

# GeoArch

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Geophysical survey of the supposed  
findspot of the 'Gold Cape',  
Bryn-yr-ellyllon, Mold, Flintshire (pt 2)

# Geophysical survey of the supposed findspot of the 'gold cape', Bryn-yr-ellyllon, Mold, Flintshire (part 2)

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## Abstract

*This report details additional geophysical surveys undertaken over the supposed findspot of the Mold Gold Cape in September 2013.*

*The work supplements that undertaken in July 2013 in three ways:*

- 1. by extending the main area of ground resistivity survey to both the west and the east, to provide a slightly larger area of coverage around the main target.*
- 2. by extending the gradiometer survey towards the north of the field to cover an area of a possible annular cropmark identified on aerial photographs. A single grid of resistivity data was also acquired in the same area.*
- 3. by providing survey pegs for the location of any further fieldwork.*

*The extension to the resistivity survey in the southern part of the field provided an alternative possible location for the trench dug by the Flintshire Historical Society and Liverpool University in the 1950s.*

*The extension to the geophysical surveys in the north of the field failed to find any anomalies corresponding to the location of the possible cropmark. The agricultural lineations were similar to those in the previously-surveyed area.*

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## Methods

### *Survey rationale and background*

The survey was undertaken on behalf of Amgueddfa Cymru / National Museum Wales and commissioned by Alice Forward. It was undertaken as a follow-up to the Community Engagement project of July 2013 and as a preliminary to trial excavations. The contribution of the volunteers to the execution of the survey is gratefully acknowledged.

The previous survey in July (Young 2013) had suggested that the footprint of a possible barrow could be identified ((The Bryn-yr-ellyllon Tumulus; CPAT SMR PRN 100055), despite Powell's assertion (1955) '*Any new study of the problems connected with the gold ornament may now be undertaken free from the uncertainty that some evidence might still survive in the field*'. This report should be read in conjunction with the previous report on the works in July 2013.

The survey was conducted on the 11<sup>th</sup> and 12<sup>th</sup> of September 2013 in good conditions, but following a period of rain.

In all cases where a high degree of certainty on the presence/absence of archaeological features is required, or a high level of interpretation of those features, then additional investigations, usually including intrusive testing through trial excavation, may be required. Geophysical survey results should not be relied on, on their own, to provide unambiguous interpretations.

### *Survey layout*

The surveys were conducted with broadly the same methodology and equipment as those in July (see

Young 2013 for details). Differences in methodology are described below. Because there had been no intention of a rapid return to the site following the July investigations, the survey station had been removed. The new survey therefore had to establish a new survey station (STN2), for which data were logged for 54 minutes on the first day and then post-processed using RINEX corrections from the closest five Ordnance Survey active stations. Raw GPS data files were converted to RINEX format using Trimble's *Rinex Converter* utility. All RINEX files were backdated using the *RinexDates* program to permit baseline processing in Trimble *Geomatics Office*. The post-processed coordinates were E=324409.39, N=363932.81 and elevation = 107.47. The previous survey grid was re-established, with stake locations 0.21m west and 0.62m north of the 'round-number' 20m intervals of the National Grid as in July.

Other aspects of the topographic survey followed the previous methodology. The grid locations are shown in Figure 1.

Three survey stakes were positioned to allow survey of the subsequent excavations using an EDM. The locations were (Fig. 1):

Stake 1: 324393.771, 363936.762, 107.575  
(in front of double fence posts in garden fence)

Stake 2: 324388.844, 363949.844, 107.764  
(by fence post on E corner of Haulfryn garden)

Stake 3: 324447.935, 363958.955, 107.41  
(by inclined fence post in SE boundary E of big tree)

### Ground resistivity

The ground resistivity survey was undertaken with a Geoscan RM15 resistivity meter, operating a 'parallel twin electrode' configuration, employing three electrodes with 0.5m probe spacing on a PA5 frame, via an MPX15 multiplexer (this setup was as used in July –for further details see Young 2013)

The data acquired in September (Figure 2) were from two areas: Area A in the south and Area B in the north of the field. The values were not standardised between the two areas.

In Area A, the values could not be standardised against those obtained in July. In equivalent areas the July data showed a range of 110-240Ω measured resistance, whereas the September data had a range of 250-450 Ω measured resistance. The difference was largely due to the change in remote probe location and spacing, but also reflects an intervening period when there had been significant rainfall after a prolonged dry spell. To obtain a single image with approximately equivalent greyscale across the two sets of survey data, a simple linear empirical transformation was applied to the data from the July survey:

$$R' = (R-110) \times 200/130 + 250$$

The resulting combined dataset still contains some discontinuity between old and new data in the western part of Area A (Figure 3).

### Magnetic gradiometry

Magnetic gradiometry was undertaken with a Bartington Grad 601 Dual fluxgate gradiometer. Data were collected at 0.125m intervals on traverses 2m apart (giving effective traverse interval of 1.0m; single density).

