side of the field. This section presents descriptive entries for each significant anomaly identified. The anomaly descriptions should be read with reference to figures 3-6. See the appendix for raw data plots.

### **6.2 Anomaly m1:**

A large area of magnetic disturbance located in the north end of the outer bailey. This is also characterised by occasional minor linear positive anomalies. This may indicate the site of a platform for a building or buildings. The location roughly correlates with resistance anomaly 6 and 3, when standard north drift of the signal is taken into account.

### **6.3 Anomaly m2:**

A series of positive anomalies at the NE edge of the outer bailey. Interpretation is complicated by proximity to the field fence, but this may indicate the presence of a prepared surface or occupation remains.

### **6.4 Anomaly m3:**

An irregular area of positive readings located in the outer bailey. This may indicate a prepared surface, such as cobbling or a metaled surface.

### **6.5 Anomaly m4:**

An irregular area of positive readings located at the NE side of the outer bailey. This may indicate a prepared surface, such as cobbling or a metaled surface. This roughly correlates with resistance anomaly 12.

### **6.6 Anomaly m5:**

This is a curvilinear positive anomaly located in the north half of the outer bailey. The anomaly is a prominent reading that extends from the west boundary of the bailey in a NW to SE direction. This anomaly generally correlates with the interface of resistance anomalies 1, 16 and 19, and may indicate the remains of a bank/wall or the inner edge of a ditch across the bailey.



#### 6.7 Anomaly m6:

An irregular negative anomaly located near the centre of the outer bailey. This may indicate an entranceway associated with anomaly m5, perhaps in the form of a metallised surface.

#### 6.8 Anomaly m7:

This is a poorly resolved curvilinear positive anomaly located on the east side of the outer bailey. The anomaly is aligned WSW to ENE and extends toward the east boundary of the field fence where the readings are disrupted by modern disturbance. This anomaly may be associated with anomaly m5 and indicate the site of a truncated bank. It roughly correlates with resistance anomalies 14 and 19.

#### 6.9 Anomaly m8:

An irregular strip of positive disturbance located along the centre of the outer bailey. This seems to correlate with resistance anomaly 20 and 7, and could relate to a track-way or road surface.

#### 6.10 Anomaly m9:

An irregular area of positive readings located beside the east side of the outer bailey. This correlates with the north end of resistance anomaly 15 and may be the remains of a levelled bank or exposed natural deposit.

#### 6.11 Anomaly m10:

This is a poorly resolved and linear positive anomaly that crosses the centre and east side of the outer bailey. The anomaly is weak, but correlates with the southern edge of resistance anomaly 1 and may indicate the edge of a ditch. Alternatively the weak extent of the reading may suggest a minor boundary feature such as the remains of a fence or boundary feature of indeterminate date.

#### 6.12 Anomaly m11:

An irregular positive anomaly located near the centre of the outer bailey. This correlates with the north end of resistance anomaly 20 and could indicate remains of a prepared surface or reduced bank.

#### 6.13 Anomaly m12:

A roughly rectangular negative anomaly located near the centre of the outer bailey and aligned approximately north to south. This correlates with resistance anomaly 7 and the north end of anomaly 20. The reading may indicate some form of prepared surface at an entrance-way or gate structure.

#### 6.14 Anomaly m13:

A large irregular and positive anomaly located at the eastern side of the outer bailey. This correlates with the north end of resistance anomaly 15 and may indicate the remains of a bank or an exposed area of natural glacial till.

#### 6.15 Anomaly m14:

This is a poorly resolved linear area of magnetic disturbance that crosses the southern end of the outer bailey. It roughly correlates with the south side of resistance anomaly 8 and is bisected by anomalies m12 and m16. This may indicate the line of a boundary feature, such as a fence, palisade or bank.

#### 6.16 Anomaly m15:

A prominent curvilinear positive anomaly located at the west side of the outer bailey. This is associated with a polarised negative reading and extends from the western fence boundary toward the SE and east. The anomaly is comparable with anomaly m5 and may indicate the remains of a section of ditch.

#### 6.17 Anomaly m16:

This is a prominent positive anomaly located at the southern end of the outer bailey and aligned north to south. The anomaly correlates well with resistance anomaly 20 and may indicate the remains of a metalled roadway.

#### 6.18 Anomaly m17:

A prominent and irregular positive anomaly located at the northern edge of the outermost bailey. This correlates roughly with part of resistance anomaly 15. It may be part of a boundary feature such as bank, but is more likely part of an exposed section of glacial deposit.

