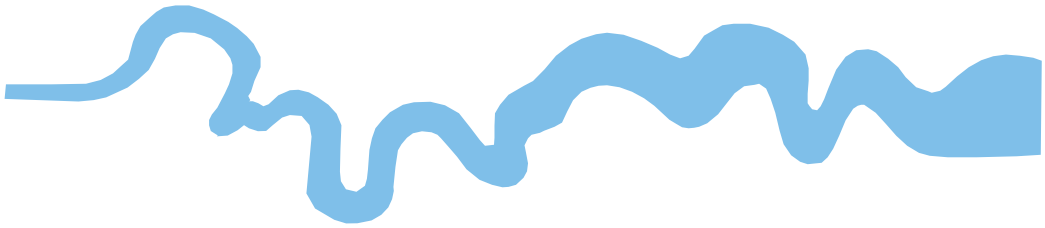
T V A S



SOUTH

Land east of Keymer Road (Persimmon site) (field 5), Burgess Hill, West Sussex

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: KRB 23/92

(TQ 3207 1772)

Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex

Geophysical Survey (Magnetic) Report

For Persimmon Homes

by Kyle Beaverstock

TVAS South

Site Code KRB 23/92

December 2023

Summary

Site name: Land east of Keymer Road, Burgess Hill, West Sussex

Grid reference: TQ 3207 1772

Site activity: Magnetometer survey

Date and duration of project: 24th November 2023

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: KRB 23/92

Area of site: c.1.5ha

Summary of results: No magnetic anomalies which may indicate the presence of features of archaeological interest were identified by the geophysical survey.

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✓ 4.12.23
	Tim Dawson✓ 4.12.23

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Land east of Keymer Road, Burgess Hill, West Sussex
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 23/92c

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Keymer Road, Burgess Hill, West Sussex (TQ 3207 1772) (Fig. 1). The work was commissioned by Mark Hendy on behalf of Persimmon Homes, Persimmon House, Knoll Road, Camberley, Surrey, GU15 3TQ.

Planning permission (DM/22/3049) has been granted by Mid Sussex District Council for the construction of 260 dwellings and associated infrastructure on the 15.2ha site east of Keymer Road. The site is divided between two developers, Thakeham Homes and Persimmon Homes covering 6.8ha and 8.4ha respectively. A condition (12) has been placed on the planning permission concerning archaeology. This is in accordance with the *National Planning Policy Framework* (NPPF 2021), and the District's policies on archaeology. The fieldwork was undertaken by Kyle Beaverstock on the 24th of November 2023 and the site code is KRB 23/92.

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

Location, topography and geology

Field 5 of the Keymer Road site consists of a sub-rectangular parcel of land covering *c*.2ha located on the southern edge of Burgess Hill (Fig. 1). It is bounded by pastoral land to the north, residential development to the west and fallow land to the east and south. The land has a general slope from 56m above Ordnance Datum (aOD) in the east to 54m aOD in the west. Field 5 is currently not being utilised and is mostly fallow land and the field is bounded by trees and ecological fencing. The underlying geology is stated as mostly Head deposits overlying Weald Clay (BGS 1984).

The majority of the Field 5 site is currently subject to a reptile clearance operation and as such only a percentage of the field was available to survey at this time. This amounted to *c*.0.48ha, covering the area clear of scrub, which was bounded by reptile fencing.

Site history and archaeological background

A full archaeological background can be found in the desk-based assessment prepared for the development (Redclift 2022). To summarise, there are no known archaeological assets within the site area however a few archaeological deposits have been recorded in the vicinity including Prehistoric and Roman remains during a watching brief for the Ditchling to Wivelsfield Green pipeline as well as a Bronze Age axe recorded to the south. The site was likely within the informal parkland of the medieval 'Frekeberge' estate and as such would have been occupied by woodland or agricultural land at this 2 time. Late post-medieval mapping shows the site as three fields beyond the southern limits of Burgess Hill with the surrounding land gradually being consumed by the expansion of the town through the 19th and 20th centuries.

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 0.13m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating zig-zag pattern along a south-west to north-east orientation across the survey area. The survey encountered a significant amount of vegetation in the east and south of Field 5 which could not be removed due to ecological reasons but prevented surveying of these areas. Conditions were dry and bright.

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, 2020).

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 R2 Receiver, centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Geo 10 tablet running Windows 11 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 R2 Receiver, 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 TerraSurveyor64 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 -3.40 to 3.59 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 TerraSurveyor64 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 3.34.0 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

The geophysical survey recorded a minimal number of magnetic anomalies around the site area (Figs. 2, 3, 5-7). The survey area was surrounded by reptile fencing which caused small areas of magnetic disturbance (± 99nT) around sections of the survey areas's perimeter, particularly in the south and south-western sections. This disturbance may be potentially masking weaker magnetic variations caused by buried archaeological features although given the small area it is unlikely. There were no anomalies suggesting the presence of buried archaeology.

Conclusion

The survey was undertaken across a portion of the total field area due to ecological constraints. The reptile fencing which had been erected around the cleared area in which the survey took place contained small amounts of ferrous material and as such caused minor areas of magnetic disturbance within the magnetic readings. No anomalies suggesting the presence of archaeological features were recorded by the geophysical survey.