Data were downloaded from the instrument, assembled with the data from July and cleaned using DW Consulting's *Terrasurveyor Lite v3* software. The grids were assembled, the data clipped and the destriping function employed for data in which there was an imbalance between the two gradiometers (Figure 4). The data were exported from *Terrasurveyor* and interpolated to a 0.125m node-spacing using Golden Software's *Surfer* package to reduce pixilation (Figure 5).

## Results

The survey results are illustrated in figures 2-5.

The ground resistivity data are presented in Figure 2 (as a raw bitmapped images from *Geoplot*) and Figure 3 (as the interpolated cleaned data from *Surfer*).

The magnetic gradiometer data are presented in Figure 4 (as a bitmapped image from *Terrasurveyor* of the raw, but destriped, data) and Figure 5 (as the interpolated data from *Surfer*).

Data quality from both instruments was good and comparable to that of the data collected in July.

## Interpretation

The extension to the geophysical survey adds several new elements to understanding of the field.

In the south, the new data add to information about the northwest side of the possible barrow.

A NS linear negative resistivity anomaly possibly indicates the early 1950s excavation trench. It lies within about 4m west of the location interpreted by Young (2013), from the description of Powell (1955). The discrepancy is due a major difference between the measured location of the garden fence for Haulfryn (the reference for Powell's measurements) and that which appears on the OS mapping. The anomaly lies approximately the distance from the measured fence corner that Powell described, but the measured fence corner lies 4m west of the location shown on the OS mapping. This location is illustrated in Figure 8 as an alternative possibility to the location for the trench shown by Young (2013).

An area of high resistivity close to the fence, but to the west of Powell's trench, may suggest that edge of the barrow might lie fractionally further west than proposed in July (and therefore intersect Powell's trench), but the preferred interpretation is that the edge of the feature actually lies immediately E of Powell's trench.

At the foot of the terrace to the west of the excavation, a large negative resistivity anomaly on the edge of the surveyed area corresponds to a visible topographic 'scar', probably a small quarry from gravel extraction.

In the east of Area A, the prominent negative resistivity anomaly close to the fence, can be seen to close

immediately south of the area surveyed in July. It this forms a rounded rectangular area 9m NS and 9m EW. The resistivity appears to rise slightly in its centre. The bounds of the anomaly correspond closely to the linear positive resistivity anomalies, both of the northwest-southeast and northeast-southwest sets. This suggests the anomaly is due to a modification of groundwater within the framework of the agricultural lineations and is not a feature cross-cutting them. This could be interpreted either as a modification of ground water content through a localised water-source or from minor superficial dumping, or as a modification of groundwater conductivity through increased ionicity. The latter explanation appears to fit the observed anomaly better and an interpretation of the anomaly as the former site of an animal feeder seems possible.

The new area of survey (both ground resistivity and magnetic gradiometry) in the north of the field produced on evidence for an annular feature in the location suggested by aerial photography. This extension to the survey showed agricultural lineations on the same alignments as those described in July (Young 2013). They are illustrated here (Fig. 7), but require no further addition to the interpretation given previously.

## References

- Powell, T G E , 1955 , Trial excavations at Bryn Ellyllion, Mold , *Flintshire Historical Society Publications* : 15 : 149
- Young, T.P. 2013. Geophysical survey of the supposed findspot of the 'Gold Cape', Bryn-yr-ellyllon, Mold, Flintshire. *GeoArch Report 2013-16*, 14pp.

## Figure Captions

**Figure 1.** Layout of survey grids, with respect to key modern features, mapped 'findspot' and the 1953 excavation trench (location amended to geophysical anomaly). The locations of the steel survey stakes are also shown.

**Figure 2.** Raw ground resistivity data as a bitmapped images from *Geoplot*.  
Area A (south) greyscale 220 ohm measured resistance (black) to 530 ohm (white).  
Area B (north) greyscale 100 ohm measured resistance (black) to 450 ohm (white).

**Figure 3.** Interpolated cleaned ground resistivity data, with transformation of July data as described in text. Image from *Surfer*.  
Area A (south) greyscale 250 ohm measured resistance (black) to 440 ohm (white).  
Area B (north) greyscale 100 ohm measured resistance (black) to 450 ohm (white).

**Figure 4.** Raw (but destriped) magnetic gradiometer data as a bitmapped image from *Terrasurveyor* , greyscale -6nT (black) to +6nT (white).

**Figure 5.** Interpolated magnetic gradiometer data as an image from *Surfer*, greyscale -6nT (black) to +6nT (white).

**Figure 6.** Summary interpretation of the ground resistivity data.

**Figure 7.** Summary interpretation of the magnetic gradiometer data. Only a representative selection of the lineations from ploughing are shown.