#### 6.19 Anomaly m18:

This is a series of poorly defined linear magnetic disturbance anomalies located at the north side of sloping ground above the outermost bailey. This may correlate with the change of gradient at this location which has affected the magnetic reading or could indicate the ephemeral remains of a boundary feature at the top of the slope, such as a fence or tree-line.

#### 6.20 Anomaly m19:

An irregular positive anomaly located at the NE side of the outermost bailey. This anomaly is comparable with anomalies m9, m13 and m17, which are on a general north to south alignment. As with these other anomalies this may simply indicate an exposed area of glacial deposits associated with the gravel slope

situated adjacent to the east, but they may also possibly indicate the remains of a boundary feature or bank positioned along the edge of the slope because the reading is relatively anomalous to the general background geological readings in the outer bailey.

#### 6.21 Anomaly m20:

This is a curvilinear anomaly of magnetic disturbance, which extends in a central position from the north end of the outermost bailey. It is interpreted together with a comparable curvilinear anomaly identified at the southern end of the field, which may relate to the same feature, though it is poorly resolved in the southern area. The northern half of the anomaly correlates with the southern end of resistance anomaly 20. This may indicate a prepared roadway or track.

#### 6.22 Anomaly m21:

A linear section of positive readings at the east side of sloping ground located at the NE end of the outermost bailey. Interpretation is not clear, but this could be an extension of the feature identified by anomaly m18, or possibly an indication of a prepared surface or boundary feature on the upper part of the more gradually sloping area of ground visible at this location.

#### 6.23 Anomaly m22:

This is a series of linear magnetic disturbance readings, which may indicate a boundary feature such as fence line or tree plantation. The location at the south edge of a possible earthwork depression or ditch may suggest this anomaly marks the southern cut of a large ditch feature.

#### 6.24 Anomaly m23:

This is an extensive area of pronounced magnetic disturbance across the outermost bailey. The area covered is irregular in shape and roughly aligned SSE to NNW. This is most likely a geological response from an igneous dyke.

#### 6.25 Anomaly m24:

A globular positive anomaly located beside the west field boundary. Interpretation is not clear, but this may simply derive from modern disturbance from the adjacent fence.

#### 6.26 Anomaly m25:

A linear reading of magnetic disturbance in the west side of the outermost bailey and located beside an irregular positive anomaly. This is the remains of a stone wall which extended across this area from NNE to

SSW and is visible on the ground. The positive anomaly may derive from modern disturbance linked to the adjacent fence.

6.27 Anomaly m26:

This is an irregular positive anomaly beside the modern field boundary at the west side of the outermost bailey and may derive from modern disturbance.

6.28 Anomaly m27:

This is an irregular positive anomaly beside the modern field boundary at the west side of the outermost bailey and may derive from modern disturbance.

6.29 Anomaly m28:

This is an irregular positive anomaly beside the modern field boundary at the east side of the outermost bailey and may derive from modern disturbance.

6.30 Anomaly m29:

This is an irregular positive anomaly beside the modern field boundary at the east side of the outermost bailey and may derive from modern disturbance.

6.31 Anomaly m30:

A group of minor curvilinear positive anomalies located at the east side of the outermost bailey. Interpretation is not clear, but this may relate to a structural feature such as a small enclosure or building, though it also may simply mark the site of a modern animal feeder.

6.32 Anomaly m31:

This is an irregular positive anomaly beside the modern field boundary at the east side of the outermost bailey and may derive from modern disturbance.

6.33 Anomaly m32:

This is a pronounced and irregular positive anomaly near the modern field boundary at the east side of the outermost bailey. This derives from a pile of clearance rubble and modern debris at this location.

#### 6.34 Anomaly m33:

A series of globular magnetic disturbance readings located along the south end of the outermost bailey in a generally linear arrangement. These probably indicate the site of a tree plantation along the top of a slope, which may have formerly have been the site of the south side of the bailey's enclosure bank.

#### 6.35 Anomaly m34:

A pronounced and linear positive anomaly located at the southern end of the outermost bailey. This may indicate the edge of a boundary feature such as a ditch and possibly marked at some point by a fence, which might account for the narrow clear signal.

#### 6.36 Anomaly m35:

These series of positive linear readings are probably to be associated with linear anomaly m34. The anomalies extend WNW to ESE from the west edge of the field toward the east side. This may mark the edges of a ditch or other form of boundary feature.

