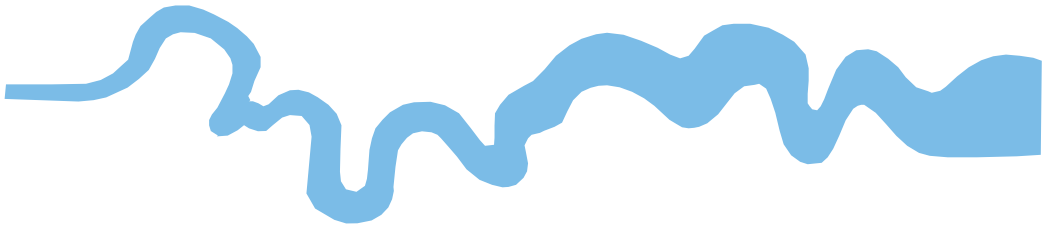
T V A S



SOUTH

Lydden Hill Race Circuit, Wootton, Kent

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: LHC20/90

(TR 2430 4701)

Lydden Hill Race Circuit, Wootton, Kent

Geophysical Survey (Magnetic) Report

For Lydden Hill Race Circuit

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code LHC 20/90

October 2020

Summary

Site name: Lydden Hill Race Circuit, Wootton, Kent

Grid reference: TR 2430 4701

Site activity: Magnetometer survey

Date and duration of project: 28th of September 2020

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: LHC20/90

Area of site: 1.1ha

Summary of results: Despite the potential to identify the Roman road from Canterbury to Dover the geophysical survey only identified modern services and disturbance.

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✓ 9.19.20
	Tim Dawson✓ 9.10.20

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Lydden Hill Race Circuit, Wootton, Kent
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 20/90

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Lydden Hill, Wootton, Kent (TR 2430 4701) (Fig. 1). The work was commissioned by Hannah Rynston of Lydden Hill Race Circuit, Wootton, Canterbury, Kent, CT4 6RX.

Planning permission (19/00615) has been gained from Dover District Council for various improvements to the existing race circuit, including the construction of a new access road and VIP centre. The consent is subject to a condition (25) relating to archaeology and the historic environment. 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 Ben Found, Archaeological Officer for Kent County Council. The fieldwork was undertaken by Kyle Beaverstock on the 28th of September 2020 and the site code is LHC 20/90.

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 a thin strip of land located on the southwestern side of the A2, 1.9km northeast of Wootton and 1.9km southwest of Shepherdswell (Fig. 1). The site is bounded by farmland to the south, the A2 to the north and private roads to the east and west. The land sits at a general height of between 135 and 137m above Ordinance Datum (aOD) with a drop to 130m aOD in the northwest. The land is currently being utilised for arable farming and the underlying geology is stated as Clay with Flints (BGS 1982).

Site history and archaeological background

The archaeological potential of the site has been considered in a recent desk-based assessment (Boast and Moody 2019), and in a brief issued by the Kent County Council Archaeological Officer who advises Dover District Council on Archaeological matters (Mr Ben Found) (KCC 2020). In summary, part of the site is located

in an area where the underlying geology consists of 'clay with flints', which sometimes provided preferable conditions for prehistoric settlement activity. Although no archaeological features dating from the prehistoric period have been found in the area around the site, there have been a number of finds including Iron Age coins. The Roman road connecting Canterbury (Durovernum) to Dover (Portus Dubris) is thought to run through the eastern part of the site and, perhaps unsurprisingly, there have been a number of Roman finds in the area. These include a Roman settlement site to the east of the site, near the end of Dunbrill Hill, and finds of Roman material. It is possible that the earthworks recorded to the south of Geddinge Farm may represent the remains of a medieval settlement.

