Archaeological Services
University of Durham

Land at Holystone, Harbottle, Northumberland

geophysical surveys

on behalf of
Holystone History & Archaeology Group

Report 1785
December 2007

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1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted at Holystone in Northumberland, principally around the church but also at other locations in and around the village. The works comprised geomagnetic and earth resistance surveys to test for the presence of the former priory, a dovecote and the course of a Roman road near the Lady's Well.

1.2 The works were commissioned by the Holystone History & Archaeology Group and were conducted by members of the Group and Archaeological Services.

Results

1.3 Whilst the remains of a number of walls have been detected to the south and probably west of the existing church, these can all be accounted for by reference to 18th- and 19th-century plans, which show former cottages and garden boundaries to the south and formal gardens to the west. None of the geophysical anomalies detected in these surveys is likely to reflect features associated with Holystone Priory.

1.4 Identification of features on the site of a former dovecote to the north-west was hindered by the presence of a ferrous pipe.

1.5 No evidence for a Roman road was identified in the surveys at Haremoor Law, to the north-east of Lady's Well.

2. Project background

Location (Figures 1 & 2)

2.1 Holystone is situated on the south side of the River Coquet, 4km south-east of Harbottle in Northumberland. The study areas comprised land on each side of the existing Church of St Mary the Virgin in Holystone, land near Salmon House and parts of Haremoor Law to the north-east of Lady's Well (NGR church: NT 9551 0266).

2.2 The land to the immediate south of the church is a scheduled monument (no. ND 296), being the possible site of Holystone Priory. Surveys in that area were therefore undertaken with a licence granted by English Heritage under Section 42 of the Ancient Monuments and Areas Act 1979 (as amended by the National Heritage Act 1983).

2.3 The locations of an earlier programme of survey (Archaeological Services 2005) are also shown in Figure 2.

Objectives

2.4 The principal aims of the project were twofold: 1) to provide members of the Holystone History & Archaeology Group (HHAG) with further opportunities to conduct research in Holystone using geophysical survey techniques; 2) to locate sub-surface remains associated with the priory and Roman road, as well as any other features of potential archaeological significance.

Dates

2.5 Fieldwork was undertaken on 17th and 18th November 2007. This report was prepared between 19th November and 6th December 2007.

Personnel

2.6 Fieldwork was conducted by the following members of the HHAG: Jan Frazer, Dave Robinson, John MacLean, Julian & Jill Philipson, Dave Brummitt, Graham Jones, Peter & Janice Henney, Alec & Carol Plater, John Kendall, Tony & Pam Williams and Janet Fenwicke-Clennell, who were assisted by Graeme Attwood and Duncan Hale of Archaeological Services. This report was prepared by Duncan Hale with illustrations by David Graham. The Project Manager was Duncan Hale.

Archive/OASIS

2.7 The site code was **HCP07** for **H**olystone **C**ommunity **P**roject 20**07**. The paper and data archive is currently held by Archaeological Services Durham University. Archaeological Services is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-35531**.

Acknowledgements

2.8 Archaeological Services is grateful to the residents who allowed us access to their land: Frank & Nancy Moscrop, Bertie & Fiona Woodcock, John &

Marian Farndale and the Rev Judy Glover; to the Council for British Archaeology, English Heritage and the Northumberland National Park Authority for facilitating this research; and to the HHAG for setting up the project, their enthusiasm, assistance and hospitality.

3. Archaeological and historical background

3.1 Holystone was one of 17 historic village settlements to be studied for the Historic Village Atlas project undertaken by the Northumberland National Park Authority. Detailed archaeological and historical background is presented in the Atlas: (http://www.northumberlandnationalpark.org.uk/understanding/historyarchaeology/historicvillageatlas.htm).

3.2 In the mid-12th century there was an Augustinian convent at Holystone, though its exact location is yet to be determined. The priory was one of the first to be destroyed in the Dissolution in 1539 and good-quality building stone is incorporated into many of the existing walls around the village, almost certainly derived from the priory buildings. It was hoped that surveys around the existing church might detect some remains of such buildings.

3.3 The tithe map (1848) and 1st edition Ordnance Survey mark a row of cottages, probably comprising three or four dwellings, parallel to and south of the church. The cottages were demolished in the early 20th century, but their foundations are still visible covered in vegetation. The cottages could possibly have overlain former priory buildings, though the visible remains are only a few metres south of the existing church.

Foundations of former cottages to south of present church, Area 1

3.4 Additional surveys were undertaken to try to confirm the location of a former dovecote associated with the priory, possibly the same one that is shown on a plan of 1765, and to the north of the village in a further attempt to locate the

course of the Roman road from *Bremenium* (High Rochester) to Bridge of Aln, which is presumed to pass adjacent to the Lady's Well.

4. Landuse, topography and geology

4.1 Seven areas were covered by geomagnetic survey; all except Areas 4 and 5 were also covered by earth resistance survey:

	Location	**Landuse**	**Topography**
Area 1	S of church	grassland	gentle S-facing slope
Area 2	E of church	grassland	gentle S+E-facing slope
Area 3	W of church	grassland	S-facing slope
Area 4	N of church	graveyard	gentle S-facing slope
Area 5	SW of Salmon House	grassland	level
Area 6	Harelaw Moor	pasture	gentle S+E-facing slope
Area 7	Harelaw Moor	pasture	gentle S+E-facing slope

4.2 All survey areas were on land between 120-140m OD.

4.3 The underlying solid geology of the area comprises sandstone of the Carboniferous Limestone Series, overlain by glacial drift deposits. An igneous intrusion is located just to the north of the village.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage (1995) Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation*; the Institute of Field Archaeologists (2002) Paper No.6, *The use of geophysical techniques in archaeological evaluations*; and the Archaeology Data Service (2001) *Geophysical Data in Archaeology: A Guide to Good Practice*.

