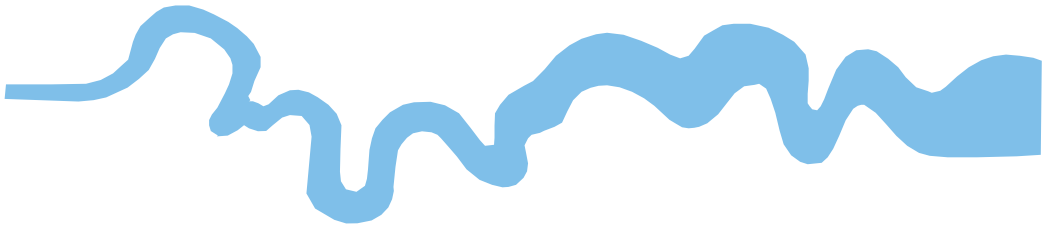
T V A S



SOUTH WEST

Newhouse Farm, Wells, Somerset

Geophysical Survey (Magnetic)

by Kyle Beaverstock and Luciano Cicu

Site Code: NWS19/127

(ST 5316 4574)

Newhouse Farm,
Wells, Somerset

Geophysical Survey (Magnetic) Report

For Gleeson Strategic Land

by Kyle Beaverstock and Luciano Cicu

TVAS South West

Site Code: NWS
19/127

February 2020

Summary

Site name: Newhouse Farm, Wells, Somerset

Grid reference: ST 5316 4574

Site activity: Magnetometer survey

Date and duration of project: 3rd February, 2020

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: NWS 19/127

Area of site: c.2.3ha

Summary of results: Across the site significant magnetic disturbance and debris was detected, however no features of archaeological interest were detected.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Report edited/checked by:	Steve Ford✓ 14.02.20
	Tim Dawson✓ 14.02.20

TVAS South West, 21 Apple Business Centre, Frobisher Way, Taunton TA2 6BB
Tel. (01823) 288 284; Email southwest@tvas.co.uk; Website: www.tvas.co.uk

Newhouse Farm, Wells, Somerset
A Geophysical Survey (Magnetic)

by Kyle Beaverstock and Luciano Cicu

Report 19/127b

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Lawrence Hill, Newhouse Farm, Wells, Somerset (ST 5316 4574) (Fig. 1). The work was commissioned by Peter Rawlinson, on behalf of Gleeson Strategic Land, Sentinel House, Harvest Crescent, Ancells Business Park, Fleet.

Planning permission is to be sought from Mendip District Council for a housing development of 2.71ha land at Newhouse Farm. The site is located in Haybridge and to the west of the city of Wells in Somerset (ST 5316 4574) (Fig. 1). The project is at a pre-planning stage and no detailed plans have been drafted yet. A geophysical survey has been requested in order to inform any further archaeological work. This is in accordance with the *National Planning Policy Framework* (NPPF 2019), and the District's policies on archaeology. The field investigation was carried out to a specification approved by Mr Steve Membury, Senior Historic Environment Officer for the South West Heritage Trust. The fieldwork was undertaken by Kyle Beaverstock and Luciano Cicu and the site code is NWS 19/127.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site is located in the hamlet of Haybridge, just outside the western edge of the city of Wells, some 1.5km from the city centre. The A317 passes the site to the east and the B3139 to the south (Fig 1). The site is bounded by the A317 to the east, pastoral lands to the west, residential buildings to the south and farm buildings to the north. The site is a sub-rectangular parcel of land, of 2.71ha in area, that is currently utilised for pastoral farming. The site itself is on a natural incline from north to south, with its lowest point in the north east corner at 38m above Ordnance Datum (aOD) and the highest is in the centre of the southern boundary at 50m aOD. The underlying geology is recorded as Mercia Mudstone Group (BGS 1997).

Site history and archaeological background

The archaeological potential of the site has been highlighted by the desktop study (Jones 2019). Although there are limited archaeological assets in the immediate vicinity, the surrounding region has an abundance of archaeological sites from the prehistory onwards. The hills to the north and east have well known prehistoric sites, such as the Palaeolithic remains found in Wookey Hole caves, Bronze Age barrows at Horrington and the Iron Age Hillfort at King's Castle. Recent archaeological investigations in the Wells area have provided evidence of both Mesolithic and Neolithic activity (Gathercole 2003).

