HERITAGE LINCOLNSHIRE

ARCHAEOLOGICAL PROJECT SERVICES

Geophysical Survey Report

BOLINGBROKE CASTLE AND DEWY HILL LINCOLNSHIRE

Prepared for

Castle Studies Trust
Advancing the Understanding of Castles

by
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1. SUMMARY

A detailed magnetic gradiometer survey was undertaken to understand the origins and development of Bolingbroke Castle and a possible predecessor, Dewy Hill, located north of Old Bolingbroke, Lincolnshire. The survey was carried out over the scheduled remains of the possible outer ward of the castle, including the enigmatic Rout Yard, as well as on the summit of Dewy Hill, where previous excavations had identified a possible manorial centre predating the castle.

The geophysical survey has identified several magnetic anomalies most of which are believed to be of geological origin. Several anomalies may be modern in nature with a single anomaly of possible archaeological feature identified.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation. Evaluation is defined as *'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate'* (CIfA 2014a).

2.2 Project Background

Archaeological Project Services, part of Heritage Lincolnshire, undertook several surveys around Old Bolingbroke, to assess the origin and development of Bolingbroke Castle and its possible predecessor, located at Dewy Hill. The work was funded by a grant provided to Heritage Lincolnshire by the Castle Studies Trust.

The geophysical survey was undertaken in two stages, firstly Dewy Hill on the 12th June 2018 followed by the area lying south of Bolingbroke Castle on the 13th August 2018 in accordance with a Written Scheme of Investigation prepared by Archaeological Project Services/Heritage Lincolnshire (2017) and approved by Historic England.

2.3 Topography and Geology

Old Bolingbroke is located 10km southeast of Horncastle, in the administrative district of East Lindsey, Lincolnshire (Fig. 1). The castle is situated in the centre of the village, to the south of Moat Lane, at National Grid Reference TF 3493 6501. Dewy Hill is located 420m northwest of the centre of Old Bolingbroke at National Grid Reference TF 3482 6547 (Fig 2).

Old Bolingbroke lies at a height of 30m OD within a valley formed largely by the Hagnaby Beck. Land rises sharply to the north, towards the Lincolnshire Wolds, where Dewy Hill overlooks the village and situated at a height of *c*. 60m OD. There is a slope down along the valley floor to the south of the village towards the fens of south Lincolnshire.

Local soils at both the survey areas are of the Wickham 2 Association, typically fine loamy over clayey stagnogley soils (Hodge *et al*. 1984, 351). These are developed over a solid geology of Kimmeridge Clay Formation, with some alluvium likely to the east of the southern survey area, associated with the Hagnaby Beck (BGS 1992).

2.4 Archaeological Setting

Bolingbroke is first mentioned in the Domesday Survey of *c*. 1086. Referred to as *Bolinbroc*, the name is derived from the Old English and means 'the brook belonging to *Bula*' (Cameron 1998, 16). The Domesday Survey records that the manor was held by Ivo Taillebois and contained a church, a new market, 3 mills as well as arable land and 70 acres of meadow. In addition, Bolingbroke is mentioned as holding sokeland in the surrounding villages, 6 leagues in length by 6 leagues wide, suggesting an important estate centre (Foster and Longley 1976, 14/65).

Following the death of Ivo, shortly after the Domesday Survey, his lands passed to his wife Lucy. She later married Roger de Roumare with whom she had one son, William de Roumare, who became the 1st Earl of Lincoln in 1143. The various estates handed down to William from his mother became the principal *caput* of the Lincolnshire estates and later formed the basis of the Honour of Bolingbroke. It was the belief of Thompson, who excavated Dewy Hill in the 1960s, that this was the manorial centre perhaps based on a motte and bailey type arrangement built by William de Roumare (Thompson 1966). An earthwork bank surmounted Dewy Hill, which has since been degraded by the plough. Domestic debris indicates settlement of some form took place during the 11th and 12th centuries, though some of the earlier pottery was difficult to distinguish between Iron Age or Saxon forms. Also found were structural remains including roofing tile indicating buildings of some status occupied the summit of the hill. Excavations also identified the bank and a partial ditch towards the western end.

The descent of the manor appears to have been handed down through the line of the Earls of Lincoln, though initially these were for the lifetime of the earl. In the fourth creation of the earldom, the next earl was Ranulph de Blondeville, also Earl of Chester, who having recently returned from the 5th crusade is believed to have constructed Bolingbroke Castle between *c*. 1220-30.

The earliest references to the castle occur in the Close Rolls of 1232 and 1243. These record that on the death of Randulph the castle at Bolingbroke and various lands in Lincolnshire were given to his sister, Hawise, and upon her death were handed to the crown. From de Blundevill, the castle came to the de Lacy family and then, in 1363, to John of Gaunt who became the first Duke of Lancaster. John of Gaunt's son, Henry Bolingbroke, the future Henry IV, was born at the castle in 1366, taking his name from it.

It is recorded that extensive rebuilding took place in the mid-15th century on one of the southern towers of the castle, probably the octagonal southwest tower. Subsequently, the castle became increasingly dilapidated and by 1600 four of the towers were derelict and collapsing and the main domestic buildings had disappeared, with only the gatehouse and one tower remaining in use. Despite this, during the English Civil War, a Royalist garrison was established in the castle in the August of 1643, perhaps strengthening the fortifications[1].