**Figure 8.** Summary interpretation of major features. For detailed explanation see text.

Figure 1

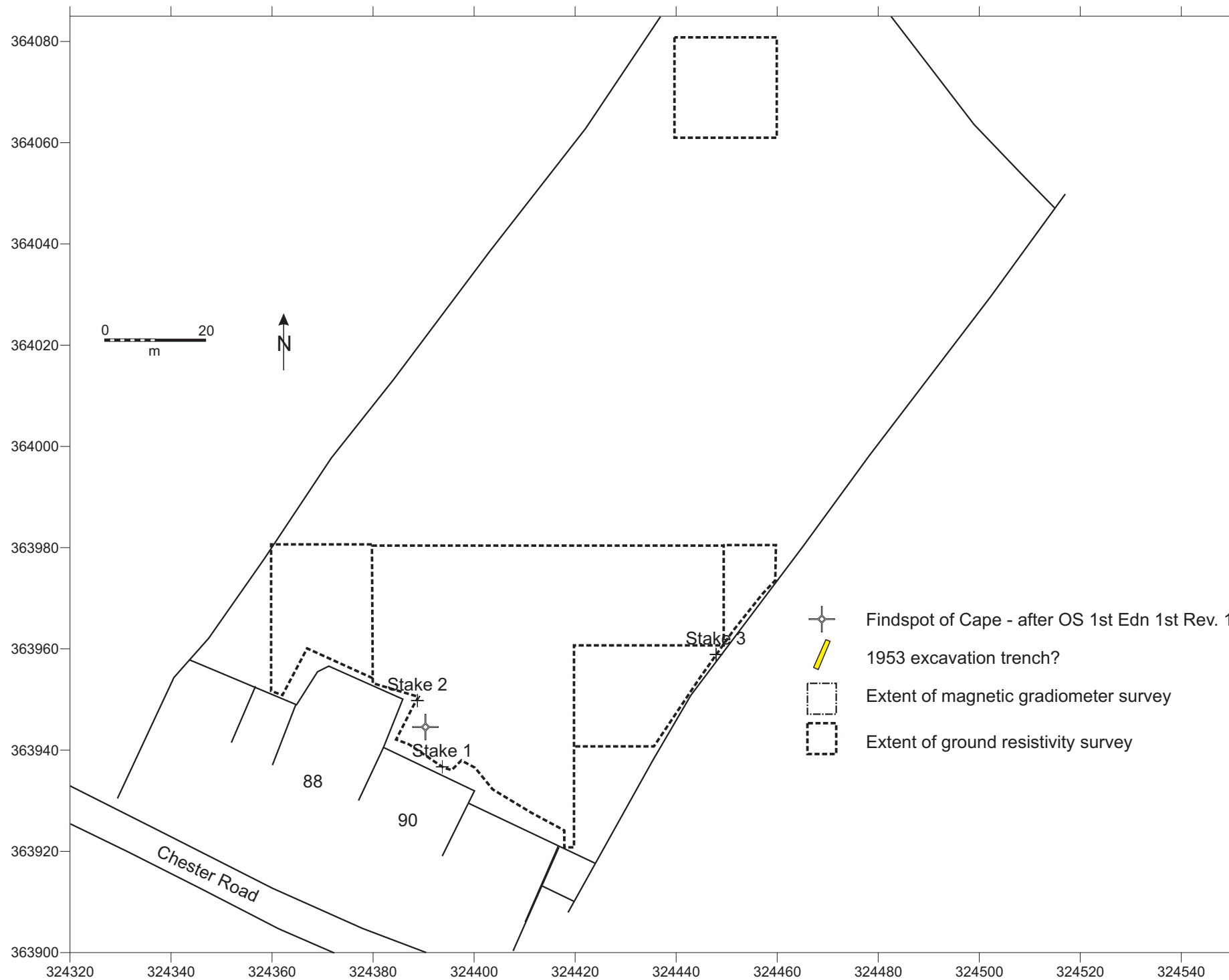


Figure 2

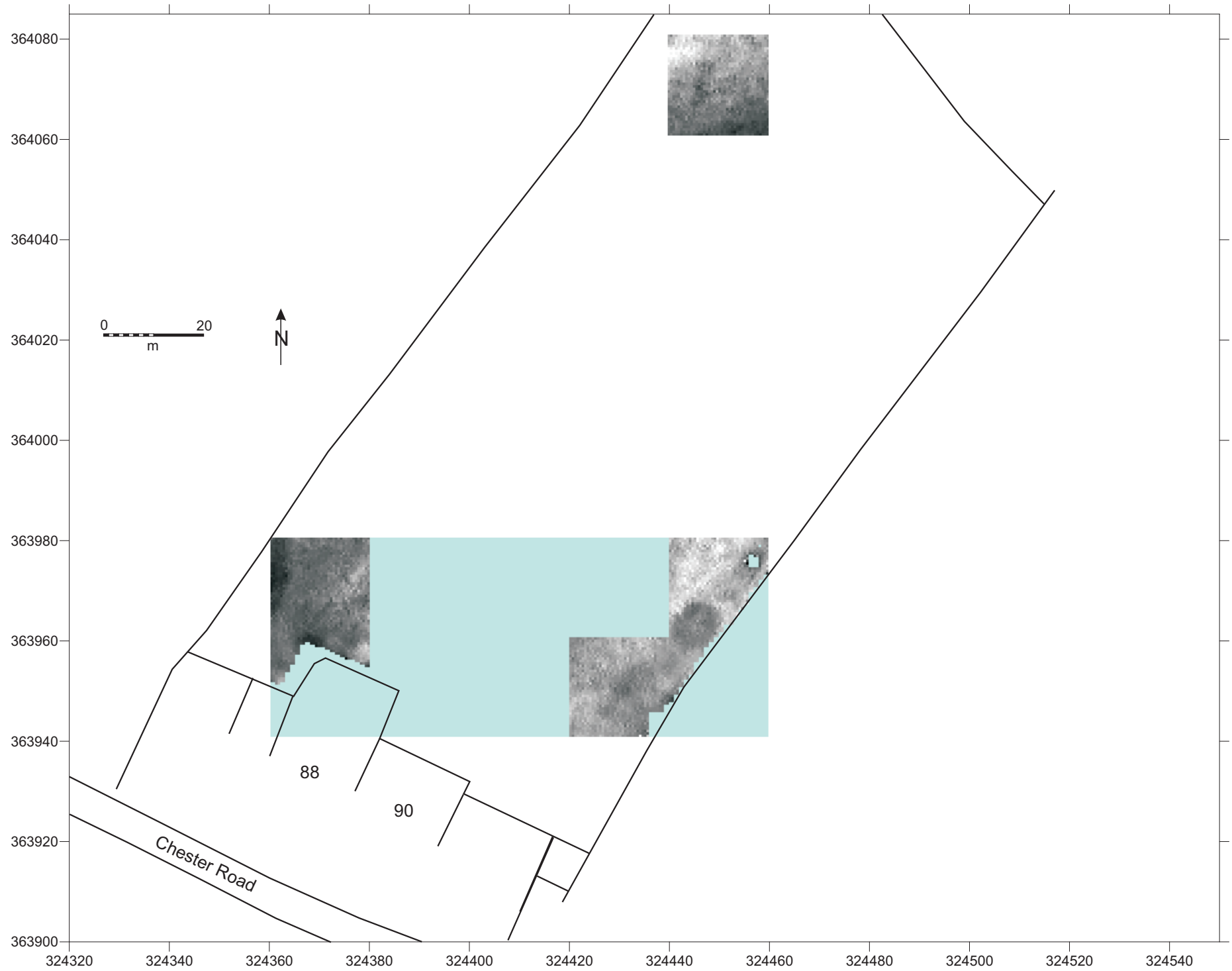