Methodology

Sample interval

Data collection involved the traversing of the survey area along straight and parallel lines using two cart-mounted Bartington Grad601-2 fluxgate gradiometers. Even coverage was achieved with the use of regularly spaced markers at the ends of traverses and the real-time positional trace plot. Readings were taken at 0.25m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating north to south orientation in a zig-zag pattern across the western half of the survey area, and east to west on the eastern half of the survey area. Although the majority of the survey area was undisrupted by obstacles, there were a few that were apparent. These consisted of three pylons, several disturbances caused by a previous geotechnical survey, feeders for cattle, as well discarded material dumps on the eastern survey area located near the farming buildings. The terrain maintained a smooth dry surface to carry out the survey, aside from the northern centre of the survey area which was disturbed by farming equipment.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both European Archaeological Council (EAC 2015) and the Chartered Institute *for* Archaeologists (2002, 2014).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using two dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometers mounted upon a Bartington non-magnetic cart. A two-wheeled lightweight structure pushed by hand, the cart consisted a bank of four vertically-mounted Bartington Grad601-2 magnetic sensor tubes at 1m apart and a Trimble Geo 7x centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Linx 12x64 tablet running Windows 10 mounted at the rear of the cart. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

The Trimble Geo7x centimetre edition GPS system with centimetre real-time accuracy was used to tie the cart traverses into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process	**Effect**
Clip from -5 to 5 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of

	potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.
De-stagger: all grids, both by -1 intervals	Cancels out effects of site's topography on irregularities in the traverse speed.

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 2) with the processed data then presented as a second figure (Fig. 3), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons.

The greyscale plot of the processed data is exported from TerraSurveyor in a georeferenced portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is combined with grid and site plans in QGIS 2.18.15 and exported again in .PNG format in order to present them in figure templates in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

Across the site there were numerous areas of both magnetic disturbance and magnetic debris (Fig. 2). The magnetic disturbances are composed of high amplitude readings, which can be represented by a bipolar anomaly or a single polarity response (Fig. 3). In this case the magnetic disturbances were likely caused by fencing that surrounds the boundary of the survey area. As well as this, other scatters of magnetic disturbances are likely caused by the sewer services and pylons running across the site. The magnetic debris which consists of numerous dipolar responses that are spread over an area in the northern half of the survey area and is most likely connected to the activity such as discarded metallic materials, for example nails and other equipment from the farm complex to the north. This can be highlighted in both Fig. 4, where in the north eastern corner the gap in the data is in fact a material dump, and seen in Pl. 3 and Pl. 4. It is possible that these areas of magnetic disturbance are masking weaker anomalies indicating possible archaeological features. Lastly, the survey presented several dipolar magnetic spikes scattered throughout the area, these are most likely caused by buried ferrous objects.

Conclusion

The site contained numerous areas of magnetic disturbances and debris caused by above ground obstacles, such as fencing, pastoral activity, services for example sewer lines, and material dumps. With this there is no conclusive data that suggests that there are any buried archaeological remains within this field. However, it could be possible that these disturbances and debris are masking possible archaeological features.

References

BGS, 1997, *British Geological Survey*, 1: 50,000, Sheet 280, Solid and Drift Edition, Keyworth

CI*f*A, 2014, 'Standard and Guidance for archaeological geophysical survey', Reading

EAC, 2015, *EAC Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider*, EAC Guidelines 2, Namur

Gathercole, C, 2003, *Somerset Urban Archaeological Surveys – Wells, Somerset County Council,* Extensive Urban Survey

IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading

Jones, S, 2019, 'Newhouse Farm, Wells, Somerset: An Archaeological Desk-Based Assessment', Thames Valley Archaeological Services unpubl rep 19/127, Taunton

NPPF, 2019, *National Planning Policy Framework (revised)*, Ministry for Housing, Communities and Local Government, London