#### 6.37 Anomaly m36:

This is a positive linear reading that is probably associated with linear anomalies m34 and m35. The anomalies extend WNW to ESE from the centre of the field toward the east side. This anomaly is superimposed with a NW to SE aligned linear reading of magnetic disturbance, which is an extension of the igneous geological readings identified by anomaly m23.

#### 6.38 Anomaly m37:

This is an irregular positive anomaly beside the modern field boundary at the west side of the field and may derive from modern disturbance.

#### 6.39 Anomaly m38:

This is an irregular positive anomaly beside the modern field boundary at the west side of the field and may derive from modern disturbance.

#### 6.40 Anomaly m39:

A series of irregular and curvilinear anomalies located at the southern end of the field. These are probably geological readings.

6.41 Anomaly m40:

This is an irregular positive anomaly beside the modern field boundary at the west side of the field and may derive from modern disturbance.

6.42 Anomaly m41:

A series of irregular and linear anomalies located at the SE end of the field. These are probably geological readings.

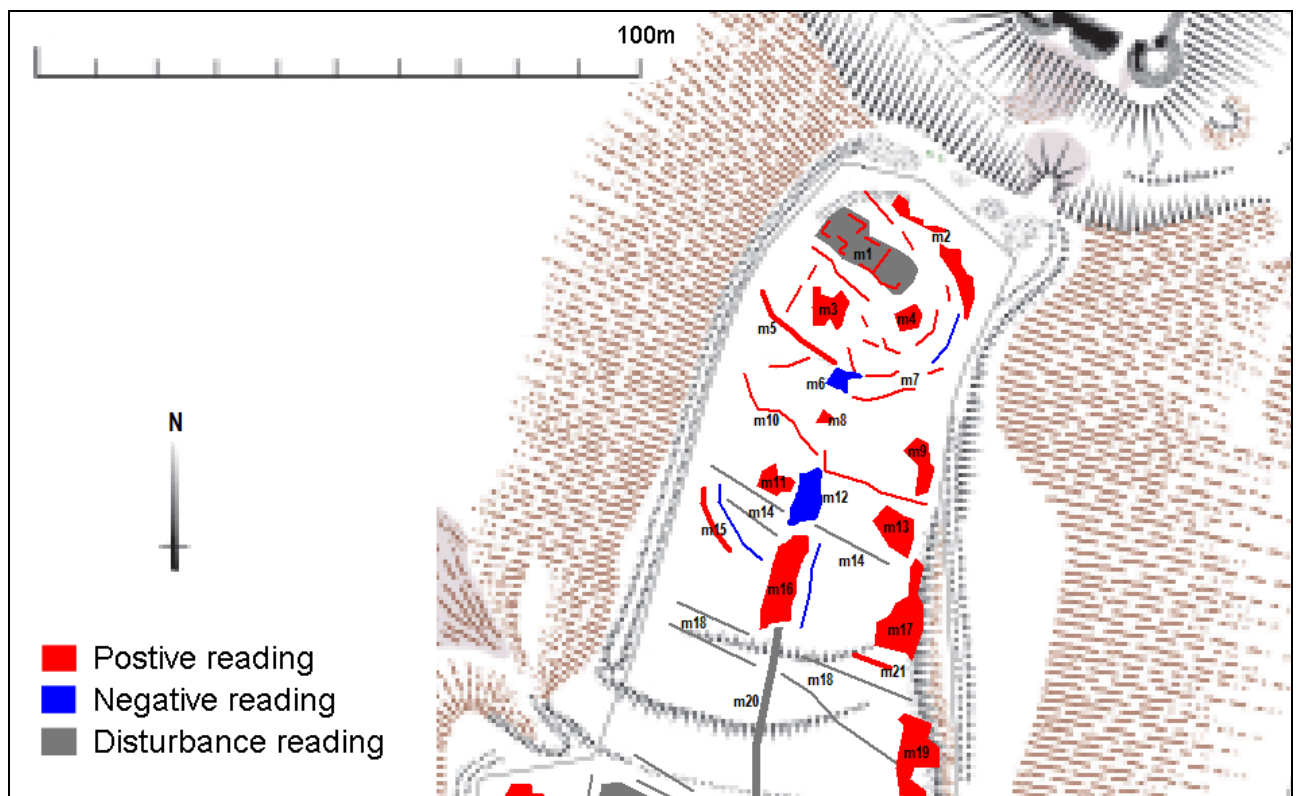


**Figure 3.** Processed flux-gate gradiometer data at Tibbers Castle bailey.  
(Background map courtesy RCAHMS ©Crown Copyright)