Figure 3

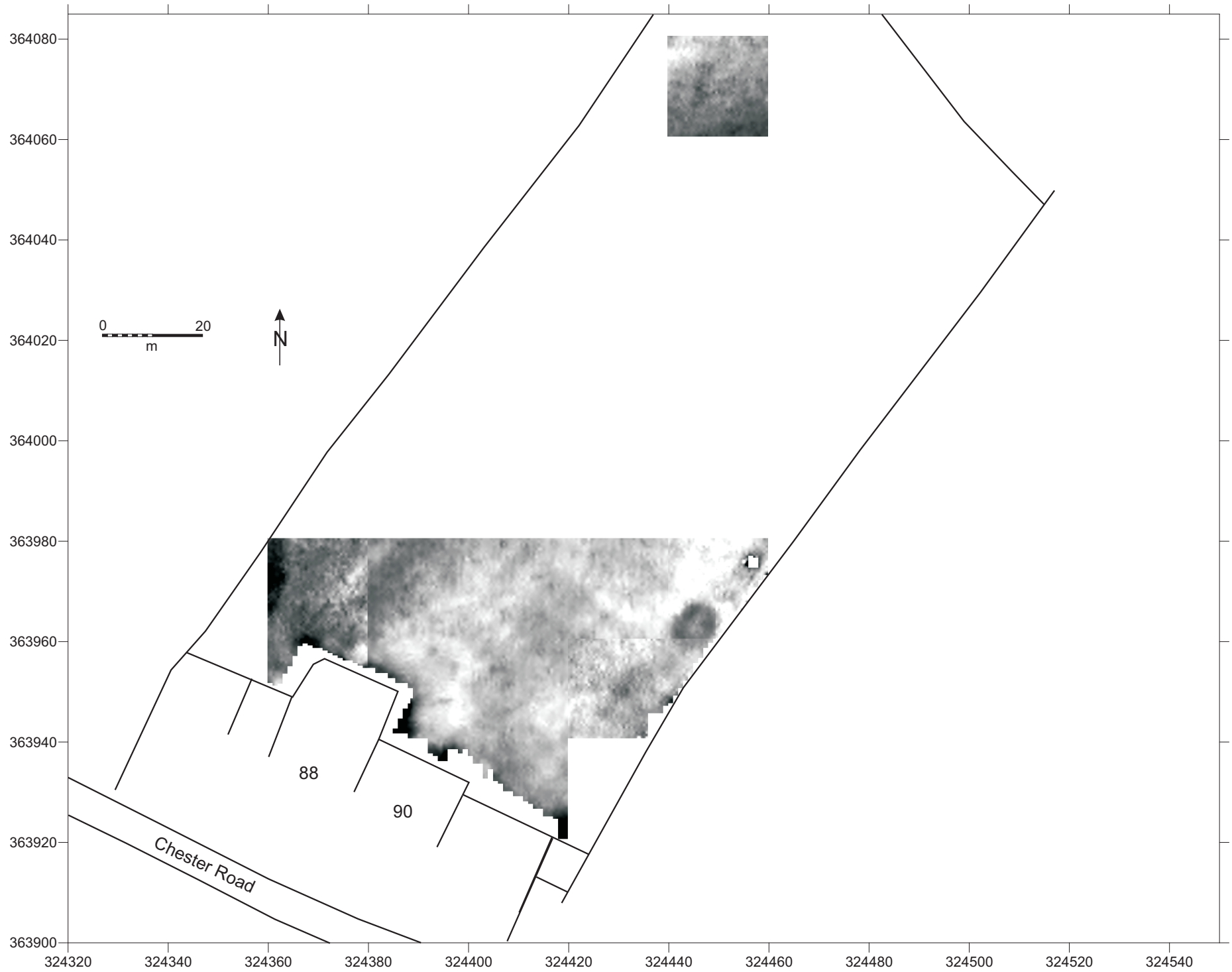


Figure 4

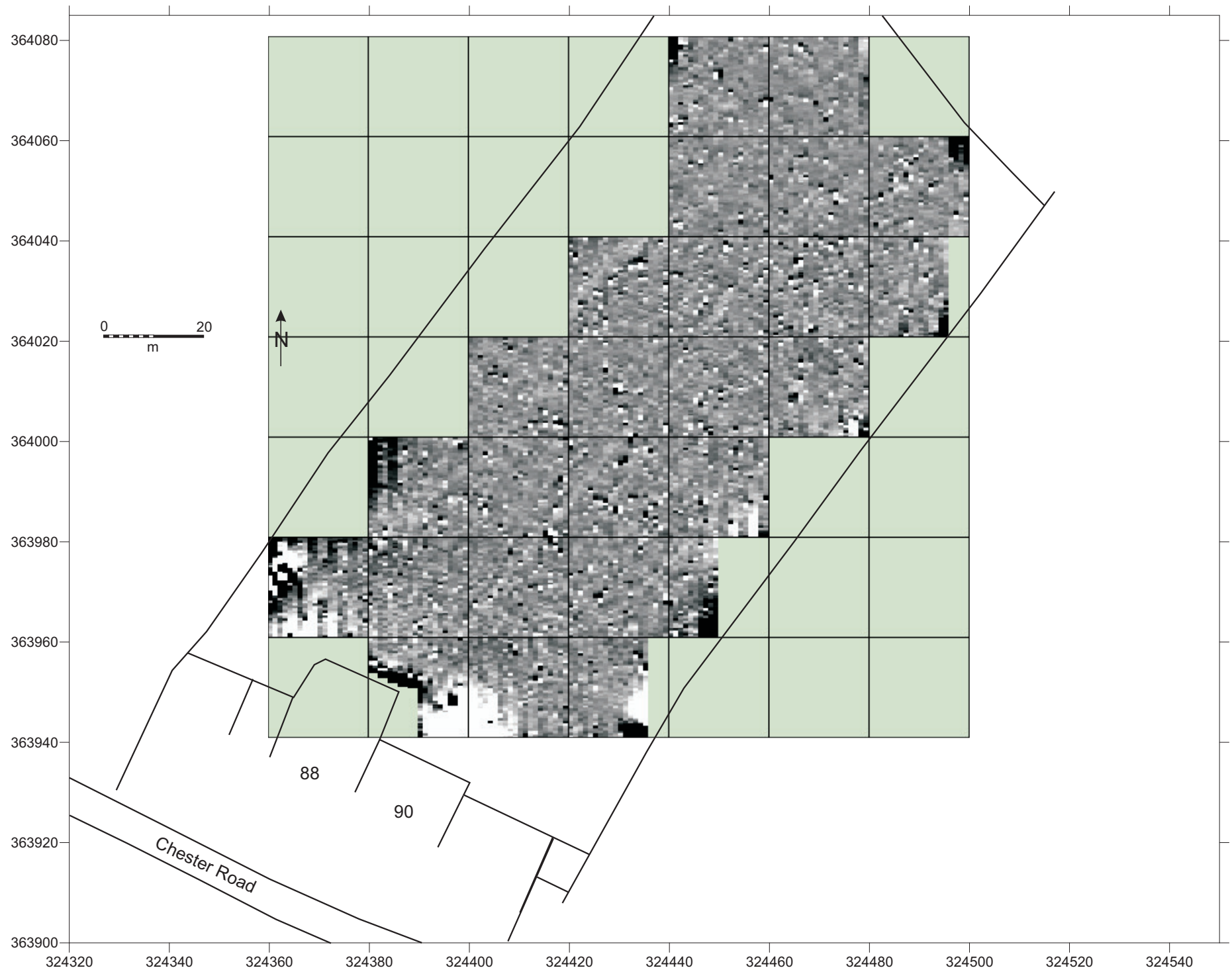