Appendix 1. Survey and data information

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

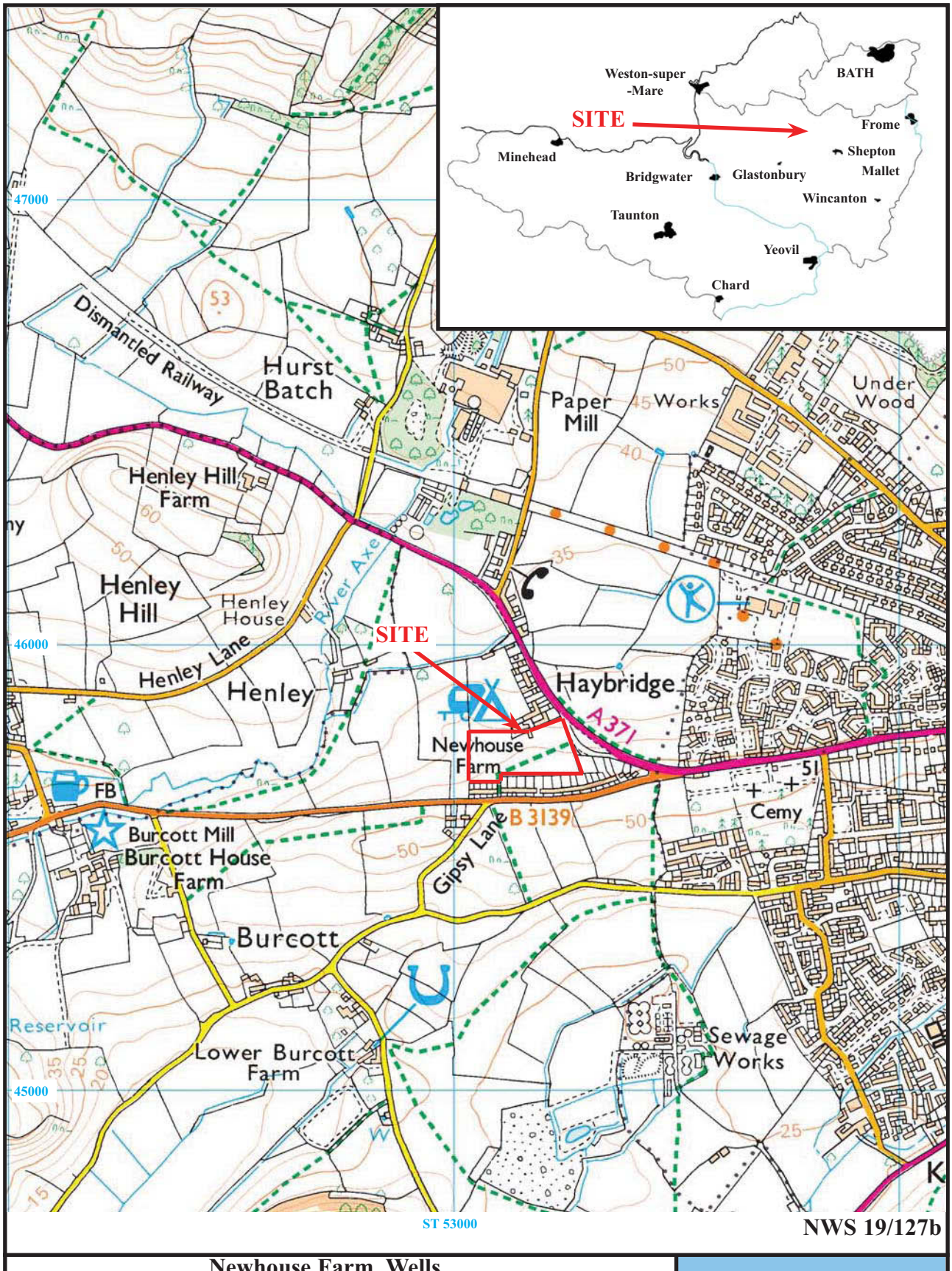
Raw data
Filename: Wells RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 353037.052876426, 145839.622292782 m
Southeast corner: 353276.122876426, 145692.982292782 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 239 m x 147 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 52383, Recorded: 52383

Stats
Max: 107.44
Min: -109.75
Std Dev: 18.72
Mean: -2.81
Median: -0.40
Composite Area: 3.5057 ha
Surveyed Area: 1.8956 ha

Processed data
Filename: Wells.xcp
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.47
Mean: -0.17
Median: 0.06
Composite Area: 3.5057 ha
Surveyed Area: 1.8574 ha