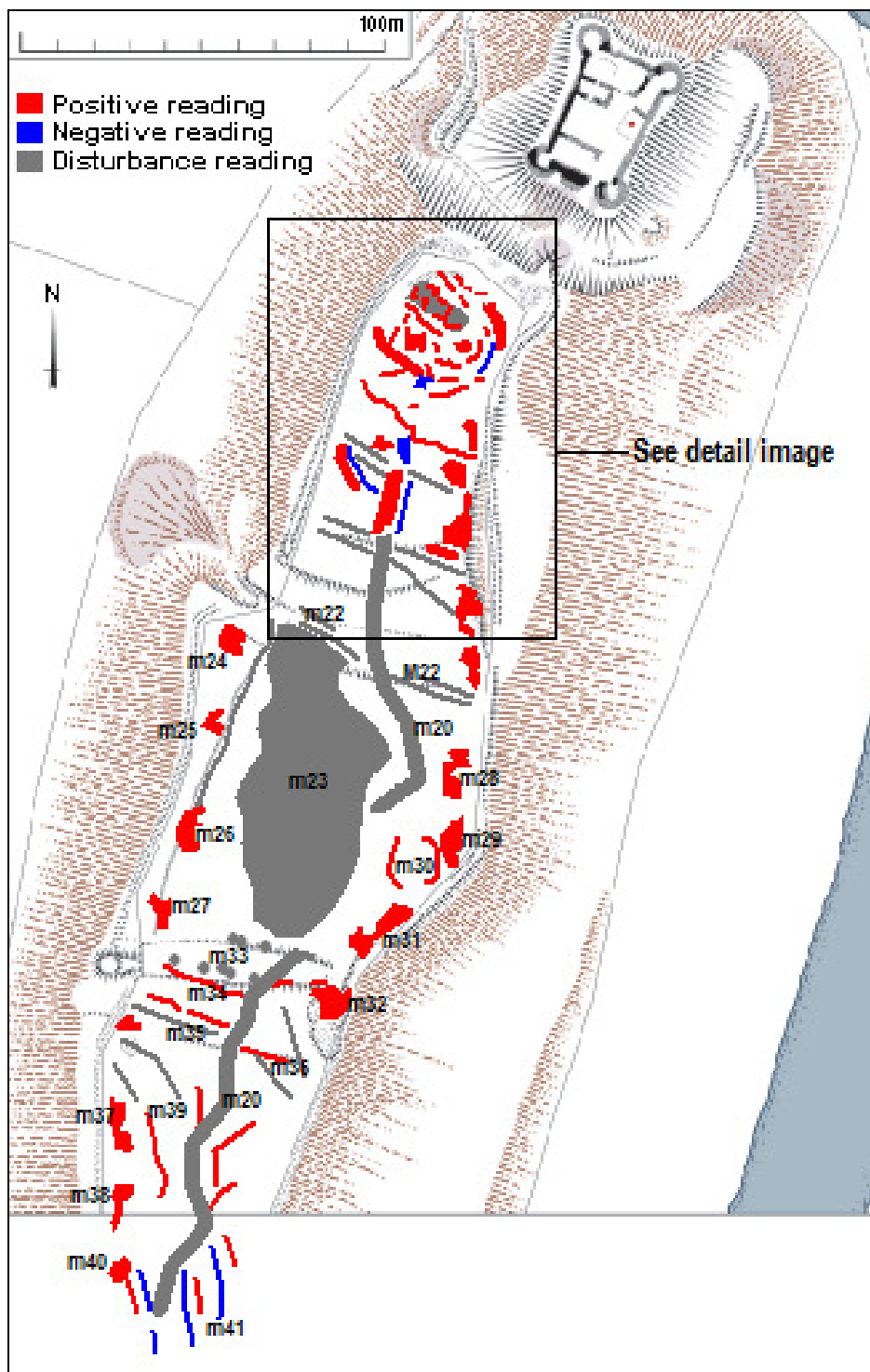


**Figure 4.** Detail of processed flux-gate gradiometer data from the outer bailey at Tibbers Castle.  
 (Background map courtesy RCAHMS ©Crown Copyright)





**Figure 5.** Annotated interpretation of the flux-gate gradiometer data at Tibbers Castle outer bailey.  
 (Background map courtesy RCAHMS ©Crown Copyright)



**Figure 6.** Annotated interpretation of the flux-gate gradiometer data with the main anomalies annotated.

(Background map courtesy RCAHMS ©Crown Copyright)

## 7.0 Conclusions

7.1 The geophysical surveys have provided valuable new information about the extent and possible character of archaeological remains within the medieval bailey enclosures at Tibbers Castle, particularly at the northern and southern ends of the site, within the areas known as the outer and outermost bailies. Despite geological constraints, results from the resistance and gradiometer surveys have also complemented each other well and identified important concentrations of archaeological remains which may be related to medieval occupation and defence of the castle's bailey enclosures.