Technique selection

5.2 Geophysical surveying enables the relatively rapid and non-invasive identification of potential archaeological features and can involve a variety of complementary techniques such as magnetometry, electrical resistivity, ground-penetrating radar and electromagnetic survey. Some techniques are more suitable than others in particular situations, depending on a variety of site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance, it was considered possible that both building and road foundations might survive in the various survey areas, and that other types of feature such as roadside ditches and pits might also be present. Given the

anticipated shallowness of targets and the non-igneous geological environment of the study area two complementary techniques were considered appropriate: fluxgate gradiometry (a geomagnetic technique) and electrical resistance survey. Fluxgate gradiometry involves the use of hand-held magnetometers to detect and record minute anomalies in the gradient of the Earth's magnetic field, caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features. Earth resistance survey relies on the relative inability of materials to conduct an electrical current. Stone features such as foundations will give relatively high resistance measurements while soil-filled features, which retain more moisture, will provide relatively low resistance values.

Field methods

5.4 A 20m grid was established across each area and tied-in to mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system (GPS) with real-time correction providing sub-metre accuracy.

5.5 Measurements of vertical geomagnetic field gradient were determined using a Bartington Grad601-2 dual fluxgate gradiometer. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1nT, the sample interval to 0.25m and the traverse interval to 1.0m, thus providing 1600 measurements per 20m grid unit.

5.6 Measurements of electrical resistance were determined using a Geoscan RM15D resistance meter and twin probe array with a mobile electrode spacing of 0.5m. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1ohms, the sample interval to 1m and the traverse interval to 1m, thus providing 400 sample measurements per 20m grid unit.

HHAG members conducting electrical resistance survey, Area 1

HHAG members conducting electrical resistance survey, Area 1

5.7 Data were downloaded on-site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Downloading and initial processing of data

Data processing

5.8 Geoplot v.3 software was used to process the geophysical data and to produce continuous tone greyscale images of the raw (unfiltered) data. The greyscale images and interpretations are presented in Figures 3-5. In the greyscale images, positive magnetic/high resistance anomalies are displayed as dark grey and negative magnetic/low resistance anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla/ohms.

5.9 The following basic processing functions have been applied to the geomagnetic data:

clip	clips, or limits data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic.
zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities.
despike	locates and suppresses random iron spikes in gradiometer data.
destagger	corrects for displacement of anomalies caused by alternate zig-zag traverses.
interpolate	increases the number of data points in a survey to match sample and traverse intervals. In this instance the gradiometer data have been interpolated to 0.25 x 0.25m intervals.

5.10 The following basic processing functions have been applied to the resistance data:

despike	locates and suppresses random spikes in data due to poor contact resistance.
interpolate	increases the number of data points in a survey to match sample and traverse intervals. In this instance the resistance data have been interpolated 0.25 x 0.25m intervals.

Interpretation: anomaly types

5.11 Colour-coded geophysical interpretation plans are provided in Figure 4. Three types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches.
negative magnetic	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as road or wall footings and other concentrations of sedimentary rock or voids.
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths.

5.12 Two types of resistance anomaly have been distinguished in the data:

high resistance regions of anomalously high resistance, which may reflect foundations, tracks, paths and other concentrations of stone or brick rubble.

low resistance regions of anomalously low resistance, which may be associated with soil-filled features such as pits and ditches.

Interpretation: features

5.13 Colour-coded archaeological interpretation plans are provided in Figure 5.

Areas 1-4, around the church

5.14 A number of linear high resistance anomalies were detected on land to the immediate south of the church, Area 1. The majority of these correspond to visible wall foundations from structures shown on a tithe plan of 1848. The plan shows a row of three cottages with a fourth small cottage to the immediate north-east of the others. Gardens on the north side of the cottages were bounded by walls. The resistance survey has detected the foundations of the north-eastern cottage, together with garden walls to the east and north.

5.15 The remains of another wall were also detected aligned with the eastern end wall of the existing church. This wall may be part of another small structure shown on the 1848 tithe plan at the south-eastern corner of the church. Part of another garden wall appears to have been detected in the south-western corner of the resistance survey.

5.16 No probable wall remains were identified in the geomagnetic survey of this area. The survey did record a relatively high concentration of ferrous debris here, as would be expected from its former use, together with three existing posts for a washing line aligned north-south in the western part.

5.17 Whilst areas of relatively high and low resistance can be seen in the survey of Area 2, to the east of the church, these are generally broad and diffuse and are more likely to represent differential drainage of the ground than archaeological features. Geomagnetic anomalies are again most likely to reflect near-surface ferrous litter.

5.18 Resistance survey of the lower slopes in Area 3, to the west of the church and south of Holystone Priory Farm, did not detect any anomalies of likely archaeological interest. The data here are more varied than would normally be expected from an earth resistance survey, possibly indicating poor contact resistance values in the rough grass. The geomagnetic data, however, exhibit several parallel negative magnetic anomalies reflecting materials with low magnetic susceptibility such as sedimentary rock. The anomalies broadly correspond to former garden features as shown on James Robertson's 1765 plan of the Farquhar Estate. The anomalies could therefore reflect former garden walls or stone/gravel paths. Other geomagnetic anomalies reflect a wire fence and near-surface ferrous/fired debris.