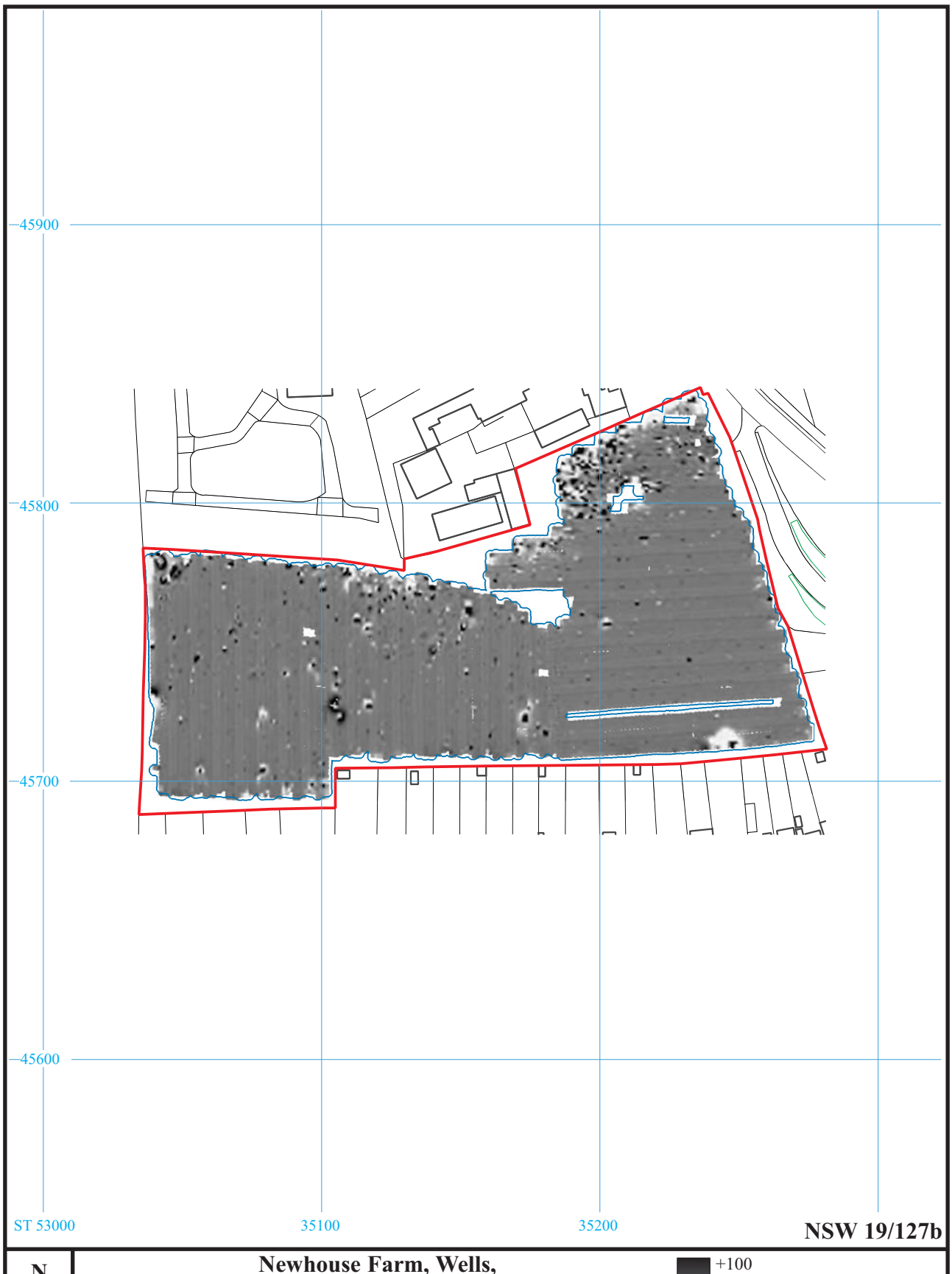
GPS based Proce7
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00
5 DeStagger by: 50.00cm, Shift Positions
6 DeStagger by: 50.00cm, Shift Positions
7 DeStagger by: 50.00cm, Shift Positions