7.2 Key new findings included the identification of two possible ditches (anomalies 1, 8, m5, m7, m10) that appear to cross the outer bailey and are potentially also associated with two inner banks (anomalies 19, m14). The lack of recognisable surface earthworks relating to these features is noteworthy and may be accounted for by the action of post-medieval agricultural activity and the potentially small size of the features (though at least anomaly 1 may indicate a feature approximately 4m wide). The dating of these enclosures or defensive works will require further comparative analysis with other medieval bailies and physical inspection by excavation. It is worth noting that the ditch anomalies do appear to respect the area of other anomalies that are indicative of possible building remains in the outer bailey. This may imply that these features are collectively related to the medieval bailey.

7.3 Readings possibly indicative of building platforms (anomalies 3, 6, 5, 12, m1) were also located within the north end of the outer bailey by both the resistance and gradiometer data. These may represent fragmentary foundations for timber buildings; perhaps small halls and other lesser structures that may have been associated with ancillary settlement and craft-working areas; such as workshops, barns or housing for men-at-arms.

7.4 In the outermost bailey igneous geology obscured a large section of the results across the north-west and centre of this area. Nonetheless useful new findings included the clear readings of ditches and possible ramparts that enclosed the north and south sides. A possible roadway (anomalies 20, m20) could be traced from the outer bailey to the SW extent of the survey area. At the western and southern end of the outermost bailey concentrations of discrete low resistance globular anomalies may indicate a two wide spreads of densely positioned pits, which are potentially significant indications of occupation activity. Further archival research will be required to mitigate the possibility that these could rather be the remains of tree bowls.

7.5 The survey results have highlighted a comparative difference between the readings from the outer and outermost bailies, which in part have resulted from variation in the geological background across the site, but may also reflect differences in the historic functions of the castle's several bailey enclosures.