References

BGS, 1984, *British Geological Survey*, 1:50,000, Sheet 318/333, Solid and Drift Edition, Keyworth

CIfA, 2020, '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

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

NPPF, 2021, *National Planning Policy Framework*, Ministry of Housing, Communities and Local Govt, London

Redclift, 2022, 'Land east of Keymer Road and south of Folders Lane, Burgess Hill; Archaeological desk-based assessment', Orion report PN3287/DBA3, Hove

Appendix 1. Survey and data information

Programme:
Name: TerraSurveyor64
Version: 4.0.18.1

Raw data
Name: KRB23-92_04
Desc: Imported as Composite from: KRB23-92_04.xyz
InstDesig: MLGrad Import
SurveyDate: 24/11/2023
AssembleDate: 30/11/2023
ProcessDate: 30/11/2023
Units:
Surveyed Area: 0.44872 ha
Survey Extent: 0.74733 ha
GPS Datum: WGS-84
Map Coordinate System: DDD
Survey Type: GPS
Average point interval : 1.29m
Interval & Radius : 0.13m 1m
Source GPS totals: Trackgroups:1 Tracks:400, Points:14824

Base layer Stats
Max: 96.70
Min: -99.90
Std Dev: 9.13
Mean: -0.19
Median: -0.10

Minimally Processed data
Name: KRB23-92_04_MIN
Top layer Stats
Max: 10.00
Min: -10.00
Std Dev: 2.70
Mean: -0.02
Median: -0.02

Base
CutTurnAngle 0.00
CutTurnThreshold 0
CutTurnLength 0.00
BreakOnJumpDistance 0.00
DiscardOverlapThreshold -1.00
DiscardOverlapMinTrack 0
DiscardOverlapMethod DelNew
PointReduction 0.00

DeStripe
Mode Track
Method Mean
Orientation Along
MaintainMean ✗
ThresholdType None
ThresholdMin 2.00
ThresholdMax 2.00
Sectors 5
WindowLength 101

Clip
Min -10.00
Max 10.00
SelectSD 0.00

Processed data
Name: KRB23-92_04
Top layer Stats
Max: 3.60
Min: -3.40
Std Dev: 1.22
Mean: 0.01
Median: 0.01

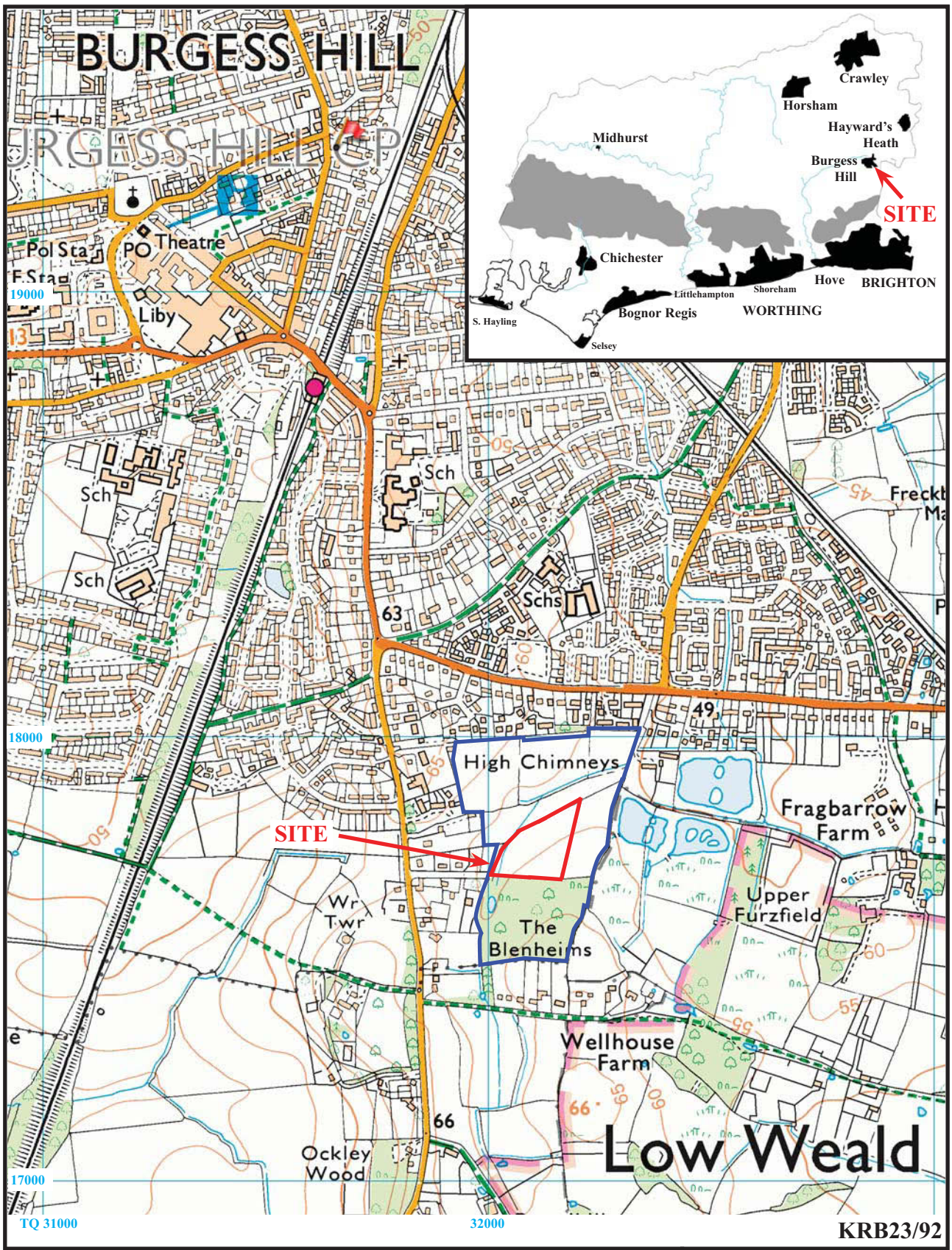
Base
CutTurnAngle 0.00
CutTurnThreshold 0
CutTurnLength 0.00
BreakOnJumpDistance 0.00
DiscardOverlapThreshold -1.00
DiscardOverlapMinTrack 0
DiscardOverlapMethod DelNew
PointReduction 0.00