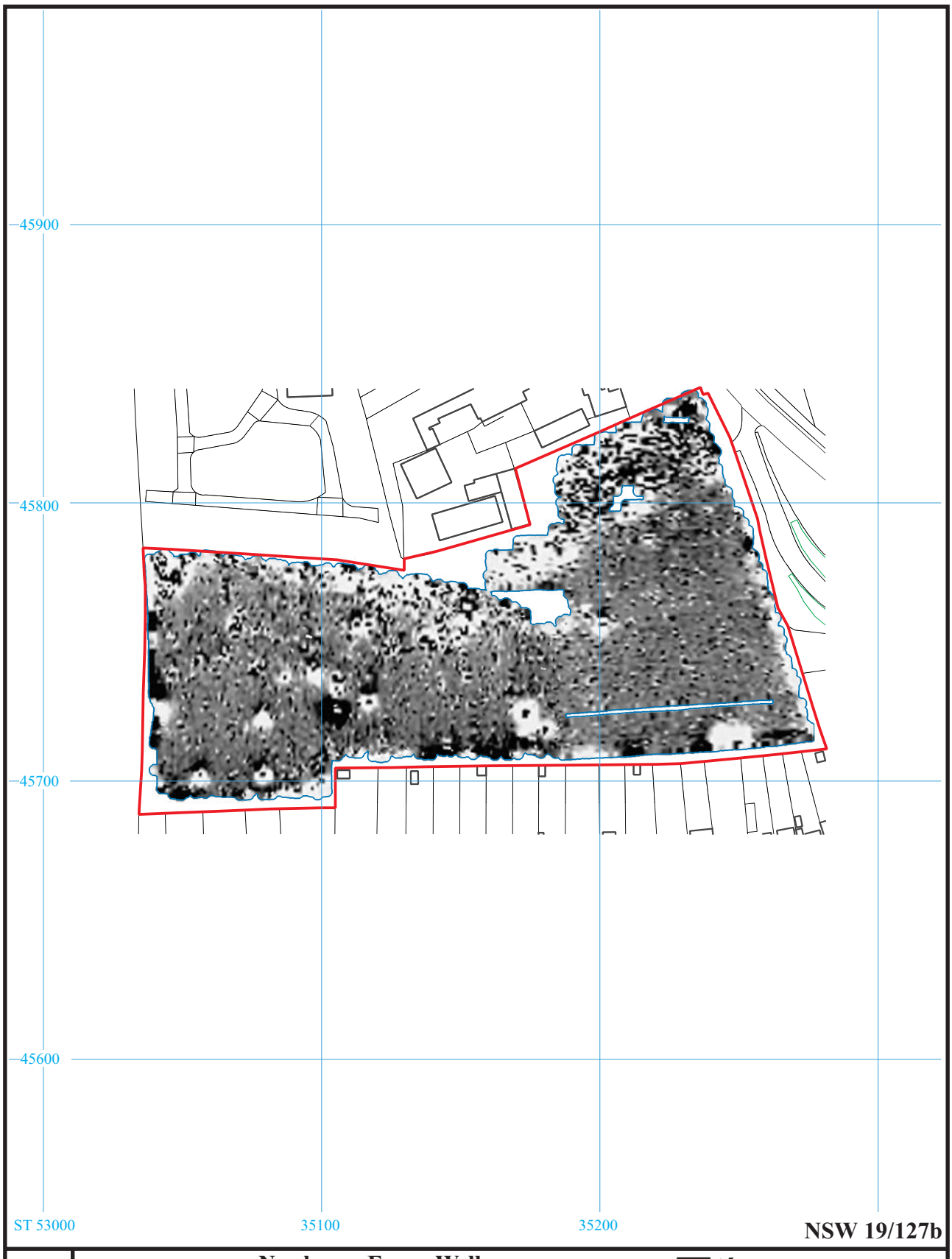
Newhouse Farm, Wells,
Somerset, 2020
Geophysical Survey (Magnetic)

Figure 1. Location of site within Wells and Somerset.