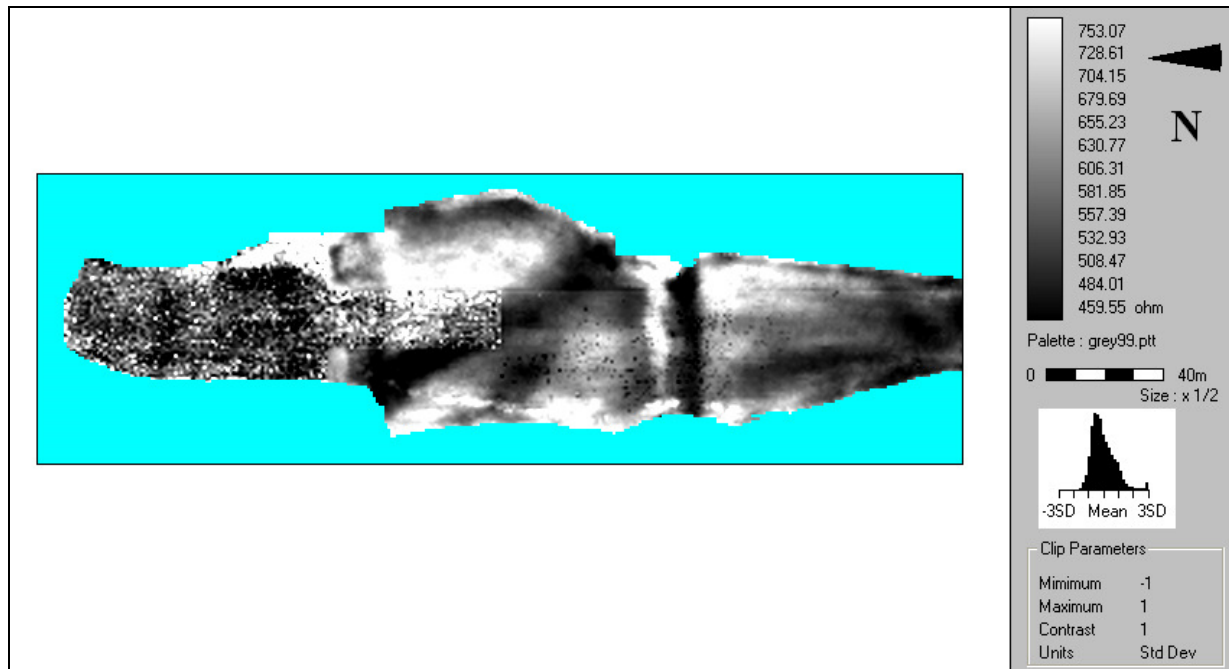
## **8.0 Statement of Indemnity**

8.1 Tibbers Castle is a Scheduled Monument and consent was confirmed from Historic Scotland by the client prior to fieldwork commencing. OJT Heritage cannot be held responsible for costs incurred or damages caused by any subsequent works devised with reference to the findings and recommendations contained in this report. This report has been produced with reference to established standards and guidance (Jones 2008). OJT Heritage holds professional indemnity and public liability insurance with Towergate Risk Solutions. Copies of certificates can be supplied on request.

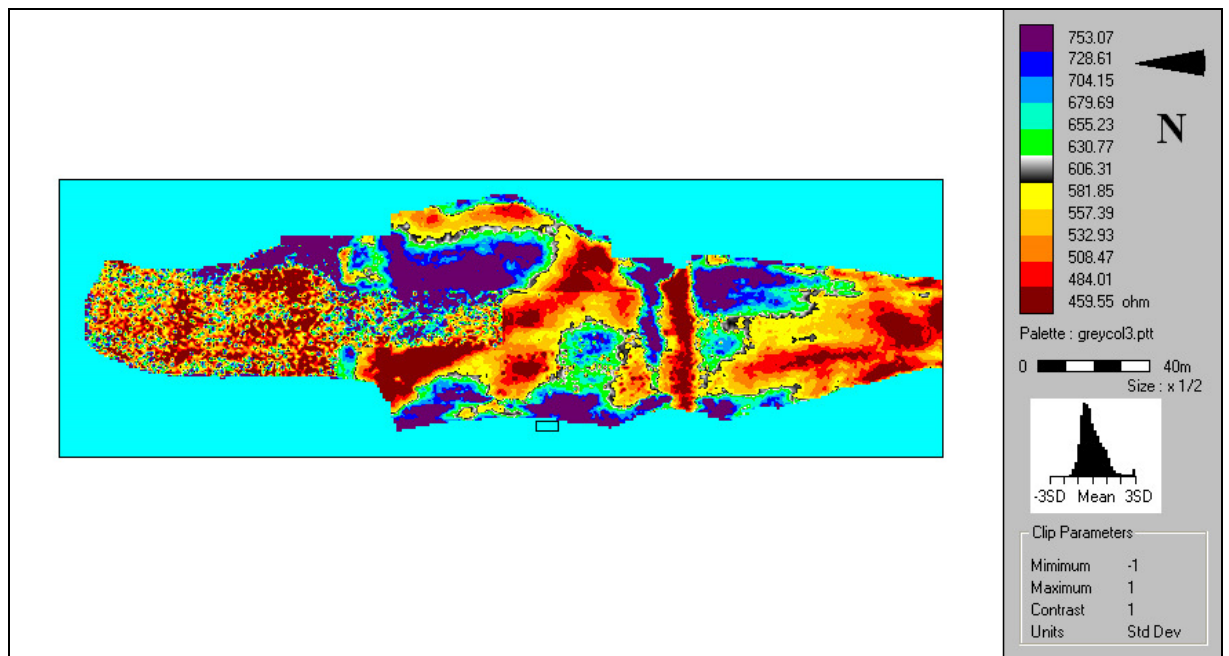
## **9.0 Bibliography**

Jones, D.M. (ed.) 2008 *Geophysical Survey in Archaeological Field Evaluation*, Swindon: English Heritage.