The earl of Manchester, heading a Parliamentary force, marched from Boston on the 9th October in order to retake the remaining parts of Lincolnshire. He left the town by the fen road, through the islands of Stickney and Stickford where he left detachments of soldiers to secure his retreat if necessary. His cavalry played diversionary tactics in the surrounding countryside whereas the foot soldiers marched to Bolingbroke, arriving there early evening and calling upon the castle to surrender (Garner 1972, 14).

The Royalist garrison, about 200 strong, within the castle had already sent for relief and believed they could hold out against Manchester's troops until reinforcements arrived. The relieving forces, comprising Royalist horse and dragoons from the garrisons at Newark, Gainsborough and Lincoln,

[1] It has been postulated that the rectangular earthwork, the Rout Yard, to the south of the castle was built at this time, though there is no evidence to support this.

arrived the following day (10th October) with successful skirmishes recorded against the parliamentarian cavalry at Horncastle and Thimbleby (Holmes 1980, 171).

Royalist forces then marched on Bolingbroke on the 11th October, but Manchester hoping for a more general engagement, sent his cavalry under the command of Cromwell leaving behind his foot soldiers to maintain the siege of Bolingbroke. The two forces met at Winceby, 5.2km to the northwest, and after approximately 30 minutes of fighting, the Royalist forces were routed with approximately 300 killed and 800 prisoners sent to Boston (House of Lords Journal).

3. GEOPHYSICAL SURVEY

3.1 Aims and Objectives

The principal aim of the geophysical survey was to determine the origin and development of Bolingbroke Castle and its possible predecessor, Dewy Hill. Although excavations had been undertaken within the castle itself with limited trenching at Dewy Hill, no attempt had been made to place both sites within their wider setting.

The objectives will be confirm the location of an features and to establish:

- the form of the archaeological features present within the site;
- the spatial arrangement of the archaeological features present within the site and
- the density of archaeological features present in the investigation area.

A further aim was to promote Bolingbroke Castle within the surrounding community by allowing participants to volunteer in the geophysical survey.

3.2 Methods

The geophysical survey was undertaken with the permission of the landowners. A Section 42 licence (AA/030551/5) was obtained from Historic England for the geophysical survey in the fields south of Bolingbroke Castle as the site is a Scheduled Monument (22623).

Dewy Hill was surveyed in 30m by 30m grids, totalling some 26 grids in all. Due to time restraints, the area south of the castle was laid out in 40m by 40m grids, comprising some 18 grids. Each grid was walked systematically in a zig-zag pattern, taking readings every 0.25m in traverses 1m apart using a Bartington Grad 601-2 fluxgate magnetometer. Readings are automatically recorded on a datalogger which is downloaded at the end of each day. The gradiometer is 'zeroed' at the start of each day and at intervals throughout to ensure consistent results are achieved throughout the survey.

Data obtained from the survey was processed using Terra Surveyor software (Version 3.0.33.10). Following examination of the raw data, the range of readings was clipped to provide the most suitable contrast for seeing archaeological features. The final processed data was also 'destriped' to remove minor inconsistences between the different sensors used in the survey. At each stage the data was carefully examined to ensure the processing did not obscure features or create artificial anomalies.

Data is exported as a PNG image and georeferenced for use in scale plans of the site. Anomalies are then checked against historical maps, and where available, lidar contour data.

The survey was undertaken in accordance with English Heritage (2008) and CIfA (2014b) guidelines and codes of conduct. Detailed methodology can be found in Appendix 1.

By and large, both areas were suitable for geophysical survey, though this had to be delayed until long grass and shrubbery had been removed from the area south of the castle. Some small copses remained which remain unsurveyed.

3.2 Results

The presentation of the data for the site involves a greyscale print-out of the raw magnetometry data (Figs. 4 and 8; clipped for display but otherwise unprocessed), and the processed magnetometry data in greyscale (Figs. 5 and 9). All identified anomalies have been plotted on to an interpretative drawing (Figs. 6 and 10).

Dewy Hill

Bipolar disturbance

There are several areas that have very strong positive and associated negative readings, referred to as areas of bipolar disturbance. Two such anomalies in the southern central part and in the east are caused by animal troughs.

The large area of disturbance in the northern part of the survey is what appeared to be a large concrete slab, possibly the base of a former building or hard standing area. To the north, a small disturbed area is possibly another part of the concreate base. Both are believed to be modern in origin.

Positive area of response

There are several small areas of positive response these could relate to pits or small ditches. However, there is no clear shape or form to them and it is possible that these are natural accumulations of enhanced material.

Geological Anomaly

Within the area there are several weaker areas of enhanced response which are likely to be geological anomalies, particularly as they are all located on the slopes of the hill.

Positive Linear

There are two positive linear responses in the survey area. These are possible former ditched features. Certainly, the one located in the south of the survey area accords well with a former field boundary. The northern anomaly occurs at the base of the slope and may well be a natural accumulation of enhanced material or a small ditch.

Weak Positive Linear

The weak positive linear is continuation of the positive mentioned above and is likely to be a continuation of the enhanced material or small ditch-like feature.

Weak Bipolar Linear

there is a small weak bipolar linear anomaly that appears to turn within the field. This could be some form of field drainage or perhaps a water pipe, though its origin is unclear.