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 east to west zig-zag orientation across the northern survey area and north-west to south-east in the eastern field. No obstructions were encountered. The 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, 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 -3.30 to 3.32 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

The geophysical survey encountered a number of anomalies, including two bipolar linear anomalies and three areas of magnetic debris. The two bipolar linear anomalies are in the north-eastern area of the site, the first is aligned south-west to the north-east and runs for 212m, 20m to the south-east of this is a second bipolar linear anomaly aligned north-northeast to south-southwest. These certainly represent modern services. At the north-western and south-eastern edge of the survey area are areas of scattered magnetic debris. These consist of areas of positive and negative responses of a relatively high amplitude and likely represent disturbance from the roads at either end of the service area. Towards the south east is another area of magnetic debris, this most likely represents disturbance to the underlying geology as seen in the ploughed soil. No features of archaeological interest were detected.

Conclusion

The geophysical survey consisted of a thin strip of land to the south of the A2, with the potential of a Roman road and associated structures being present. This would have most likely consisted of an area of negative responses representing a built road surface with some surrounding positive anomalies that would represent any associated structures. Over the course of the geophysical survey neither of these were detected despite a clean dataset, however only a small area of the site was studied. The anomalies that were detected consisted of two bipolar linear anomalies that are almost certainly modern services and three areas of magnetic debris. Two are near the western and eastern ends of the survey and are likely to be associated with the construction of the

modern roads at either end and the third may have been caused by heavy disturbance to the natural geology which was seen in the ploughed soil in this area of the site.

References

BGS, 1982, *British Geological Survey*, 1:50,000, Sheet 289, Solid and Drift Edition, Keyworth

Boast, E J and Moody, G A, 2019, 'Lydden Hill Race Circuit, Wootton, Canterbury, Kent - an archaeological desk-based assessment', Trust for Thanet Archaeology.

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

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

KCC, 2020, 'Specification for archaeological evaluation at Lydden Hill Race Circuit, Wootton, near Dover, Kent, CT4 6ET', Kent County Council brief, Maidstone.

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

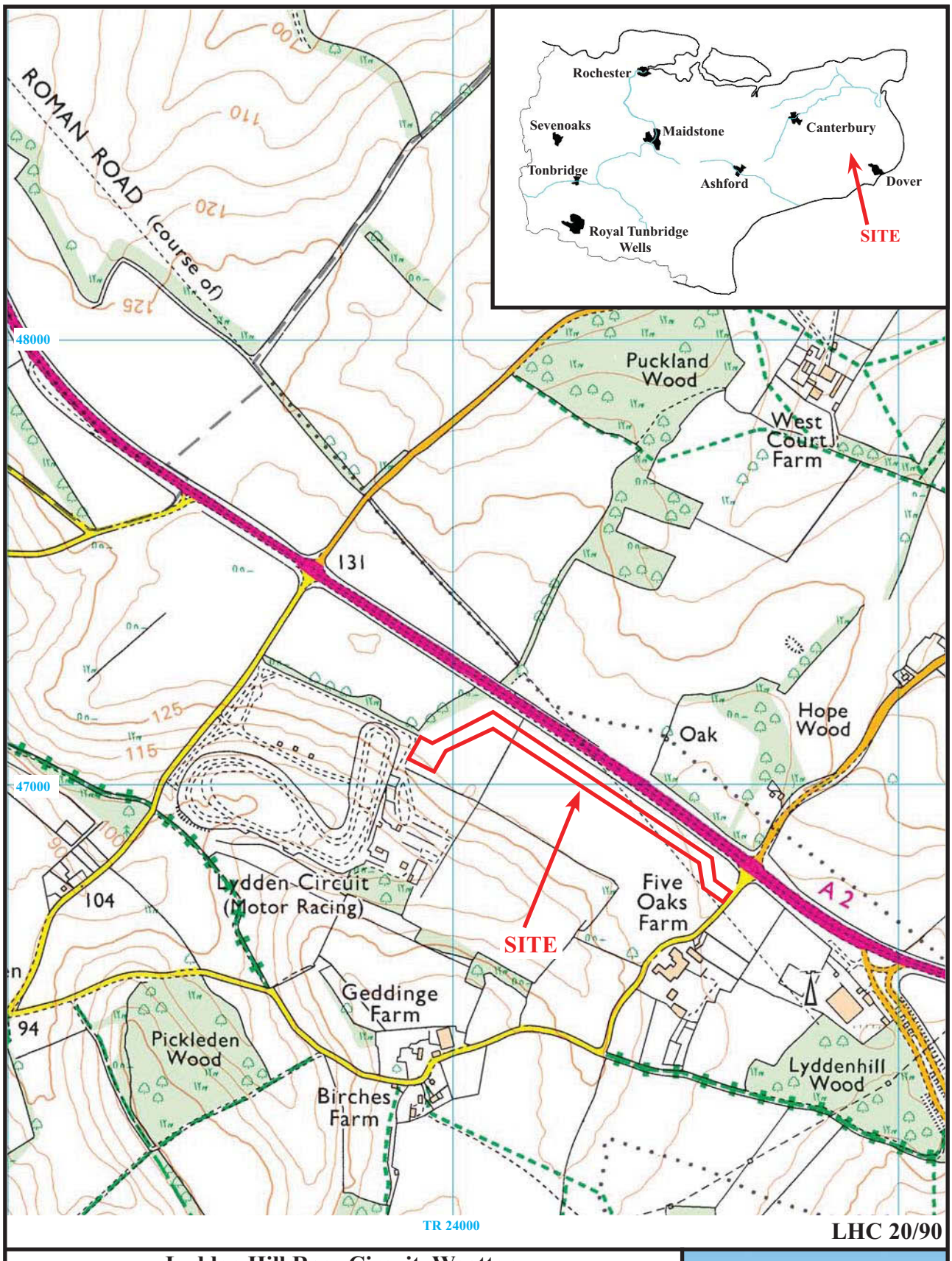
Raw data
Filename: Lydden Hill RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 31U
Survey corner coordinates (X/Y):
Northwest corner: 623904.279144212, 147193.33597865 m
Southeast corner: 624578.849144212, 146787.47597865 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 675 m x 406 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 42563, Recorded: 42563