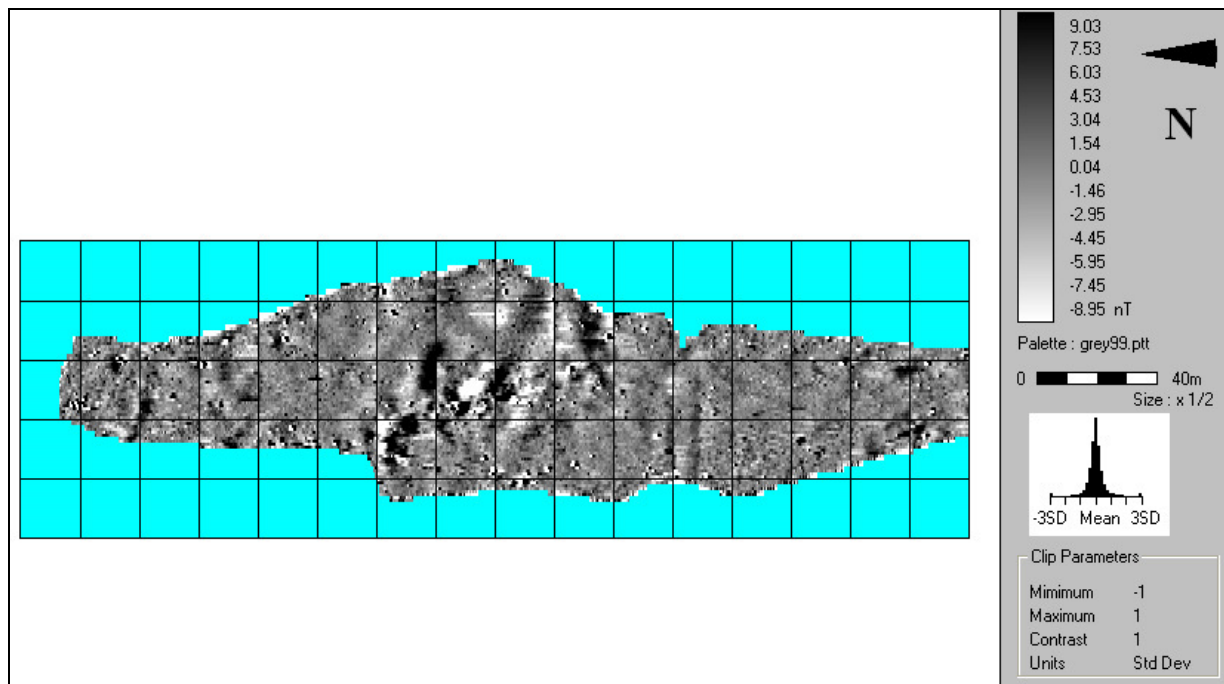
## 10.0 Appendix



**Figure A.** Electrical resistance data at Tibbers Castle bailey.



**Figure B.** Electrical resistance data at Tibbers Castle bailey (colour palette).



**Figure C.** Raw flux-gate gradiometer data at Tibbers Castle bailey.

**Table 1.** Register of Anomalies:

| ID | Reading         | Shape                 | Interpretation              |
|----|-----------------|-----------------------|-----------------------------|
| 1  | Low resistance  | Curvilinear           | Ditch                       |
| 2  | Low resistance  | Curvilinear           | ?ditch                      |
| 3  | Low resistance  | Rectilinear           | ?building                   |
| 4  | Low resistance  | Irregular             | ?natural                    |
| 5  | Low resistance  | Irregular             | ?building                   |
| 6  | Low resistance  | Rectilinear, L-shaped | ?building(s)                |
| 7  | Low resistance  | Irregular             | ?cutting, ?entrance         |
| 8  | Low resistance  | Linear                | ?ditch                      |
| 9  | Low resistance  | Irregular             | ?ditch                      |
| 10 | Low resistance  | Linear                | ?road, ?drain, ?plough-scar |
| 11 | High resistance | Irregular             | ?cobbled surface            |
| 12 | High resistance | Rectilinear           | ?building, ?cobbled surface |
| 13 | High resistance | Irregular             | ?prepared surface, ?bank    |
| 14 | High resistance | Irregular             | ?bank                       |