DeStripe
Mode Track
Method Mean
Orientation Along
MaintainMean ✗
ThresholdType None
ThresholdMin 2.00
ThresholdMax 2.00
Sectors 5
WindowLength 101

Clip
Min -10.00
Max 10.00
SelectSD 0.00

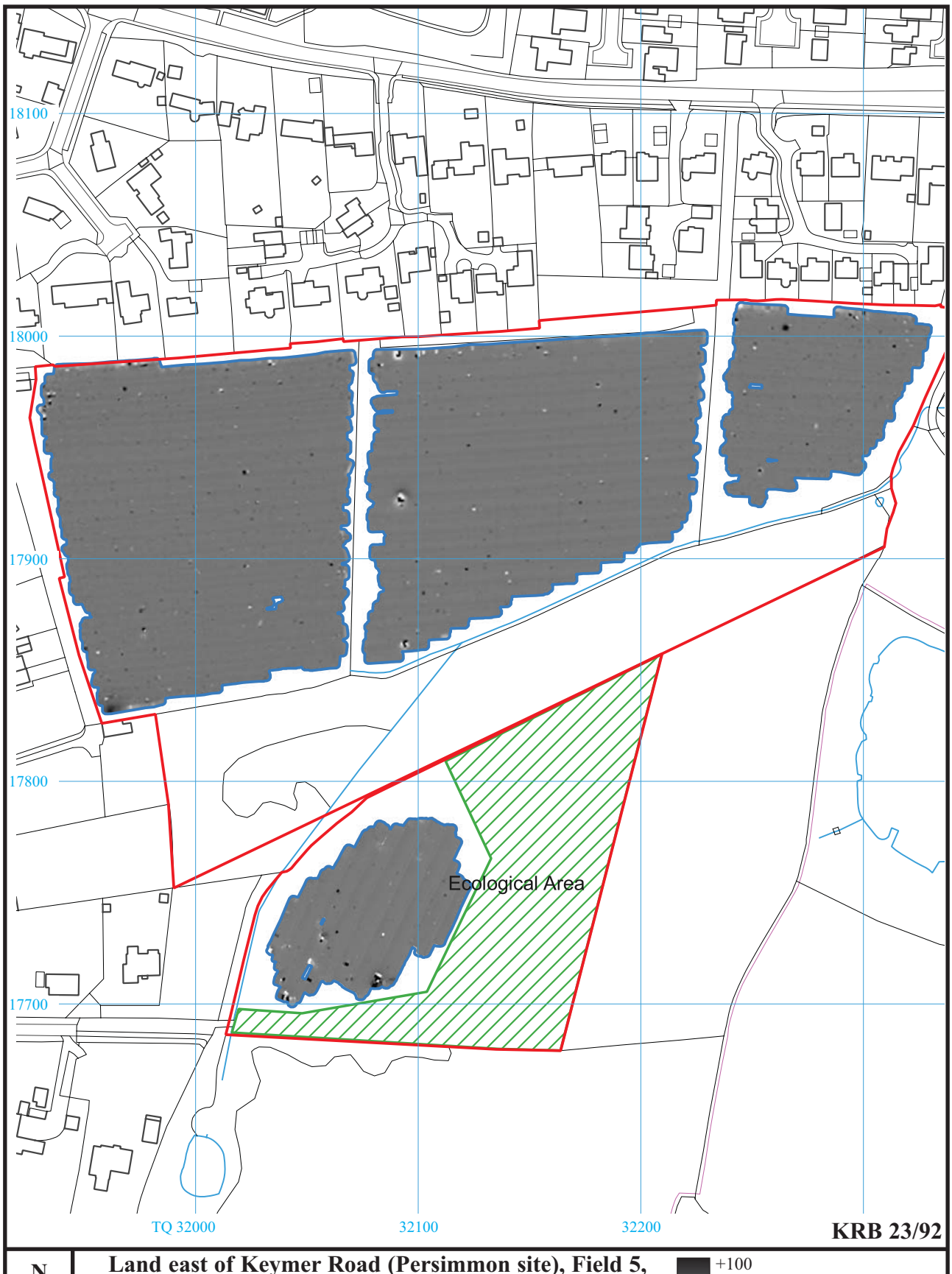
Hi/Lo
FilterModeHigh
WindowLength 21
WindowWidth 21
WeightingMode Gaussian
Threshold 1.00
ReplaceCenterWith Average