Castle Rout Yard

Bipolar disturbance

Within the area there are two patches of bipolar disturbance. One central to the banked Rout Yard is

related to material that has been removed from the castle moat when this was recently dredged. A disturbed area in the east of the surveyed area is uncertain.

Positive area of response
There is an area of positive response to the south west of the survey this is possibly a large pit-like feature or a possible pond.

Weak Positive Linear
Several of the weak positive linear anomalies that are present in the area are believed to be related to former footpaths. These are marked by green lines on the current Ordnance Survey mapping. Several of the remaining anomalies in the area are believed to be natural accumulations of enhanced material.

4. DISCUSSION

Overall the results have not been exciting. The survey of Dewy Hill suggests little of archaeological interest, despite the evidence gained from small excavations in this locality previously. It was stated that the earthworks recorded on Dewy Hill were subjected to ploughing in the 1960s, but some trace should remain. Moreover, digital terrain mapping, still indicates a rectangular earthwork surviving at the site.

The Rout Yard has also produced poor results. There is no indication of external defences contemporary with the medieval castle or any siegeworks relating to the Civil War. This area is intrinsically linked to the castle and with fishponds present in this field there was also the possibility that some garden remains may also be encountered. However, with the castle being nothing more than an administrative centre at the time gardens were popular, it may have been overlooked. Furthermore, no clear function or origin of the Rout Yard could be ascertained.

The overall quality of the geophysical data acquired is good, with no impediment known to affect the fieldwork or machine error.

5. ACKNOWLEDGEMENTS

Archaeological Project Services and Heritage Lincolnshire wish to acknowledge Mr Jeremy Cunnington of the Castle Studies Trust for providing the grant to assist in this study and to engage the local community in this work. Access to the Rout Yard field was kindly provided by John Sellick, Estates Manager for the Duchy of Lancaster. Mr Cristopher Tagg allowed access to Dewy Hill. Our appreciation also goes to Katherine Pride, the Free Sites Coordinator for English Heritage. Historic England kindly gave their agreement to survey the scheduled area.

A principal aim of this work was to engage the local community and our thanks to all the volunteers who attended and assisted in the survey.

Paul Cope-Faulkner edited drafts of the report prior to submission to Historic England.

6. PERSONNEL

Project coordinator: Paul Cope-Faulkner
Survey Team: Sean Parker, Andrea Fresca, Jonathan Smith

Volunteer Coordinator: Charlotte Davey
Background Research: Maria Leroi
Archiving: Denise Buckley
Survey processing and reporting: Sean Parker

7. BIBLIOGRAPHY

BGS, 1992 *Horncastle: solid and drift edition*, 1:50 000 map sheet **115**

Cameron, K, 1998 *A Dictionary of Lincolnshire Place-Names*, The English Place-Name Society Popular Series No. **1**

CIfA, 2014a *Standard and Guidance for Field Evaluation*.

CIfA, 2014b *Standard and Guidance for Geophysical Survey*.

English Heritage, 2008 *Geophysical Survey in Archaeological Field Evaluation*.

Hodge, CAH, Burton, RGO, Corbett, WM, Evans, R and Seale, RS, 1984 *Soils and their use in Eastern England, Soil Survey of England and Wales* **13**

Malone, S, 2005 *Archaeological Monitoring at Bolingbroke Castle, Old Bolingbroke, Lincolnshire (BBC 05)*, unpublished APS report **126/05**

Peachey, M, 2009 *Archaeological Watching Brief and Earthwork Survey, Bolingbroke Castle, Old Bolingbroke, Lincolnshire (BOLC 09)*, unpublished APS report **124/09**

Pevsner, N and Harris, 1989 *The Buildings of England: Lincolnshire* (2nd ed, revised N Antram)

Thompson, MW, 1966 'The origins of Bolingbroke Castle, Lincolnshire', *Medieval Archaeology* **10**, pp152-158

Thompson, MW, 1992 'A History of Bolingbroke Castle', in The Churchwardens and Parochial Church Council of Old Bolingbroke, *A Short Guide to The Royal Village of Old Bolingbroke, Castle and Church*