|    |                      |             |                             |
|----|----------------------|-------------|-----------------------------|
| 15 | High resistance      | Linear      | Natural, ?bank              |
| 16 | High resistance      | Irregular   | ?bank, ?prepared surface    |
| 17 | High resistance      | Irregular   | ?building, ?bank            |
| 18 | High resistance      | Linear      | ?natural                    |
| 19 | High resistance      | Irregular   | ?bank                       |
| 20 | High resistance      | Linear      | ?roadway, ?rig              |
| 21 | High resistance      | Irregular   | ?bank, ?wall                |
| 22 | High resistance      | Linear      | ?wall, ?rig, ?drain         |
| 23 | High resistance      | Rectilinear | ?building platform          |
| 24 | High resistance      | Linear      | ?wall, ?rig, ?drain         |
| 25 | High resistance      | Irregular   | ?natural, ?bank material    |
| 26 | High resistance      | Irregular   | ?natural, ?bank material    |
| 27 | Low resistance       | Irregular   | ?natural, ?prepared surface |
| 28 | High resistance      | Irregular   | ?natural                    |
| 29 | High resistance      | Irregular   | ?natural                    |
| 30 | High resistance      | Linear      | ?bank / rampart             |
| 31 | High resistance      | Irregular   | ?metalled surface, ?bank    |
| 32 | Low resistance       | Linear      | ?ditch                      |
| 33 | Low resistance       | Linear      | ?natural                    |
| 34 | High resistance      | Irregular   | Natural                     |
| 35 | High resistance      | Linear      | Field wall                  |
| 36 | High resistance      | Irregular   | Natural                     |
| 37 | High resistance      | Irregular   | Natural                     |
| 38 | High resistance      | Irregular   | ?wall, ?natural             |
| 39 | High resistance      | Linear      | ?rampart / bank             |
| 40 | Low resistance       | Linear      | Ditch                       |
| 41 | High resistance      | Irregular   | Natural                     |
| 42 | Low resistance       | Linear      | ?natural                    |
| 43 | High resistance      | Linear      | ?bank                       |
| 44 | High resistance      | Linear      | ?bank                       |
| 45 | Low resistance       | Globular    | ?pits, ?tree bowls          |
| 46 | Low resistance       | Globular    | ?pits, ?tree bowls          |
| m1 | Magnetic disturbance | Rectilinear | ?building(s)                |

|     |                      |             |                               |
|-----|----------------------|-------------|-------------------------------|
| m2  | Positive magnetic    | Irregular   | ?modern, ?occupation          |
| m3  | Positive magnetic    | Irregular   | ?prepared surface             |
| m4  | Positive magnetic    | Irregular   | ?prepared surface             |
| m5  | Positive magnetic    | Curvilinear | Ditch, ?bank/wall             |
| m6  | Negative magnetic    | Irregular   | ?gateway, ?prepared surface   |
| m7  | Positive magnetic    | Curvilinear | ?ditch                        |
| m8  | Positive magnetic    | Irregular   | ?prepared surface, ?road      |
| m9  | Positive magnetic    | Irregular   | ?bank, ?natural               |
| m10 | Positive magnetic    | Linear      | ?ditch, ?boundary feature     |
| m11 | Positive magnetic    | Irregular   | ?prepared surface, ?bank      |
| m12 | Negative magnetic    | Irregular   | ?prepared surface, ?gate      |
| m13 | Positive magnetic    | Irregular   | ?bank, ?natural               |
| m14 | Magnetic disturbance | Linear      | ?bank, ?boundary feature      |
| m15 | Positive magnetic    | Curvilinear | ?ditch                        |
| m16 | Positive magnetic    | Irregular   | ?road, ?prepared surface      |
| m17 | Positive magnetic    | Irregular   | ?bank, ?natural               |
| m18 | Magnetic disturbance | Linear      | ?natural, ?boundary feature   |
| m19 | Positive magnetic    | Irregular   | ?natural, ?bank               |
| m20 | Magnetic disturbance | Linear      | ?prepared roadway, ?track     |
| m21 | Positive magnetic    | Linear      | ?prepared surface, ?boundary  |
| m22 | Magnetic disturbance | Linear      | ?ditch edge                   |
| m23 | Magnetic disturbance | Irregular   | Natural, igneous dyke         |
| m24 | Positive magnetic    | Irregular   | ?modern                       |
| m25 | Positive magnetic    | Irregular   | ?modern                       |
| m26 | Positive magnetic    | Irregular   | ?modern                       |
| m27 | Positive magnetic    | Irregular   | ?modern                       |
| m28 | Positive magnetic    | Irregular   | ?modern                       |
| m29 | Positive magnetic    | Irregular   | ?modern                       |
| m30 | Positive magnetic    | Curvilinear | ?enclosure, ?building ?modern |
| m31 | Positive magnetic    | Irregular   | ?modern                       |
| m32 | Positive magnetic    | Irregular   | ?modern                       |
| m33 | Magnetic disturbance | Globular    | Tree-line plantation          |
| m34 | Positive magnetic    | Linear      | ?ditch, ?fence                |



|     |                      |             |         |
|-----|----------------------|-------------|---------|
| m35 | Magnetic disturbance | Linear      | ?ditch  |
| m36 | Positive magnetic    | Linear      | ?ditch  |
| m37 | Positive magnetic    | Irregular   | ?modern |
| m38 | Positive magnetic    | Irregular   | ?modern |
| m39 | Magnetic disturbance | Curvilinear | Natural |
| m40 | Positive magnetic    | Irregular   | ?modern |
| m41 | Magnetic disturbance | Curvilinear | Natural |