Clip
Min -3.40
Max 3.60
SelectSD 0.00



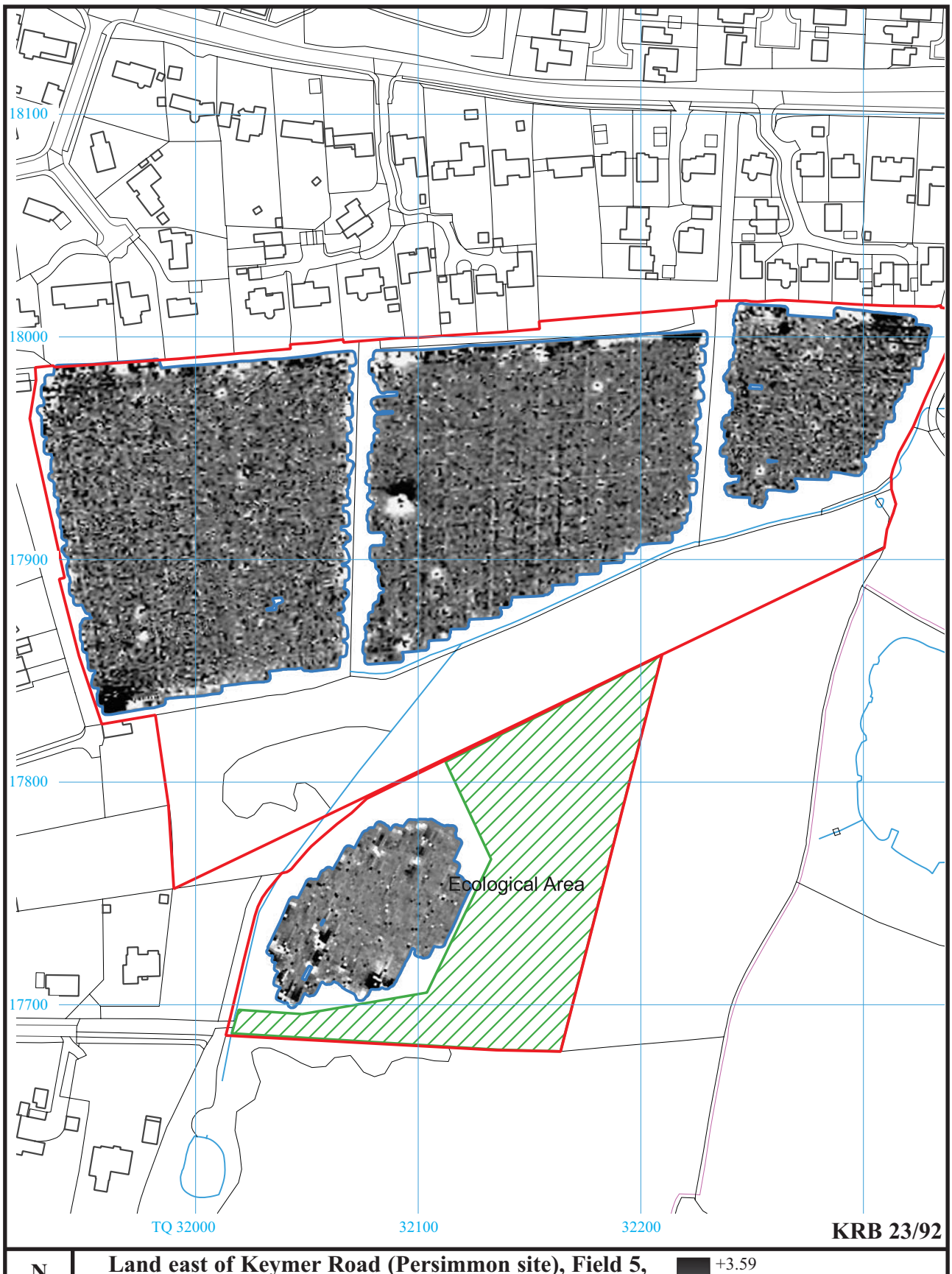
Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex
Geophysical Survey (magnetic)
Figure 1. Location of site within Burgess Hill and West Sussex.