8. ABBREVIATIONS

APS Archaeological Project Services

BGS British Geological Survey

CIfA Chartered Institute for Archaeologists

Figure 1 - General location plan

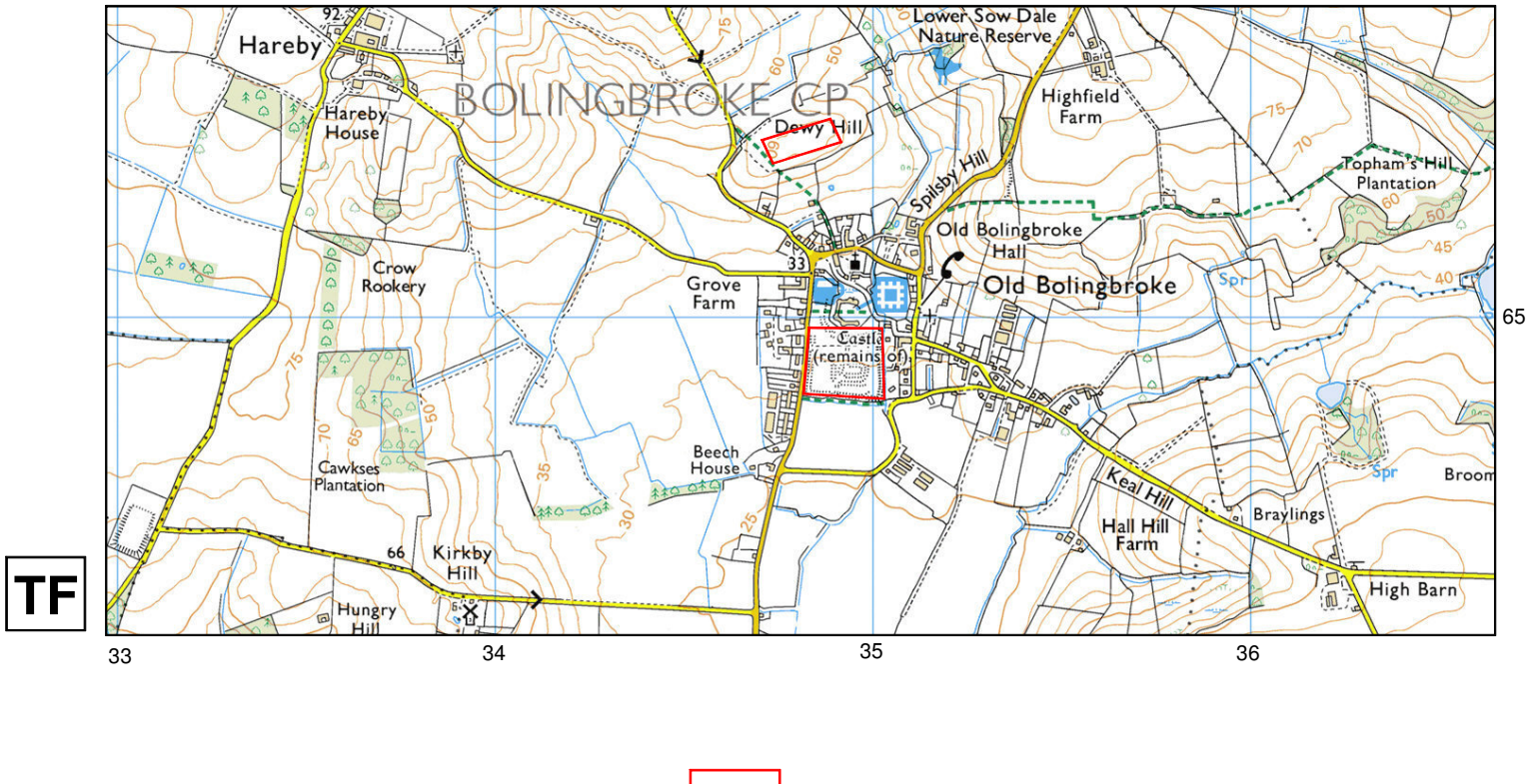

Figure 2 - Site location plan

656

654

0 50m

N

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Figure 3 - Site setout, Dewy Hill