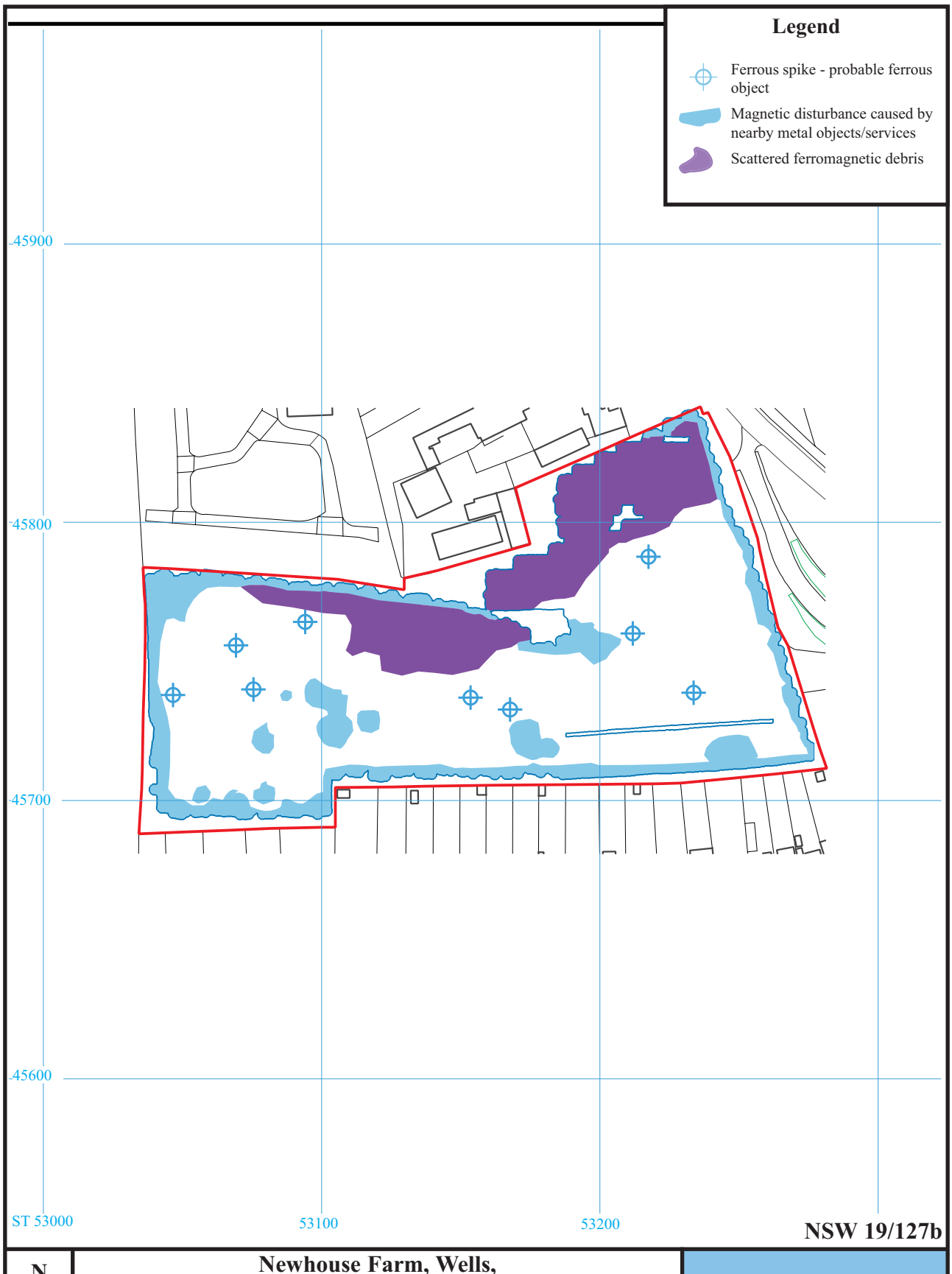
TVAS
SOUTH WEST



Newhouse Farm, Wells,
Somerset, 2020
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.



Newhouse Farm, Wells,
Somerset, 2020
Geophysical Survey (Magnetic)
Figure 3. Plot of processed gradiometer data.



N

Newhouse Farm, Wells,
Somerset, 2020
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.

0m 100m

TVAS SOUTH WEST

Plate 1. Western area of the site, looking South West

Plate 2. Western central are of the site, looking East. Along the Northern boundary.

Plate 3. South Eastern area of the site, looking North East towards the farmhouse.

Plate 4. Eastern area of the site, looking South West.

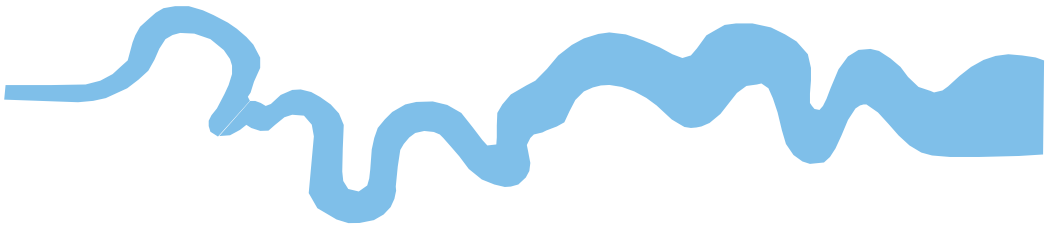
NWS 19/127b

Newhouse Farm, Wells,
Somerset, 2020
Geophysical Survey (Magnetic)
Plates 1 - 4.

TVAS SOUTH WEST

TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
	AD 0 BC
Iron Age	750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC



TVAS (South West),
Unit 21 Apple Business Centre,
Frobisher Way,
Taunton TA2 6BB
Tel: 01823 288284
Email: southwest@tvas.co.uk
Web: www.tvas.co.uk/southwest

Offices in:
Reading, Brighton, Stoke-on-Trent, Wellingborough and Ennis (Ireland)