TVAS SOUTH



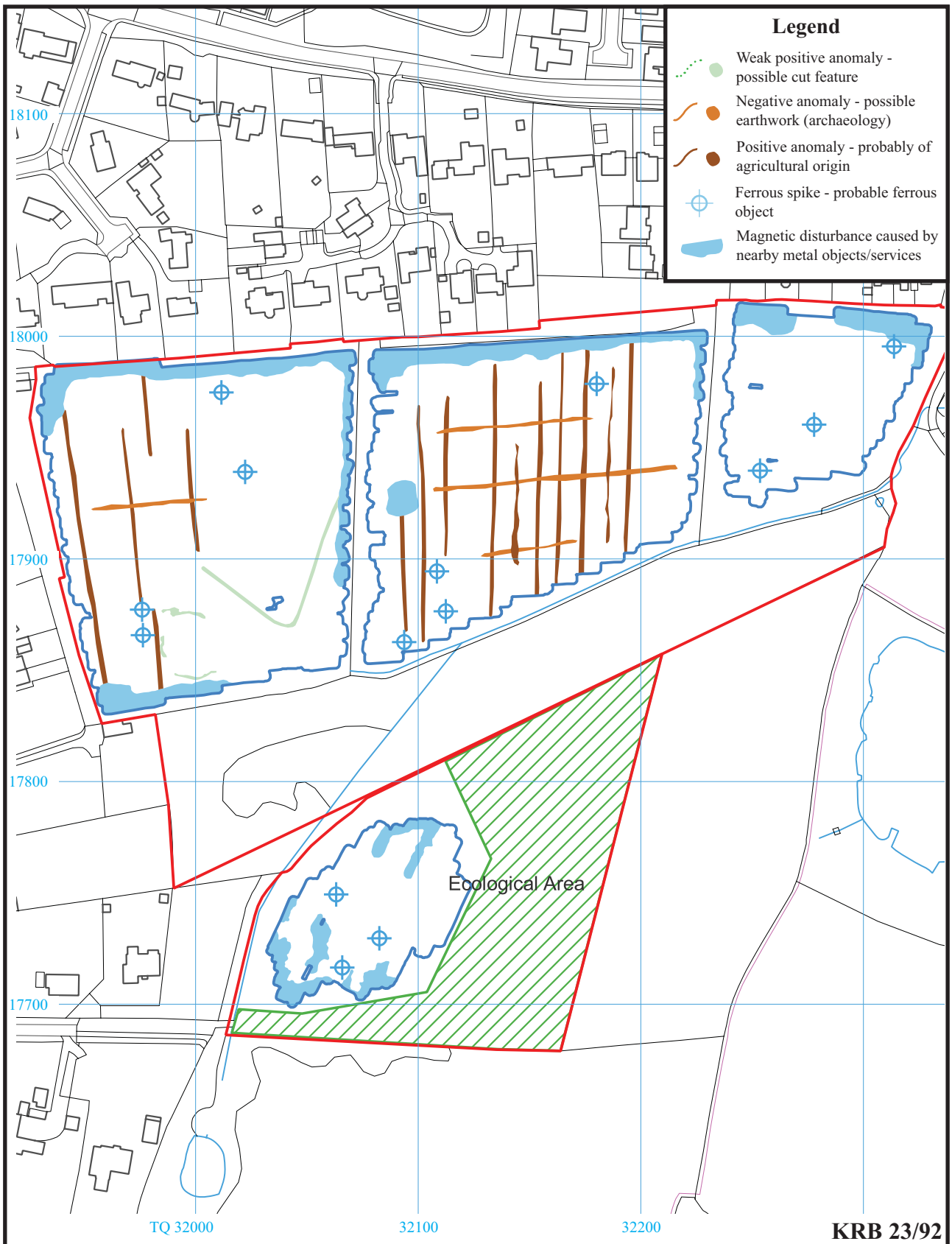
Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)

Figure 2. Plot of raw gradiometer data of whole site.



Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)

Figure 3. Plot of processed gradiometer data of whole site.