5.19 A geomagnetic survey was undertaken in the graveyard on the north side of the church, Area 4. Large intense dipolar magnetic anomalies were detected across much of the area, possibly reflecting the presence of a buried tank and associated pipes. No features of likely archaeological interest were identified.

Area 5, dovecote site

5.20 A small geomagnetic survey was conducted just south-west of Salmon House, Area 5, in an attempt to detect the remains of a dovecote. A dovecote is depicted in this location on Robertson's estate plan of 1765 and it is possible that this was the same dovecote that was associated with the earlier priory. Unfortunately the survey appears to directly overlie the course of a ferrous pipe, presumably the same pipe that was detected further north near the Lady's Well in 2005 (Archaeological Services 2005). No features of likely archaeological interest were identified.

Areas 6 and 7, Harelaw Moor

5.21 Two small surveys were undertaken in Harelaw Moor to the north-east of the Lady's Well to try to detect the remains of a Roman road, traditionally presumed to pass the well on its course from *Bremenium* to the Bridge of Aln. Electrical resistance anomalies detected near here in 2005 provided slight evidence for a metalled surface with flanking ditches (*ibid*.). Both geomagnetic and resistance surveys were undertaken in 2007.

5.22 Extremely weak, parallel positive magnetic anomalies were detected in both areas, aligned broadly east-west. Similarly aligned, though more frequent, high resistance anomalies were detected in Area 7; these correspond to faint striations on aerial photographs of this field and could reflect former ploughing.

5.23 Although broad variations in earth resistance have been detected across both survey areas these are likely to reflect local geological variation such as depth to rockhead and topsoil thickness.

5.24 No evidence has been identified for the Roman road, nor for any ditches that might have been associated with it, with either survey technique.

6. Conclusions

6.1 Geomagnetic and electrical resistance surveys were undertaken at several locations around the existing church and elsewhere in Holystone, in order to try to detect remains associated with the Augustinian priory and the course of the High Rochester to Bridge of Aln Roman road as it passes the Lady's Well.

6.2 Although several probable wall features have been identified to the south of the church, and possibly to the west, these can all be accounted for by reference to 18th- and 19th-century plans, which show former cottages and garden boundaries to the south and formal gardens to the west.

6.3 None of the geophysical anomalies detected in these surveys is likely to reflect features associated with Holystone Priory.

6.4 To the north-west it was not possible to identify features geomagnetically on the site of a former dovecote due to the presence of a ferrous pipe.

6.5 At Haremoor Law, to the north-east of the well, anomalies associated with former ploughing were detected, but none which appeared to reflect a Roman road or associated ditches.

7. Sources

Archaeological Services 2005 *Holystone, Harbottle, Northumberland: geophysical surveys*. Unpublished Report 1365 for Holystone History & Archaeology Group and the Northumberland National Park Authority. Archaeological Services Durham University.

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English Heritage 1995 *Geophysical survey in archaeological field evaluation*, EH Research and Professional Services Guideline No.1, London

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Northumberland National Park Authority - Historic Village Atlas website http://www.northumberlandnationalpark.org.uk/understanding/historyarchaeology/historicvillageatlas.htm

Robertson, J 1765 *Plan of Farquhar's Estate*

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Figure 1
Site location

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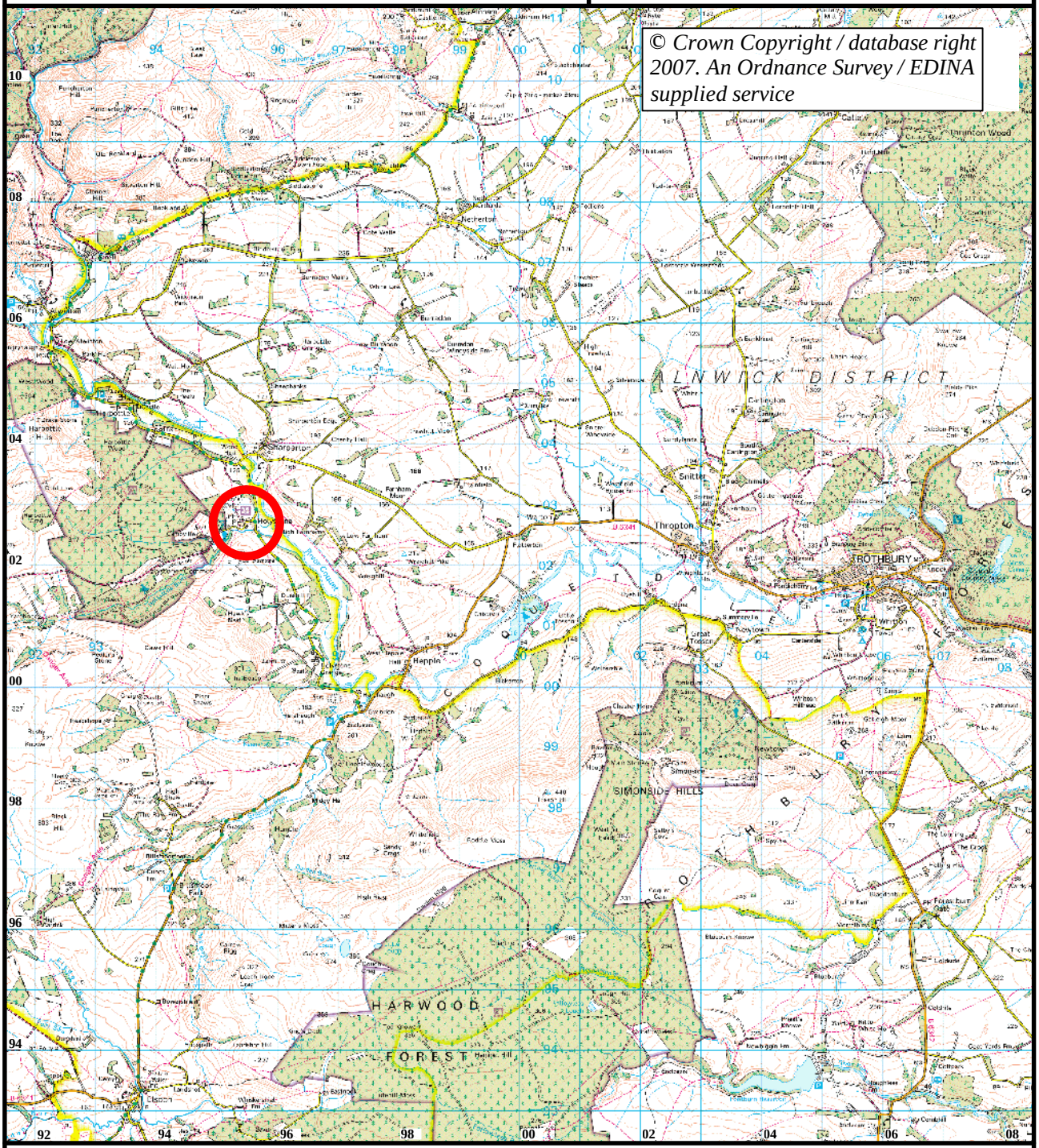