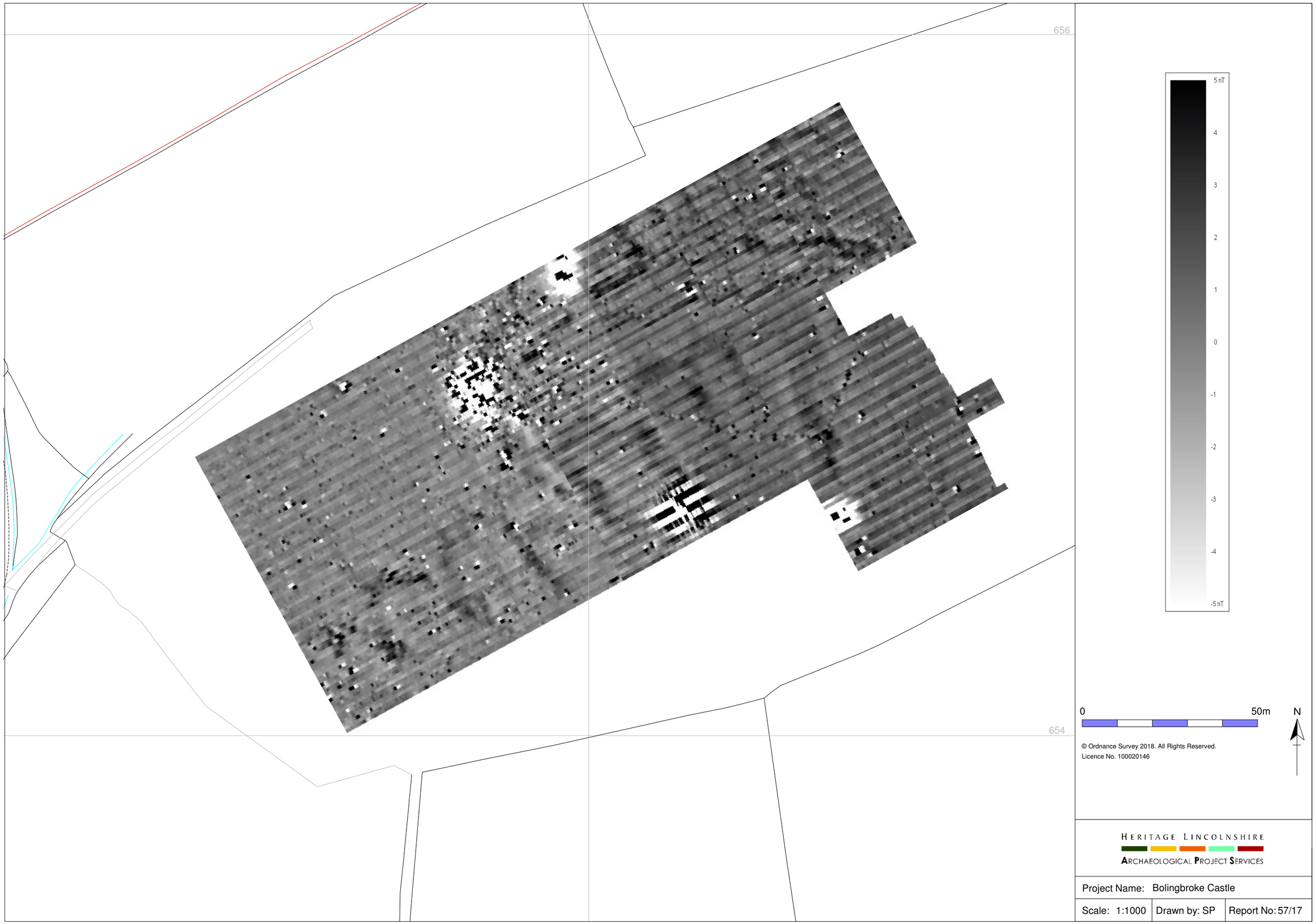

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Figure 4 - Raw greyscale data, Dewy Hill

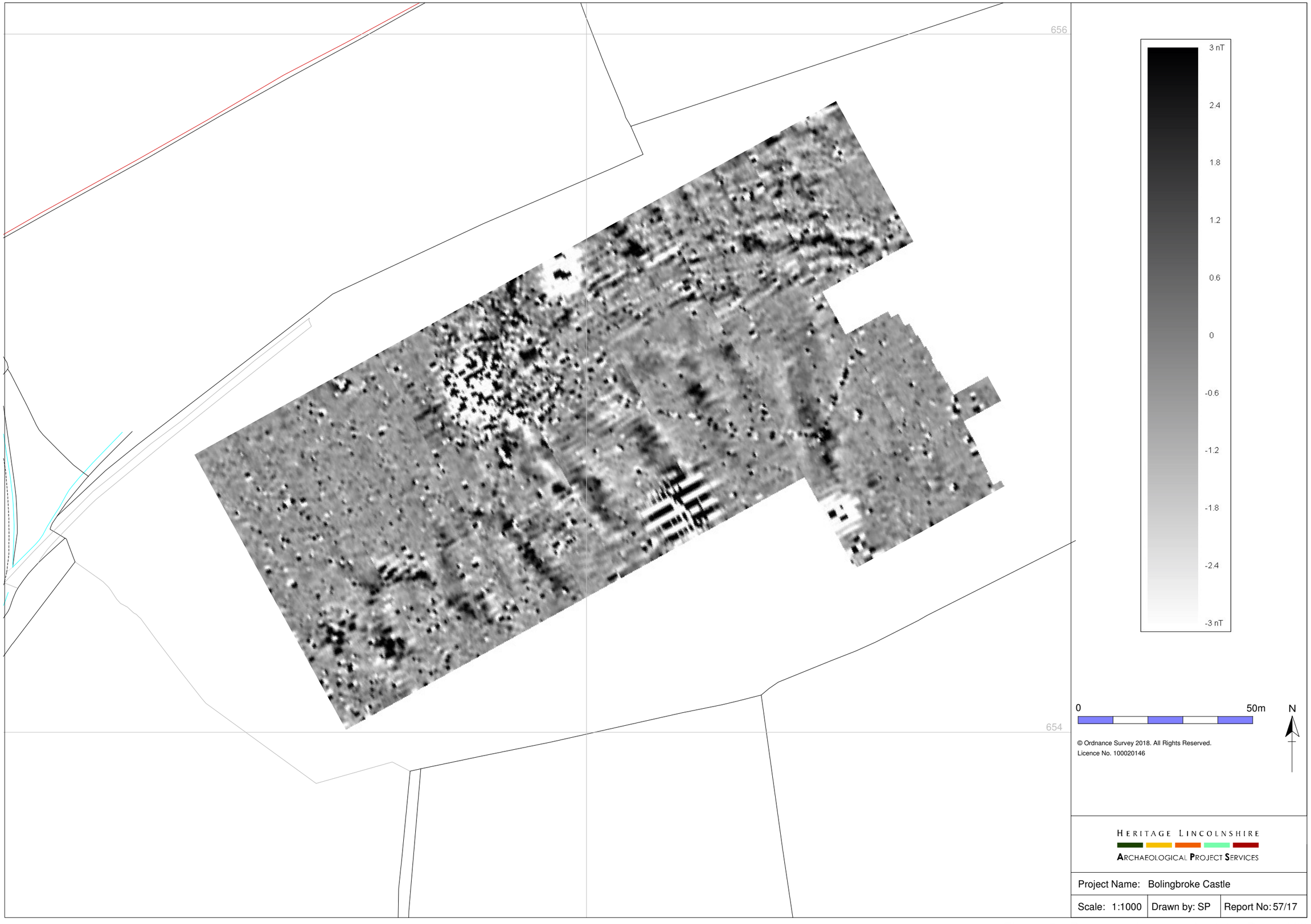

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Figure 5 - Processed greyscale data, Dewy Hill