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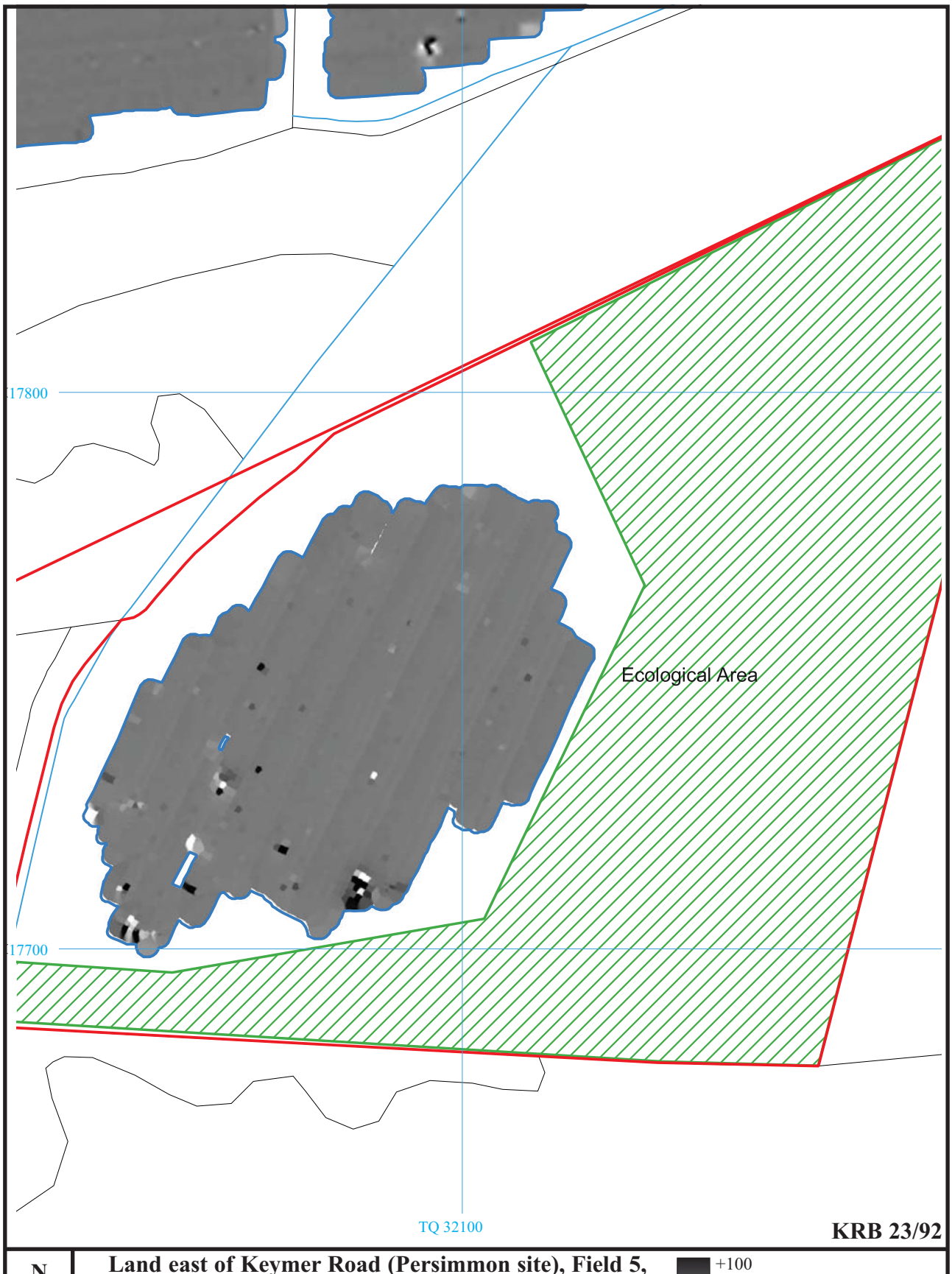
Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot of whole site.