Holystone

0 4km
scale 1:100 000 - for A4 plot

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Figure 2
Location of the geophysical surveys

on behalf of
Holystone History & Archaeology Group

0 250m
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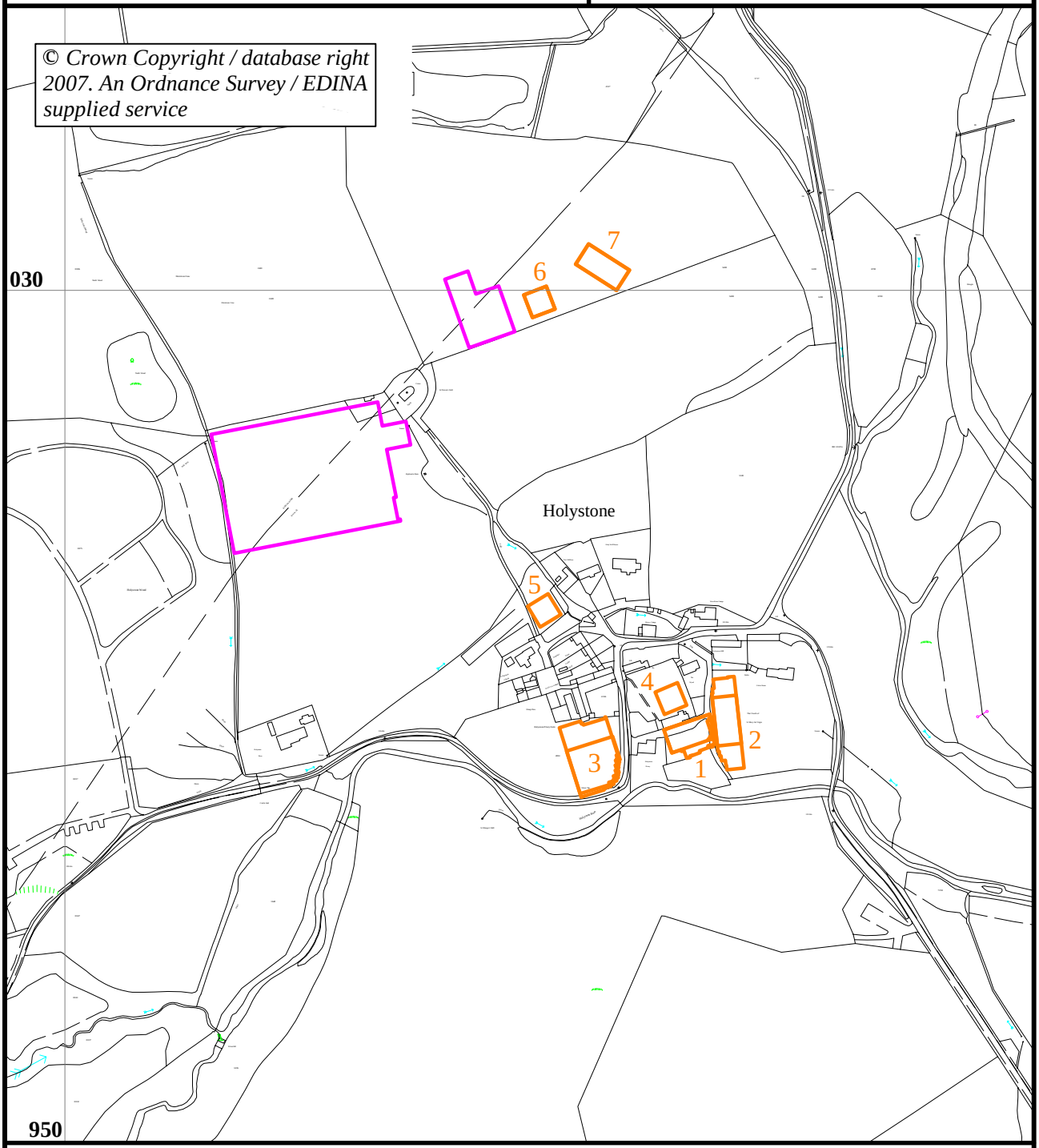