Stats
Max: 106.81
Min: -108.08
Std Dev: 7.31
Mean: 0.53
Median: 0.48
Composite Area: 27.378 ha
Surveyed Area: 1.3014 ha

Processed data
Filename: Lydden Hill.xcp
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.10
Mean: 0.02
Median: 0.02
Composite Area: 27.378 ha
Surveyed Area: 1.2973 ha

GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip at 1.00 SD
5 DeStagger by: 50.00cm, Shift Positions
6 Clip from -3.00 to 3.00



Lydden Hill Race Circuit, Wootton,
Kent, 2020
Geophysical Survey (Magnetic)

Figure 1. Location of site within Lydden Hill Race Circuit and Kent.

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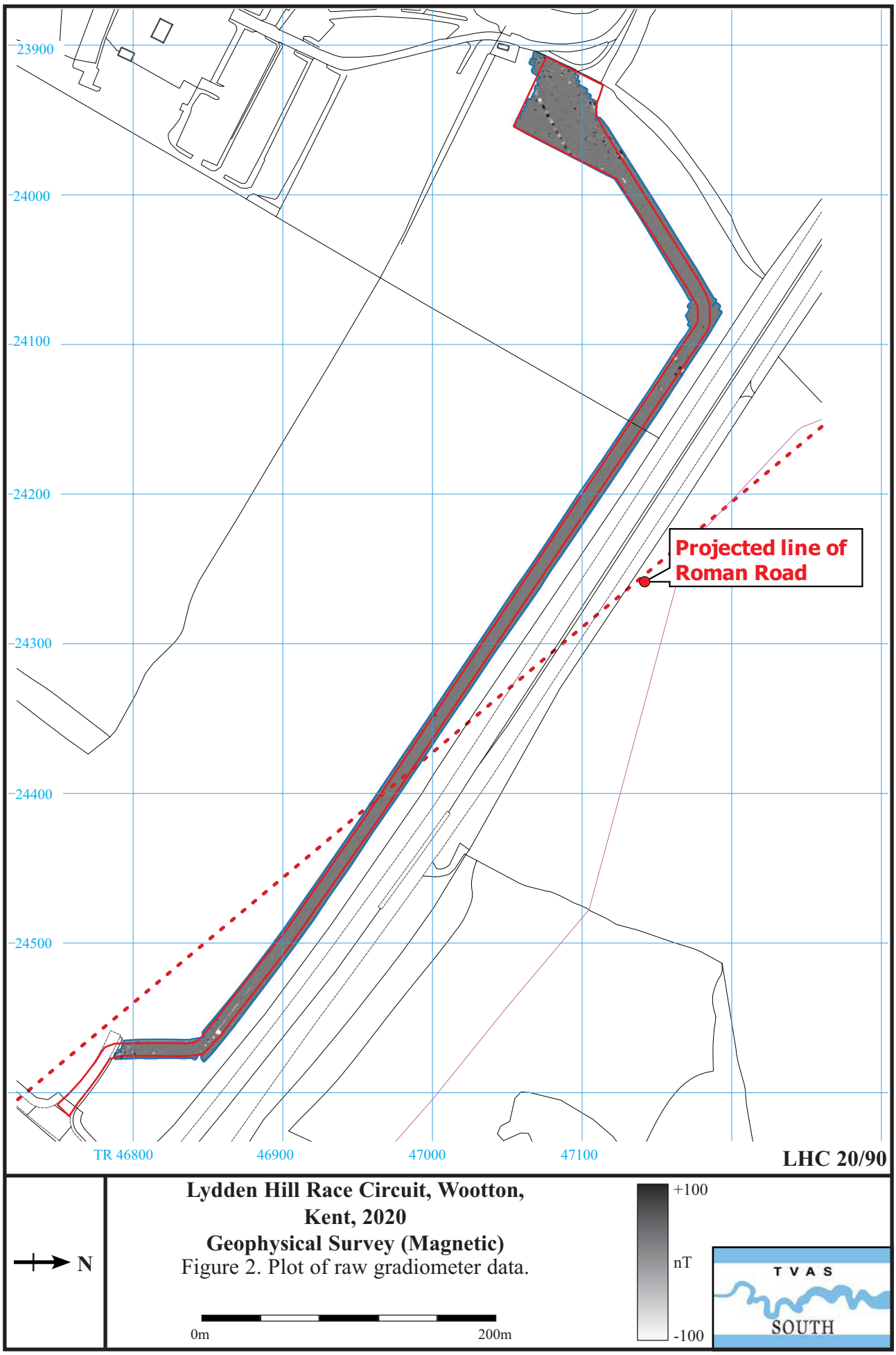
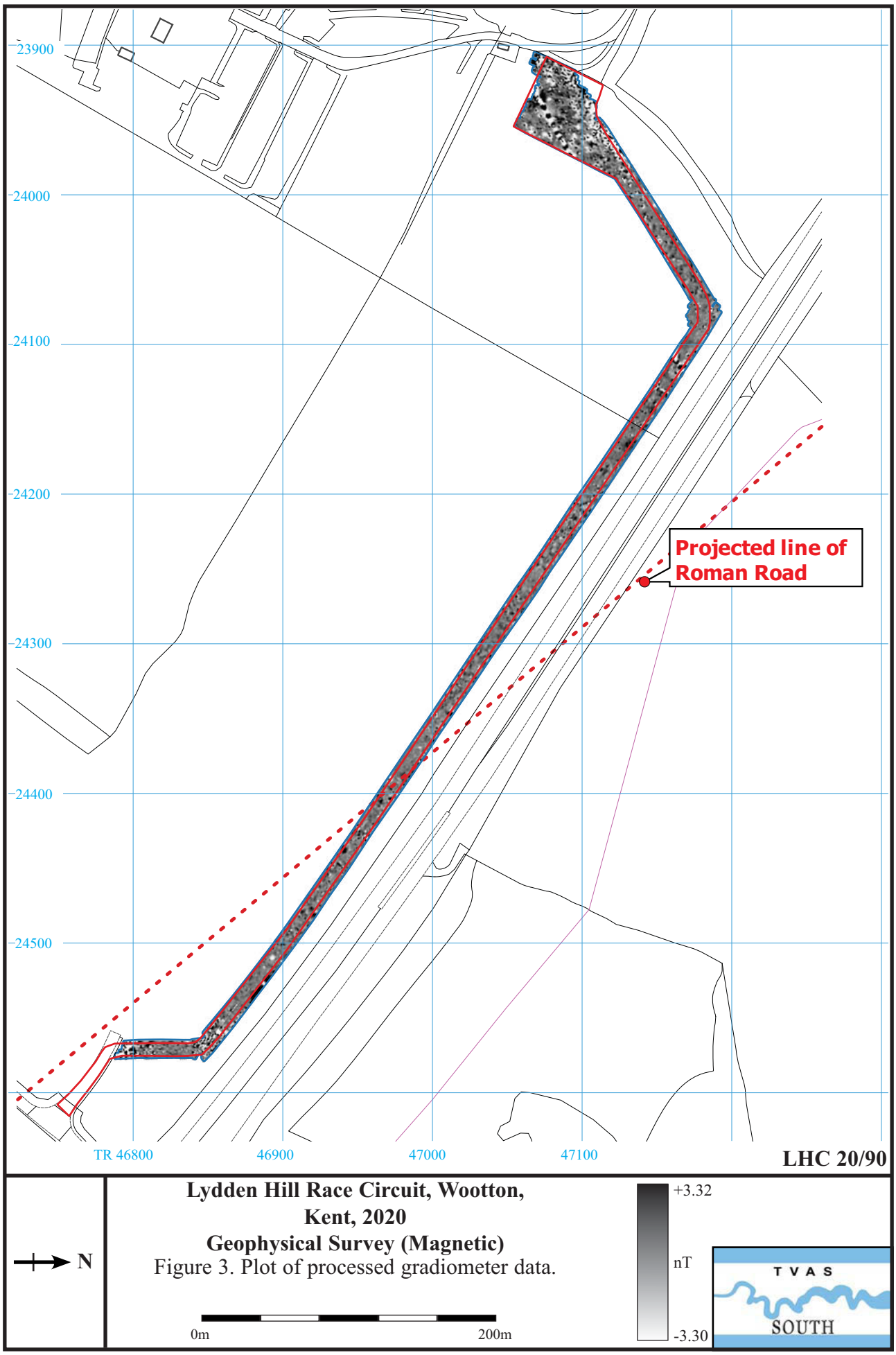
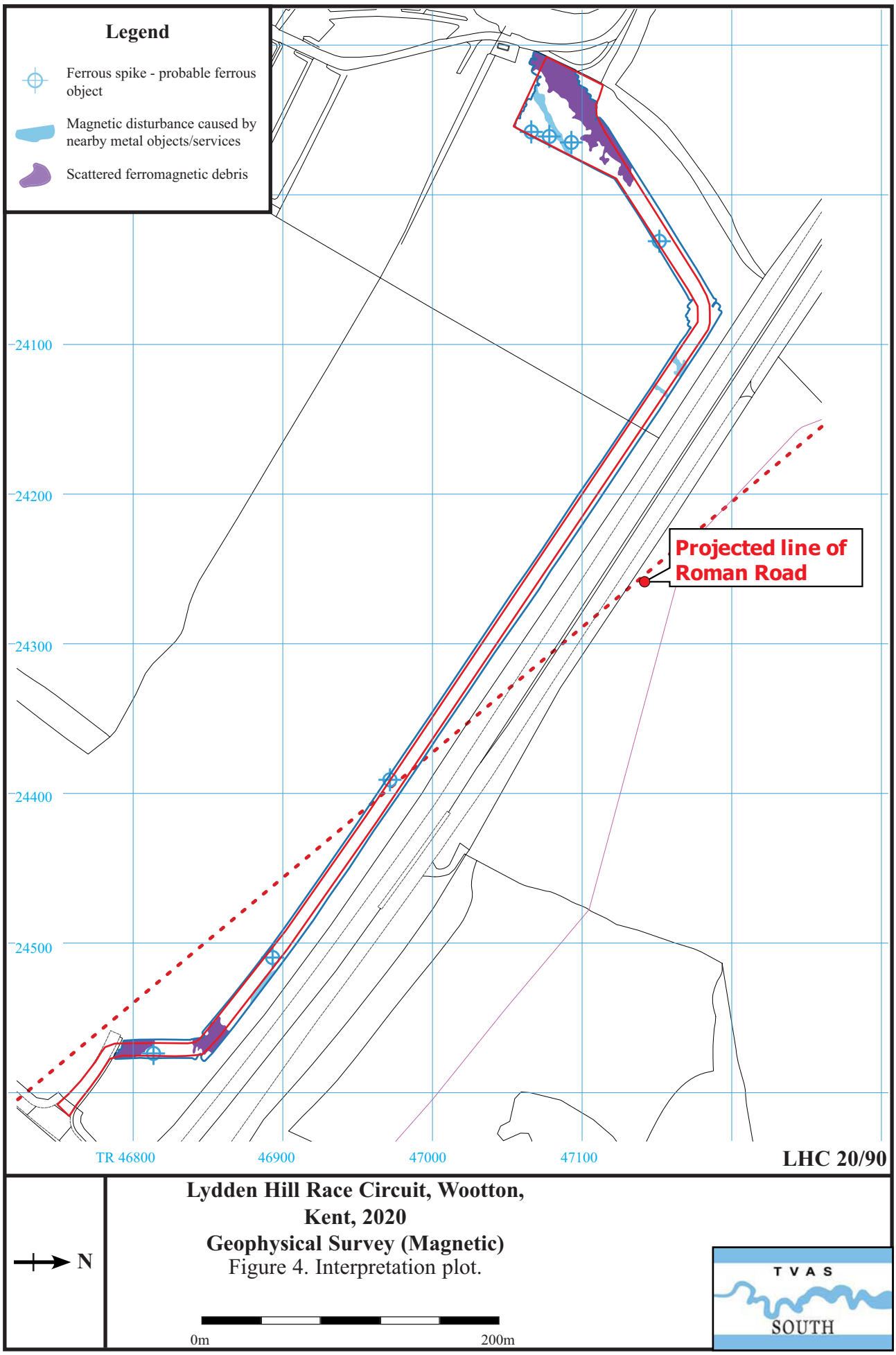