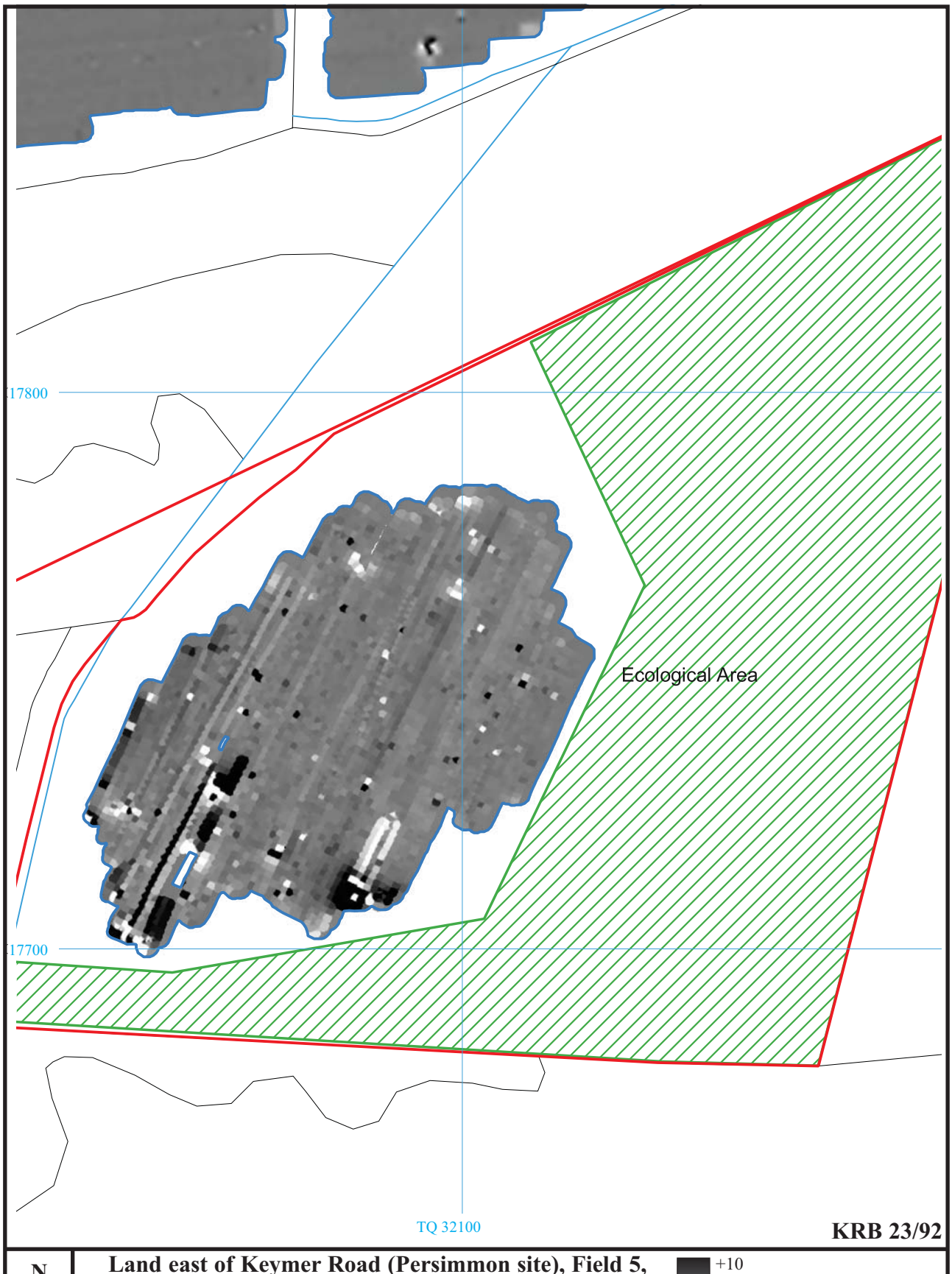
0m 100m

TVAS SOUTH



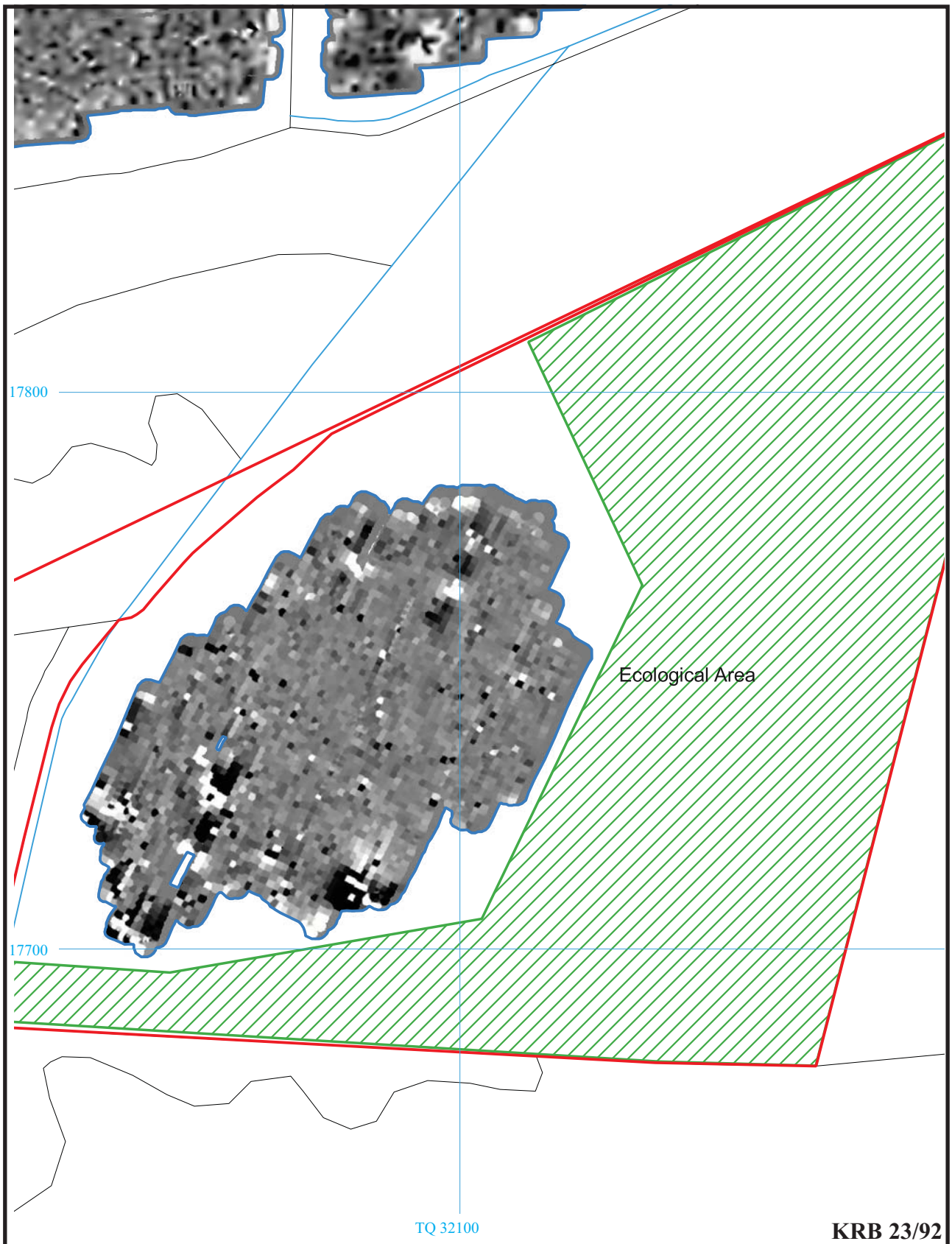
Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)

Figure 5. Focused plot of raw gradiometer data of survey area.