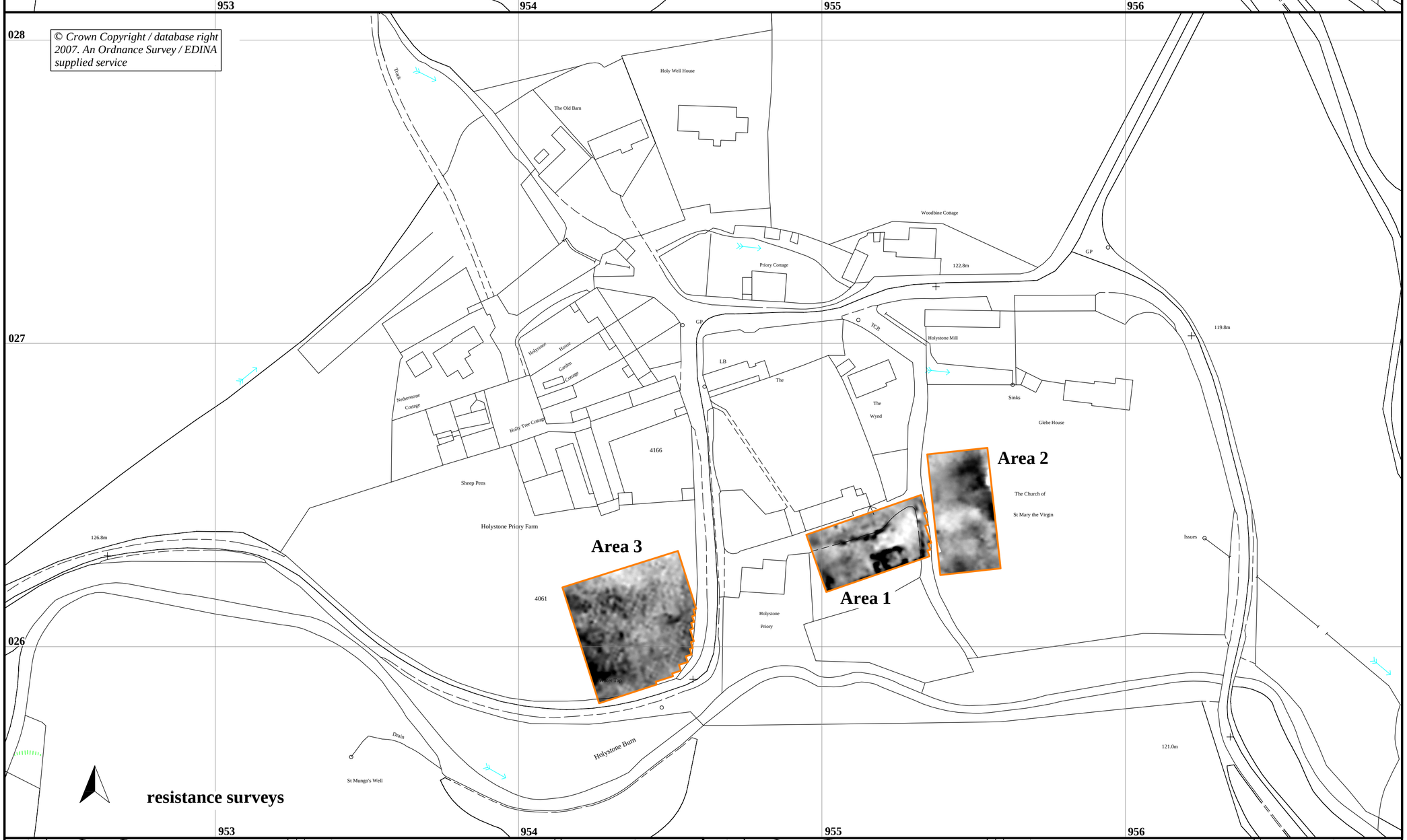
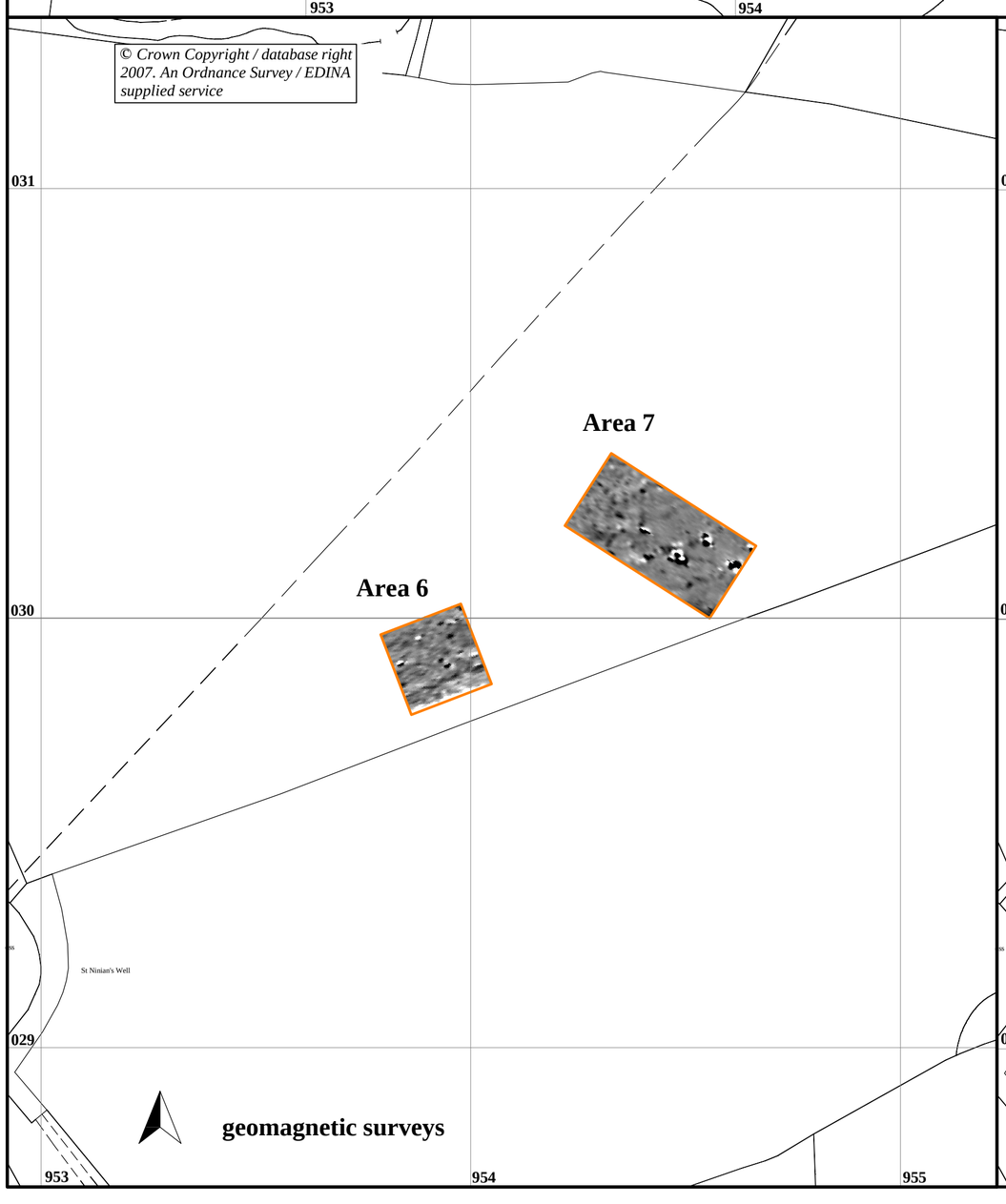
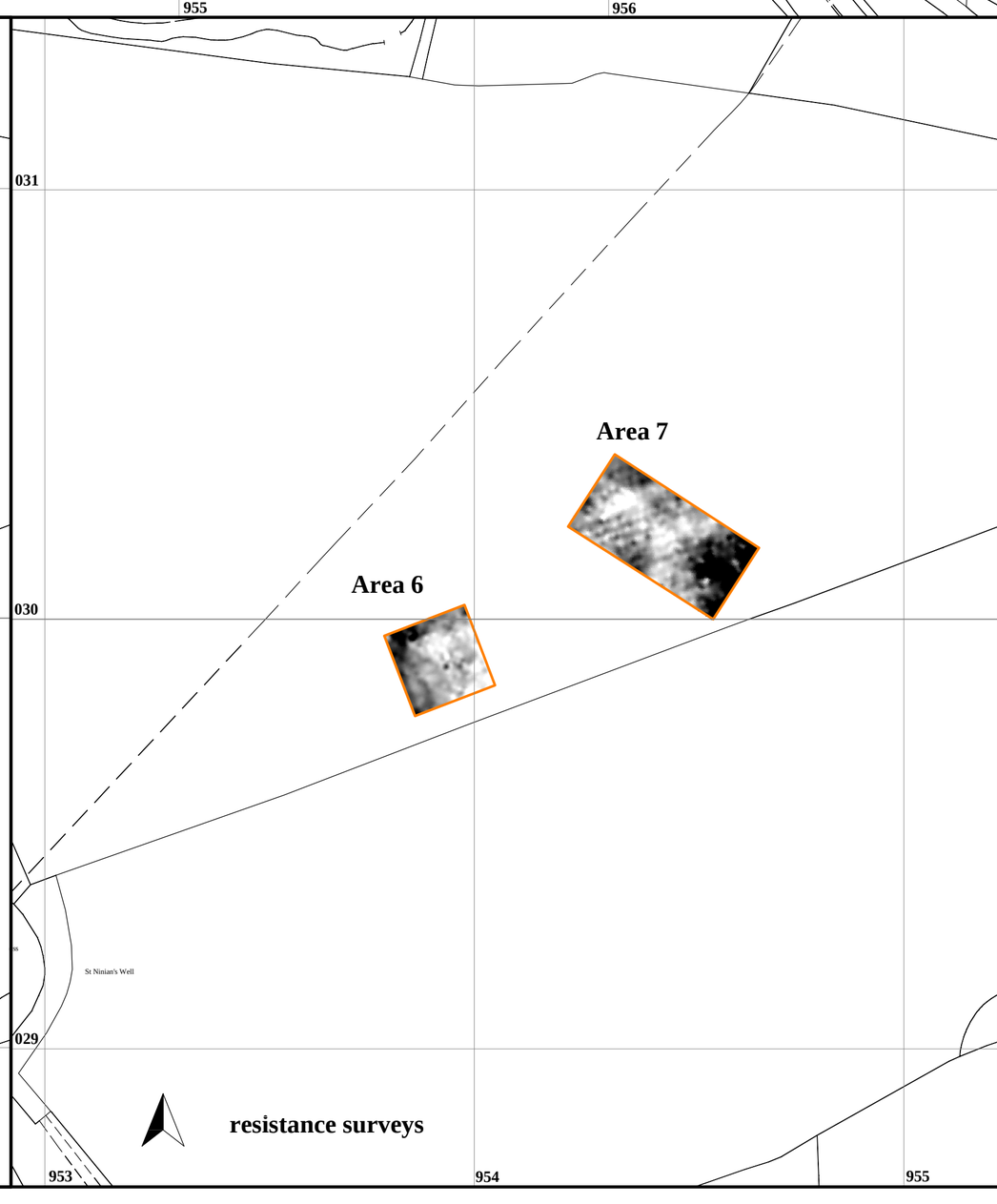