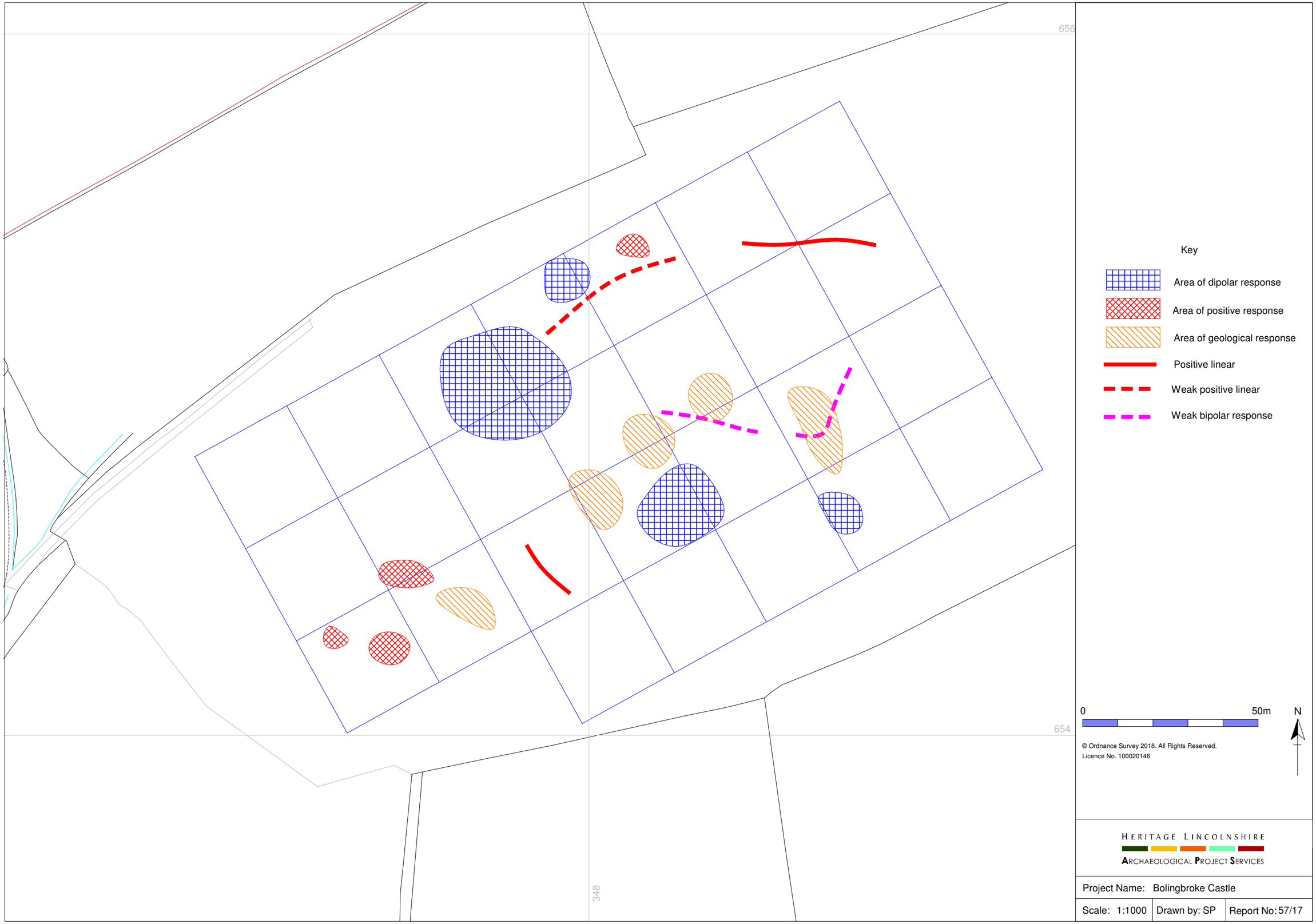

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Figure 6 - Interpretation: Dewy Hill