Figure 5

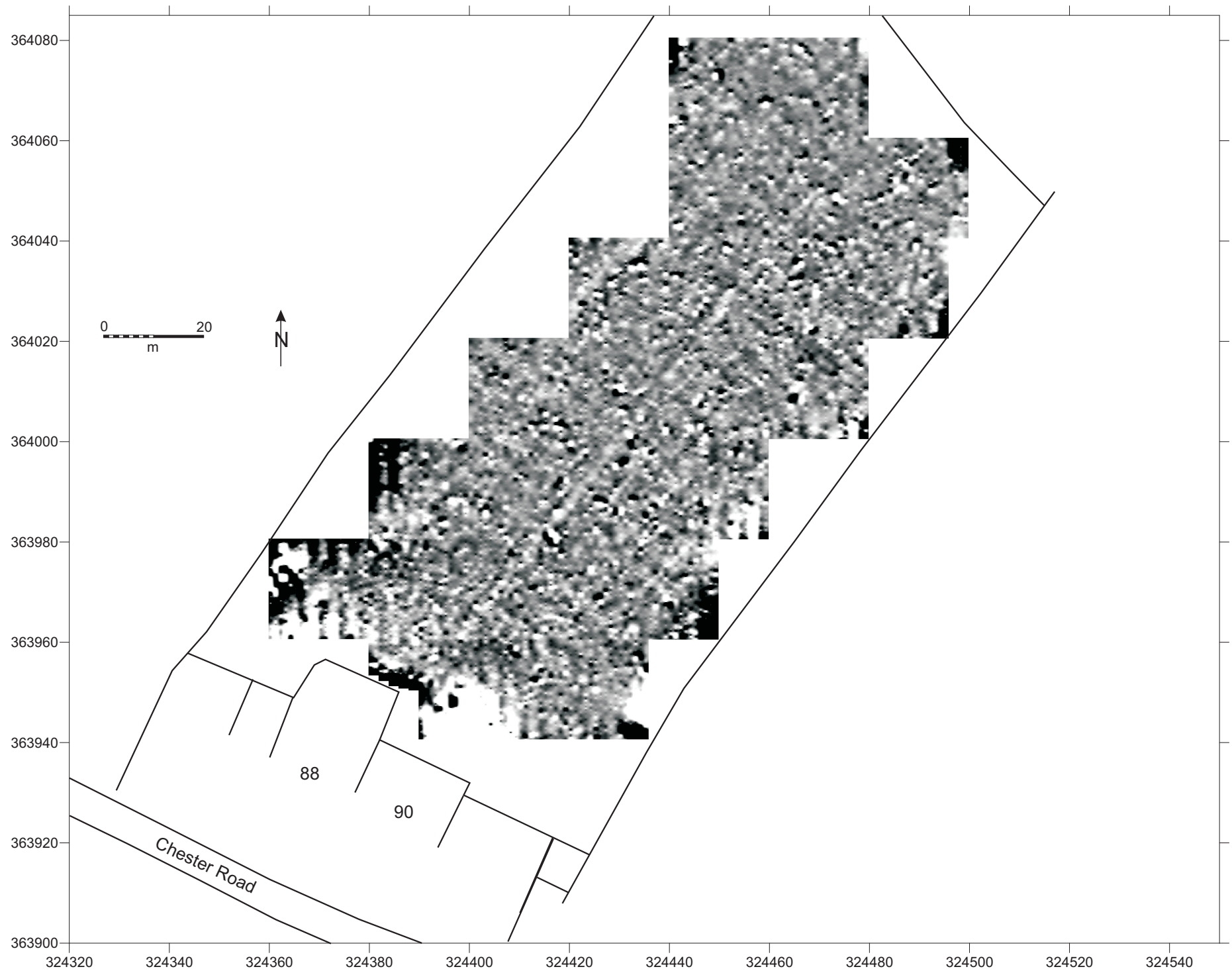


Figure 6