2007 surveys

2005 surveys







Geophysical survey

outline of survey area

geomagnetic	resistance
Area 1	
20.00	150.00
16.67	144.17
13.33	138.33
10.00	132.50
6.67	126.67
3.33	120.83
0.00	115.00
-3.33	109.17
-6.67	103.33
-10.00	97.50
-13.33	91.67
-16.67	85.83
-20.00 nT	80.00 ohm
Area 2	
8.00	100.00
6.67	96.67
5.33	93.33
4.00	90.00
2.67	86.67
1.33	83.33
0.00	80.00
-1.33	76.67
-2.67	73.33
-4.00	70.00
-5.33	66.67
-6.67	63.33
-8.00 nT	60.00 ohm
Area 3	
5.00	150.00
4.42	142.50
3.83	135.00
3.25	127.50
2.67	120.00
2.08	112.50
1.50	105.00
0.92	97.50
0.33	90.00
-0.25	82.50
-0.83	75.00
-1.42	67.50
-2.00 nT	60.00 ohm
Area 4	
5.00	
4.17	
3.33	
2.50	
1.67	
0.83	
0.00	
-0.83	
-1.67	
-2.50	
-3.33	
-4.17	
-5.00 nT	
Area 5	
5.00	
4.17	
3.33	
2.50	
1.67	
0.83	
0.00	
-0.83	
-1.67	
-2.50	
-3.33	
-4.17	
-5.00 nT	
Area 6	
2.00	80.00
1.67	77.50
1.33	75.00
1.00	72.50
0.67	70.00
0.33	67.50
0.00	65.00
-0.33	62.50
-0.67	60.00
-1.00	57.50
-1.33	55.00
-1.67	52.50
-2.00 nT	50.00 ohm
Area 7	
3.00	80.00
2.50	77.92
2.00	75.83
1.50	73.75
1.00	71.67
0.50	69.58
0.00	67.50
-0.50	65.42
-1.00	63.33
-1.50	61.25
-2.00	59.17
-2.50	57.08
-3.00 nT	55.00 ohm

0 50m

scale 1:1000 - for A1 plot

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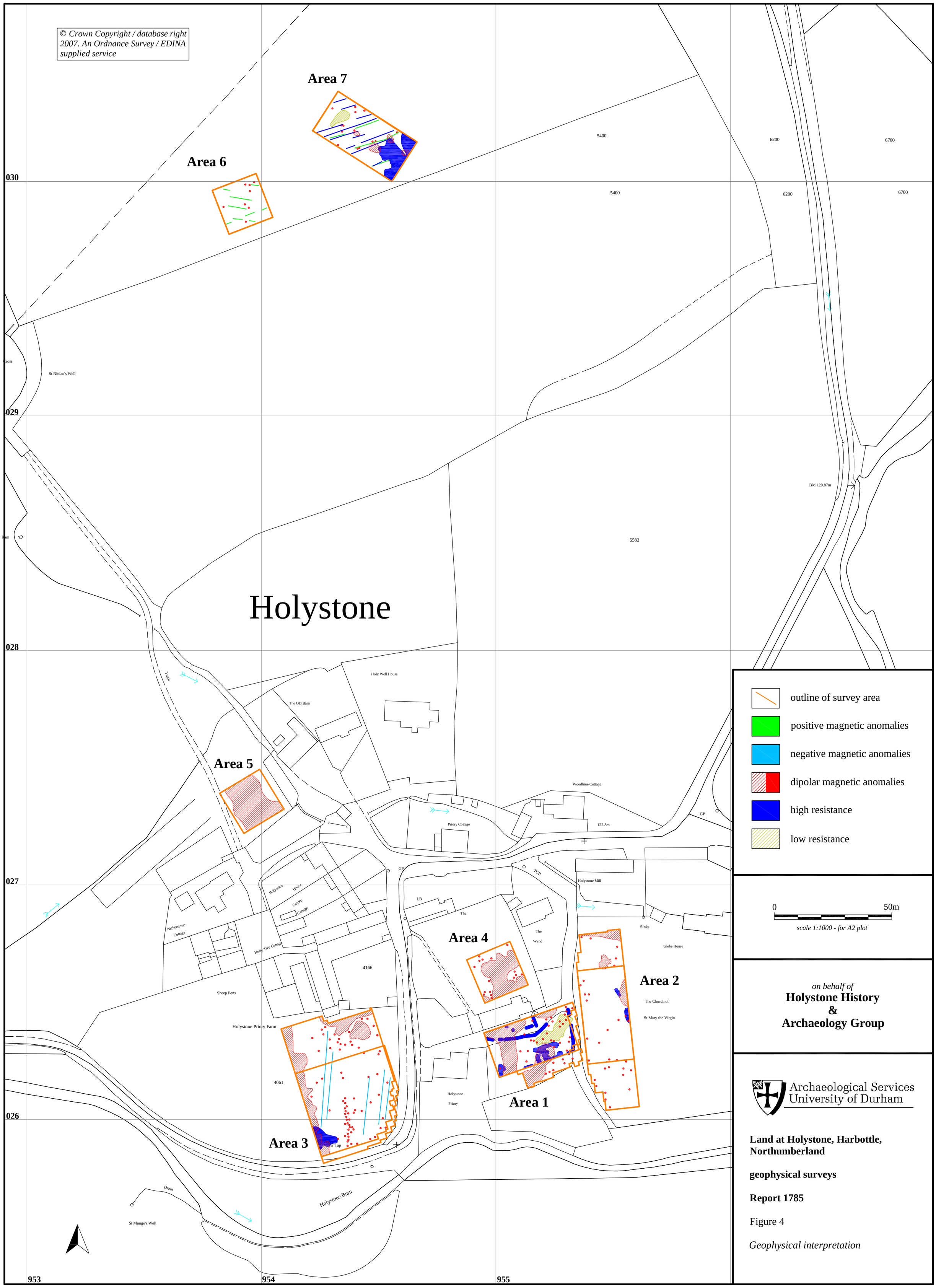
Figure 3