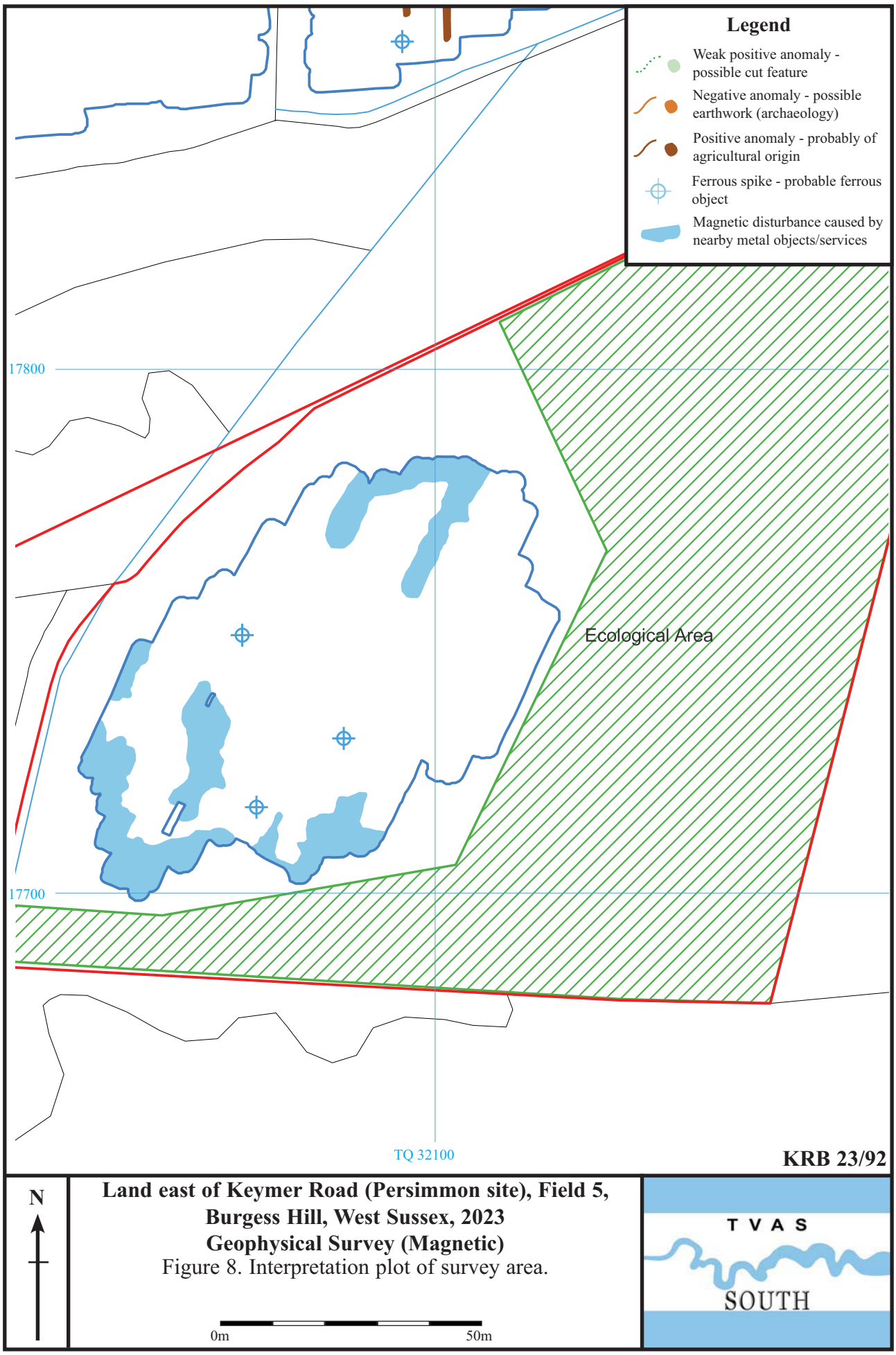
Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)

Figure 6. Focused plot of minimally processed gradiometer data of survey area.



Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)

Figure 7. Focused plot of processed gradiometer data of survey area.



Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (Magnetic)
Figure 8. Interpretation plot of survey area.

Plate 1. Northern part of survey area looking north-west.

Plate 2. Southern part of survey area looking south-west.

Plate 3. Northern part of survey area looking north-east.

Plate 4. Southern part of survey area looking south-east.

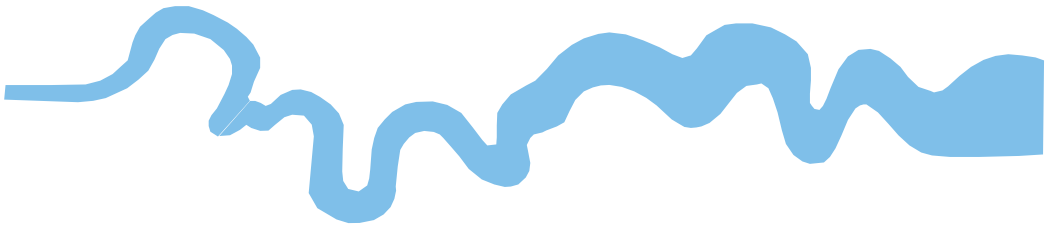
KRB 23/92

Land east of Keymer Road (Persimmon site), Field 5, Burgess Hill, West Sussex, 2023
Geophysical Survey (magnetic)
Plates 1 - 4.

TVAS SOUTH

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



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