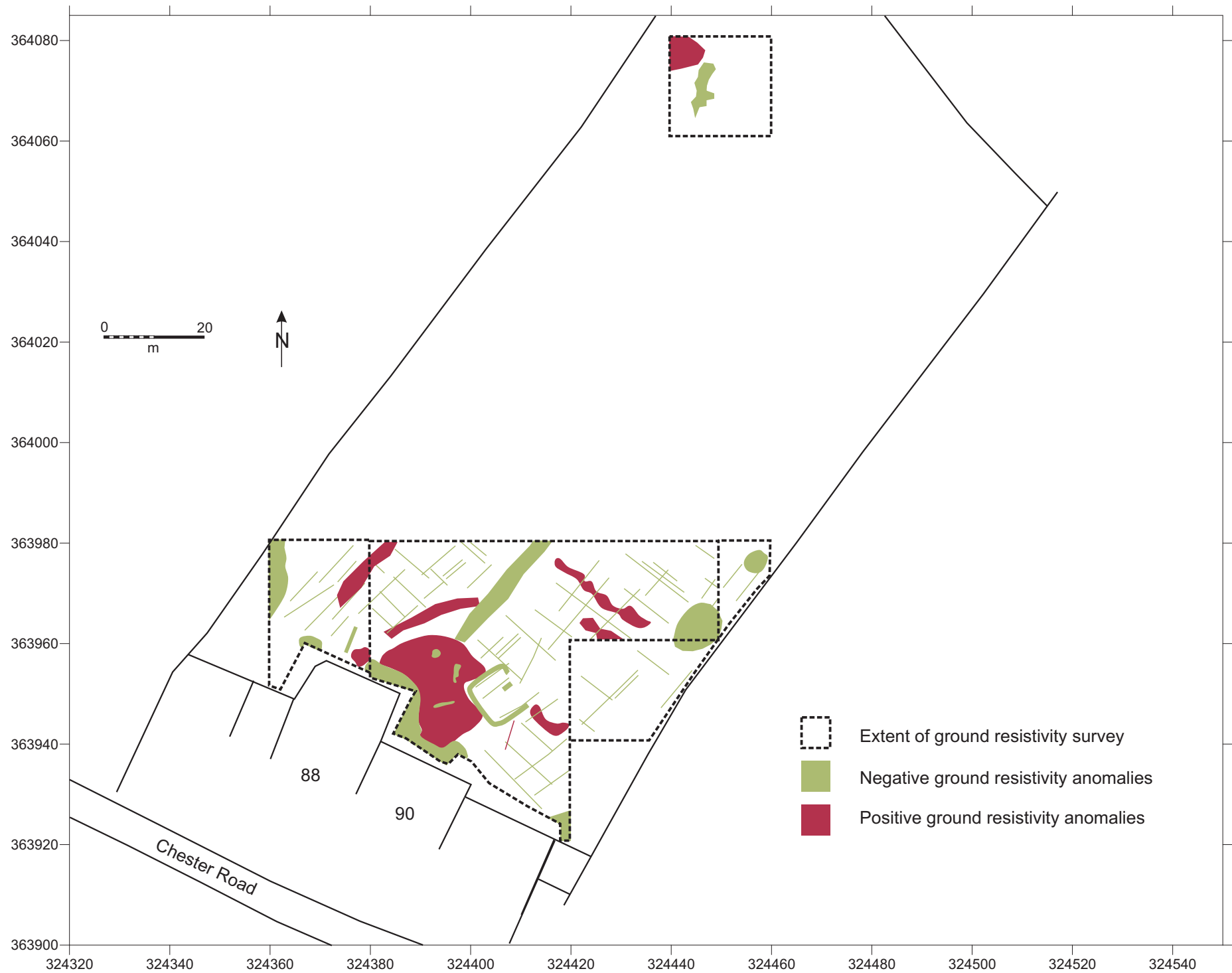


Figure 7

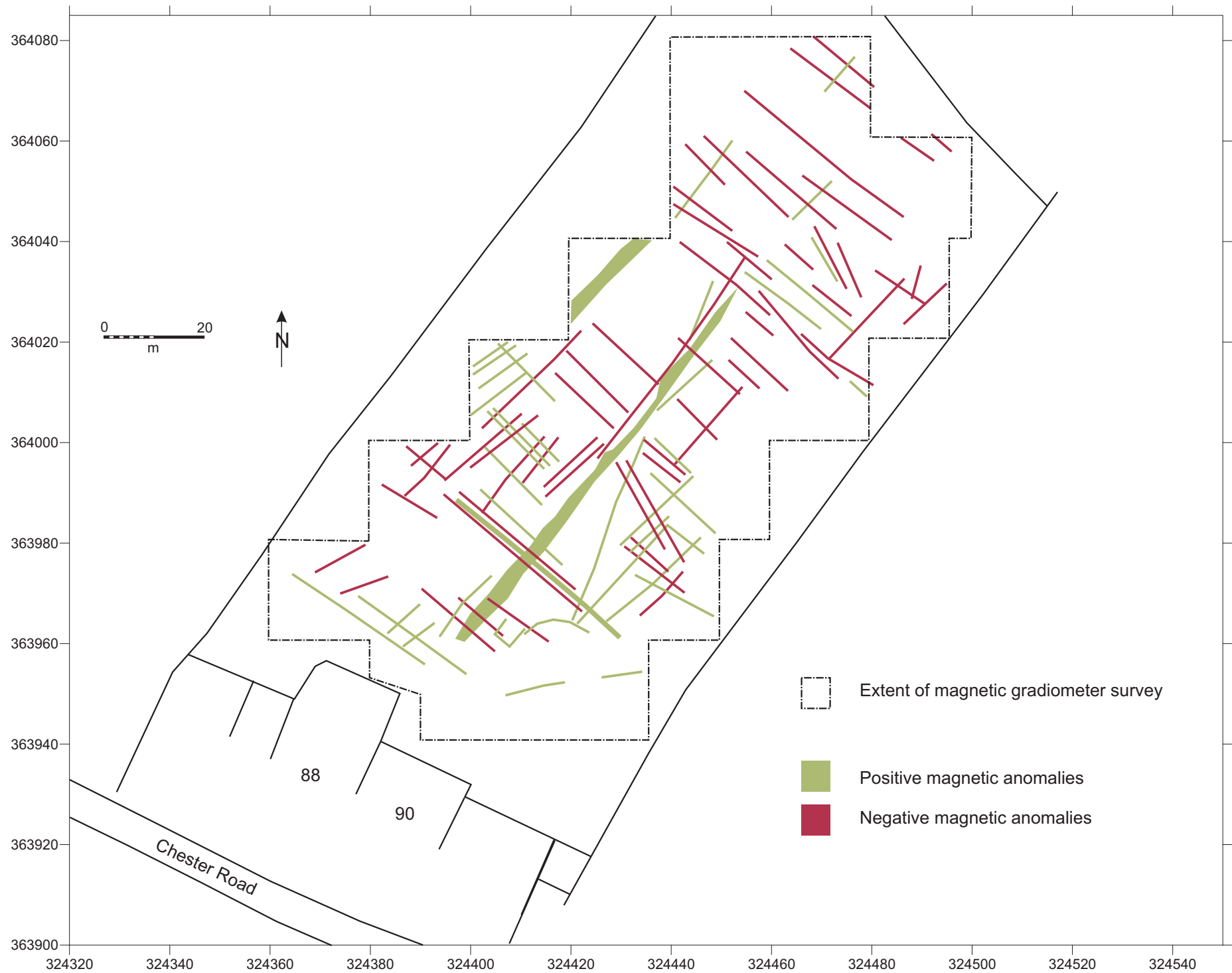