23900
24000
24100
24200
24300
24400
24500
Projected line of Roman Road
TR 46800
46900
47000
47100
LHC 20/90
N
Lydden Hill Race Circuit, Wootton, Kent, 2020
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.
0m
200m
+100
nT
-100
TVAS
SOUTH


23900
24000
24100
24200
24300
24400
24500
Projected line of Roman Road
TR 46800
46900
47000
47100
LHC 20/90
N
Lydden Hill Race Circuit, Wootton, Kent, 2020
Geophysical Survey (Magnetic)
Figure 3. Plot of processed gradiometer data.
0m
200m
+3.32
nT
-3.30
TVAS
SOUTH



Lydden Hill Race Circuit, Wootton, Kent, 2020
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.

N

0m 200m

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Plate 1. The western end of the survey area, looking east.

Plate 2. The central section of the survey area, looking south-east.

LHC 20/90

Lydden Hill Race Circuit, Wootton,
Kent, 2020
Geophysical Survey (Magnetic)
Plates 1 and 2.

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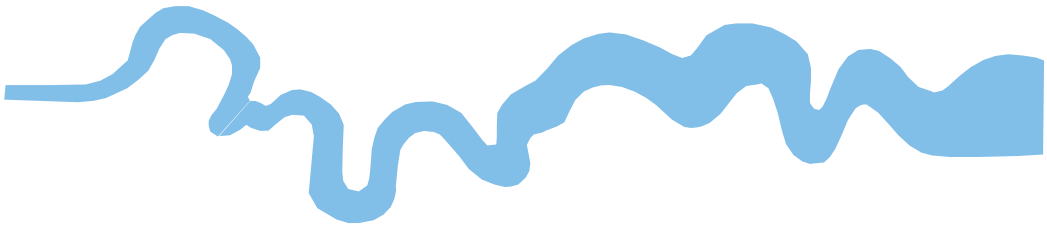
TIME CHART

	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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