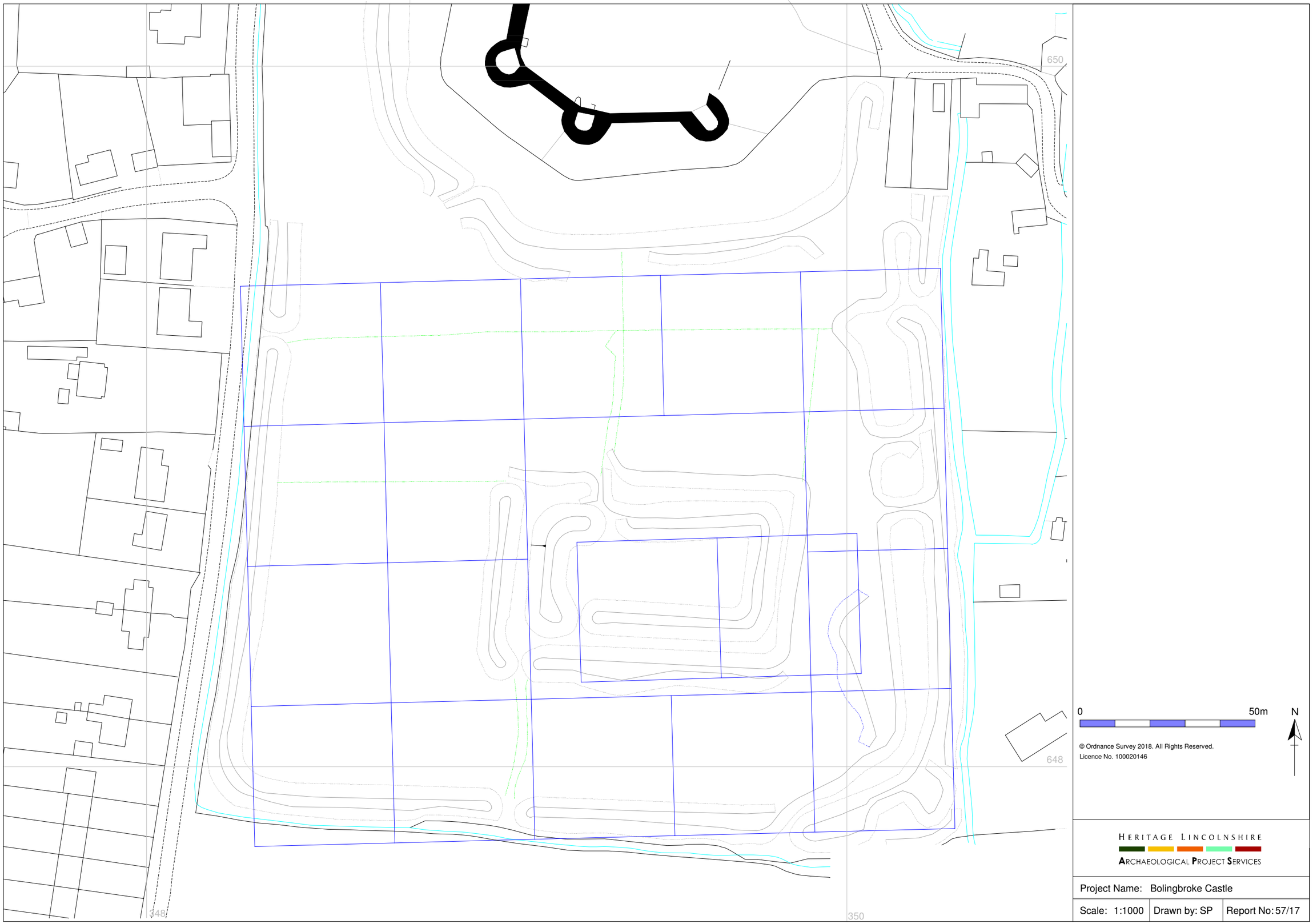

Figure 7 - Survey setout, Bolingbroke Castle

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Figure 8 - Raw greyscale data, Bolingbroke Castle