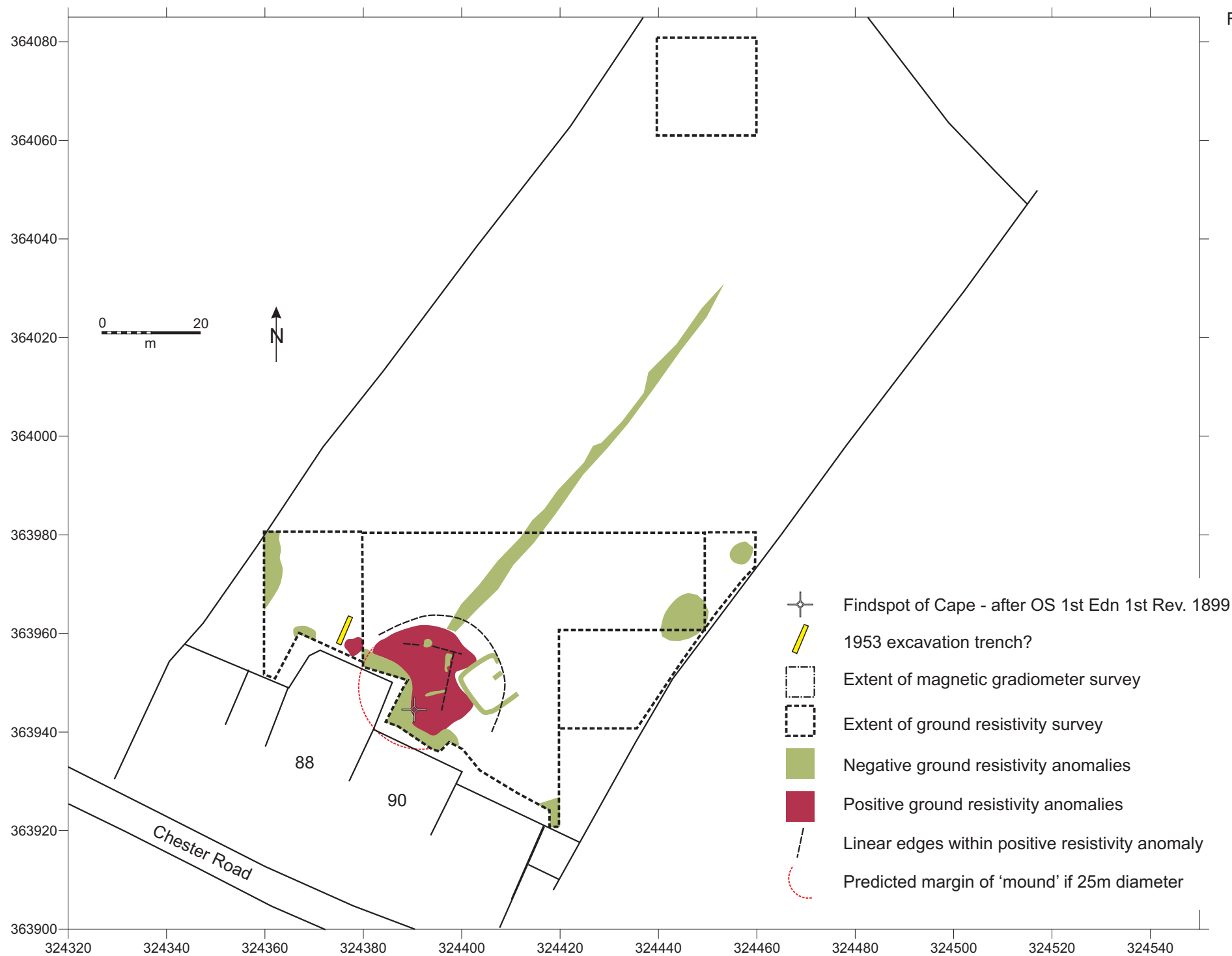


Figure 8



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