Geophysical surveys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Area 7
Area 6
Area 5
Area 4
Area 3
Area 2
Area 1
Holystone
5400
6200
6700
5583
BM 120.87m
St Ninian's Well
Holy Well House
The Old Barn
Woodbine Cottage
Priory Cottage
122.8m
Holystone Mill
Sinks
Glebe House
The Church of
St Mary the Virgin
Holystone Priory Farm
Sheep Pens
4166
4061
Holystone Priory
Holystone Burn
St Mungo's Well
Drain
Track
Netherstone Cottage
Holly Tree Cottage
Holystone House Garden Cottage
LB
GP
TCB
The Wynd
outline of survey area
positive magnetic anomalies
negative magnetic anomalies
dipolar magnetic anomalies
high resistance
low resistance
0
50m
scale 1:1000 - for A2 plot
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Figure 4
Geophysical interpretation

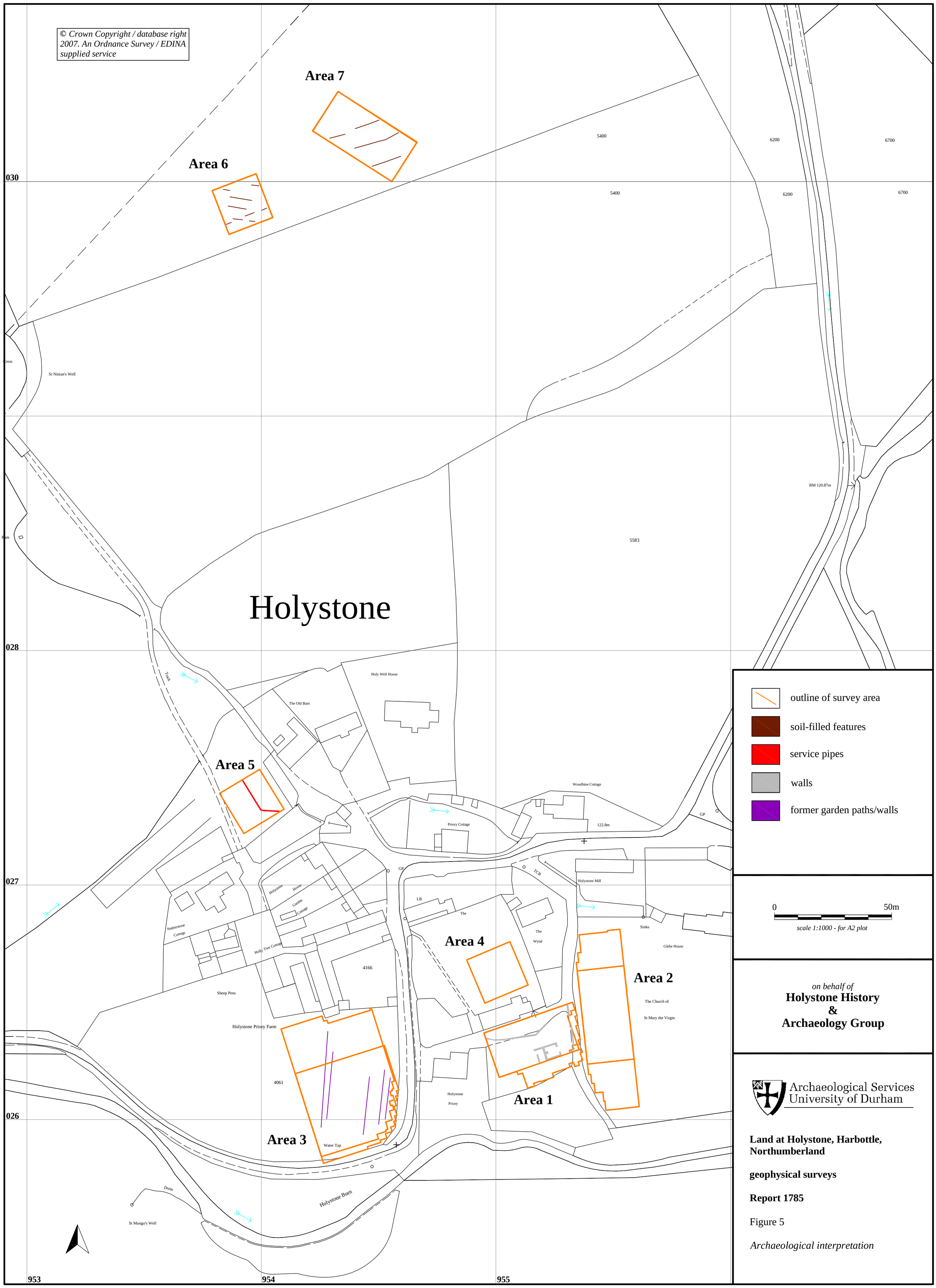

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Figure 5

Archaeological interpretation