Figure 9 - Processed greyscale data, Bolingbroke Castle

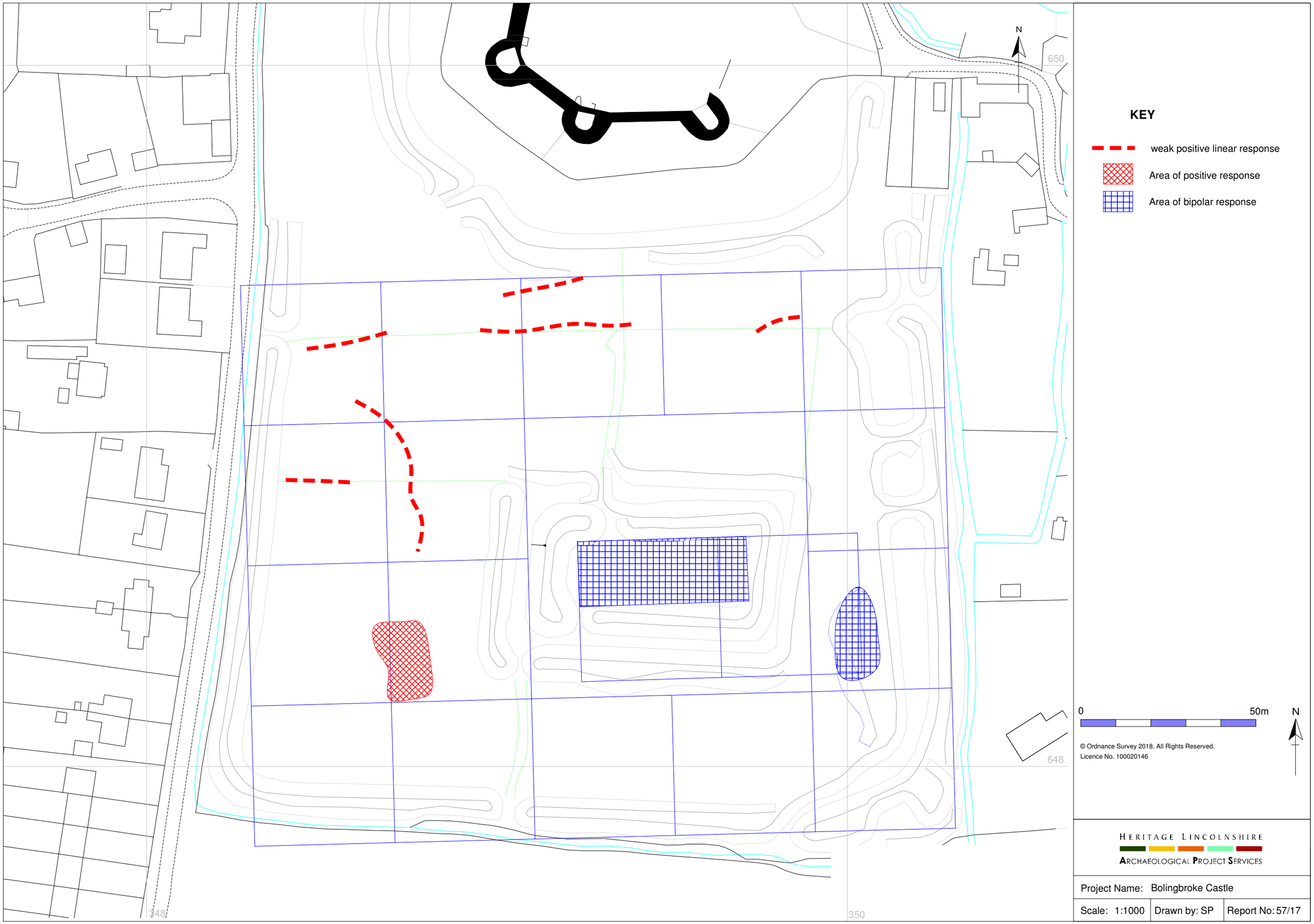

Figure 10 - Interpretation, Bolingbroke Castle

Appendix 1

TECHNICAL INFORMATION

Principles of magnetometry

The basis for magnetic prospecting is the presence of weakly magnetised iron oxides in the soil. Depending on the state of iron oxides, the material will exhibit either a weak or a strong magnetisation (Gaffney and Gater 2003).

Human activities tend to enrich sediments with magnetic particles. Strong heat, such as that generated by fires, cause surrounding iron particles in the soil to become aligned with the earth's magnetic field and take on a magnetic charge. Where these particles accumulate, such as in cut features like ditches and pits, a weak positive magnetic anomaly is apparent. In cases where very strong heat has been applied, such as furnace and kiln bases, a bipolar magnetic anomaly will be apparent, with one area having a strong positive signature and one area having a strongly negative area. Where banks have been built up from natural geological material which excludes magnetically enriched sediments, or walls have been made of stone, this may result in a negative anomaly. Modern metallic items and fired bricks cause sharp bipolar spikes. Modern services have a tendency to alternate between positive and negative readings along their length.

It should be noted that not all features will be responsive and absence of anomalies does not necessarily indicate absence of archaeological features (Clark 1996).

Bartington Grad 601-2

A gradiometer uses two sensors separated by a fixed distance in order to measure the difference in strength between the earth's magnetic field and the soil. The Bartington Grad 601 uses two fluxgate sensors separated vertically by 1m to take these readings, which reduces variations associated with the Earth's magnetic field and deep geology. Changes as small as 0.2 nanoTesla (nT) in an overall field strength of c. 49,000nT can be accurately detected using this instrumentation, although in practice instrument interference and soil noise can limit sensitivity. The instrument has typical penetration of 0.5m-1m, although stronger anomalies can be detected at greater depths. The 601-2 model uses two pairs of sensors to take parallel readings 1m apart.

Methodology

The survey area is divided into grid squares of $30m^2$ or $40m^2$, depending on the terrain. The grids are set out using a survey grade GPS, accurate to 0.03m. The grids are systematically walked in a zig-zag pattern with the gradiometer taking readings every 0.25m along a traverse, and each traverse being separated by 1m. This equates to 3600 sampling points in a full 30m x 30m grid or 6400 in a 40m x 40m grid. Readings are automatically recorded on a datalogger which is downloaded at the end of each day. The gradiometer is 'zeroed' at the start of each day and at intervals throughout to ensure consistent results are achieved throughout the survey.

Data Processing

The data is downloaded and processed using TerraSurveyor software (version 3.0.33.1). The raw data is then adjusted to emphasise possible features. At each stage the data is examined as a greyscale image and as a trace plot.

Minimally Processed data

The data is clipped so that the mid-range of readings is most visible. This involves excluding all readings outside of the -10nT to 10nT range.

Processed Data

The following processes are applied to produce the processed greyscale image:

- Destripe: Each traverse is flattened with regard to surrounding traverses by setting the median value of the traverse to 0nT. This produces cleaner images, but may cause bleeding where particularly strong signals are present at one end of a traverse.
- Data Clip: The data is clipped to provide the most suitable contrast for seeing archaeological features. This excludes readings outside of the -5nT to 5nT range.

The following processes may also be applied to improve the clarity of the processed greyscale images:

- Despike: Isolated anomalous readings, such as those generated by tiny iron fragments, are removed from the data. This makes the images cleaner. The parameters used are: X radius = 2; Y radius = 2; Threshold = 3SD; Spike replacement = median.
- Destagger: Minor inconsistences in the way an operator walked grids can be corrected by shifting a traverse up to 0.5m to match edges with adjacent traverses.

Data is exported as a JPG image and georeferenced for use in scale plans of the site. Anomalies are then checked against historical maps, and where available, lidar contour data.

References

Clark, A., 1996 *Seeing Beneath the Soil*, London, 2nd edn.

Gaffney C. and Gater, J., 2006 *Revealing the Buried Past: Geophysics for Archaeologists,* The History Press