THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Land at Lower Wasing Farm, Wasing, West Berkshire

Geophysical Survey (Magnetic)

by Luciano Cicu and Kyle Beaverstock

Site Code: LWF22/205

(SU 5798 6561)

Land at Lower Wasing Farm, Wasing, West Berkshire

Geophysical Survey (Magnetic) Report

For Tarmac Trading Limited

by Luciano Cicu and Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code LWF 22/205

February 2023

Summary

Site name: Land at Lower Wasing Farm, Wasing, West Berkshire

Grid reference: SU 5798 6561

Site activity: Magnetometer survey

Date and duration of project: 5 – 6 January 2023

Project coordinator: David Sanchez

Site supervisor: Luciano Cicu

Site code: LWF22/205

Area of site: 9.2ha

Summary of results: A number of anomalies likely to be of archaeological interest were detected, these mostly consist of field systems and an enclosure of possible Roman date.

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✓ 10.02.23
	David Sanchez ✓ 10.02.23

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Land at Lower Wasing Farm, Wasing, West Berkshire
A Geophysical Survey (Magnetic)

by Luciano Cicu and Kyle Beaverstock

Report 22/205b

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Wasing Lane, Reading, RG7 4LY (SU 5798 6561) (Fig. 1). The work was commissioned by Dan Walker of David L Walker Limited, Albion House, 89 Station Road, Eckington, Sheffield, S21 4FW on behalf of Tarmac Trading Limited.

Planning permission is to be sought from West Berkshire District Council for establishment of a mineral extraction processing plant site. A geophysical survey has been requested in order to inform the application. This is in accordance with the *National Planning Policy Framework* (NPPF 2021), and the District's policies on archaeology. The fieldwork was undertaken by Luciano Cicu and Lara Cook between the 5th and 6th January 2023 and the site code is LWF22/205.

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 1km west of Aldermaston, 1.4km north-east of Wasing and 800m south of the River Kennet (Fig. 1). The site at a height of 59m above Ordnance Datum (aOD) in the north and west and slopes down to 55m aOD in the south-east and the land is not currently being utilised. The underlying geology is stated as Beenham Grange Gravel in the south and west and Alluvium above London Clay along the north and east (BGS 2000).

Site history and archaeological background

The archaeological potential has been highlighted in a desk-based assessment (Procter and Elliot 2022). To summarise, The Kennet Valley area is rich in archaeological finds across the whole prehistoric and Roman periods with significant sites at Avebury, Thatcham (Wymer 1962; Healy et al. 1992; Ellis et al. 2003) , Wawcott (Froom 1976) and Avingdon (Barton and Froom 1986). An evaluation of three large areas surrounding the proposal site to the north, east and west was carried out as a part of the planning consent for the mineral extraction. A total of 277 trenches were excavated uncovering a range of archaeological material dating from the

later Neolithic, Bronze Age, Iron Age, Roman, Medieval and post-medieval periods. These include a range of features variously representing settlement and landscape features (Weale 2011).

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 north-west to south-east orientation across the survey area. In the south-west of the survey area is significant overgrowth that prevented the area from being surveyed, 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 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 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 -1.10 to 1.11 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

A number of anomalies of archaeological interest were detected by the geophysical survey. Across the noth and east of the site are a number of weak background variations **[1]**, these are represented by irregular positive anomalies with a relatively low response most likely caused by variations in the clay deposits in these areas which match the stated positions in the geological spread. It was also noted that the south-western area contained a significant amount of background 'noise' represented by numerous low level fluctuations in the readings that were likely due to the underlying gravel in this area. In the far south-west was a short length of magnetic disturbance **[3]**, this is represented by relatively high positive and negative responses and are likely caused by ferrous material in the surrounding fencing.

In the south-east was a length of magnetic disturbance **[2]** measuring orientated south-east to north-west 65m long with relatively high positive and negative responses and is likely caused by a buried service. Intersecting with this is a weak positive linear **[4]**, this is orientated south-west to north-east and running for 66m long. Running from the centre of weak positive linear towards the south-east for 42m is a positive linear **[5]**, this is likely related to weak positive linear **[4]** and their morphology suggests they may form agricultural land division.

In the north-east of the site is a positive linear **[6]** surrounded by negative responses, this is orientated south-east to north-west and measures 95m long, it corresponds to linears marked by the cropmarks and is likely related to land division. To the south of this are two positive linears **[7]**, one orientated south-west to north-east and measuring 54m long and a shorter positive linear to the east orientated west to east and measuring 12m. From the western end of these is an L-shaped positive linear **[8]**, it runs from the south-east towards the north-west for 150m before turning to the south-west and running for 105m.

In the west of the site are two linears **[9]** one running from the western boundary towards the north-east with the other from the north-eastern end of this to the north-west they measure 77m and 158m respectively. Along the north-eastern edge of positive linear **[9]** is a rectangular positive linear **[10]**, measuring 40m long and 39m wide, this likely represents an enclosure. This along with positive linears, 7, 8 and 9 form an agricultural

field system with potential for some occupational deposits within the enclosure. To the south-east of positive linear [9] are two potentially related weak positive linears **[11]** and **[12]**. Weak positive linear **[11]** runs from the western boundary towards the north-east and curving round to the north-west and ending at the edge of positive linear [9] suggesting a relationship. To the south of this is an L-shaped weak positive linear **[12]** this runs parallel to weak positive linear **[12]** for 35m before turning to the east and measuring a total of 54m long. These may represent field systems.

Conclusion

A number of anomalies with archaeological potential was encountered by the geophysical survey including a number of positive and weak positive linears which form a series of field systems and an enclosure. The morphology suggests that these may be from the Roman period however a number of finds from a number features in the adjacent fields suggests the presence of multiple periods of activity.

References

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Appendix 1. Survey and data information

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

Raw data
Filename: Wasing A RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 457920, 165795 m
Southeast corner: 458159.85, 165519.79 m
Surveyed by: on 30/12/1899
Assembled by: on 30/12/1899
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 240 m x 275 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 86743, Recorded: 86743

Stats
Max: 104.14
Min: -104.57
Std Dev: 2.17
Mean: 0.29
Median: 0.24
Composite Area: 6.6009 ha
Surveyed Area: 2.5727 ha

Filename: Wasing B RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 457793, 165810 m
Southeast corner: 458044.16, 165501.64 m
Surveyed by: on 30/12/1899
Assembled by: on 30/12/1899
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 251 m x 308 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 115543, Recorded: 115543

Stats
Max: 87.85
Min: -107.67
Std Dev: 2.00
Mean: -1.23
Median: -1.30
Composite Area: 7.7448 ha
Surveyed Area: 3.763 ha

Filename: Wasing C RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 457984, 165436 m
Southeast corner: 458039.25, 165380.1 m
Surveyed by: on 30/12/1899
Assembled by: on 30/12/1899
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 55.2 m x 55.9 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 4663, Recorded: 4663

Stats
Max: 106.66
Min: -109.72
Std Dev: 23.79
Mean: -5.03
Median: -2.66
Composite Area: 0.30885 ha
Surveyed Area: 0.17479 ha

Processed data
Filename: Wasing A.xcp
Stats
Max: 1.11
Min: -1.10
Std Dev: 0.38
Mean: -0.01
Median: 0.00
Composite Area: 6.4973 ha
Surveyed Area: 2.4795 ha

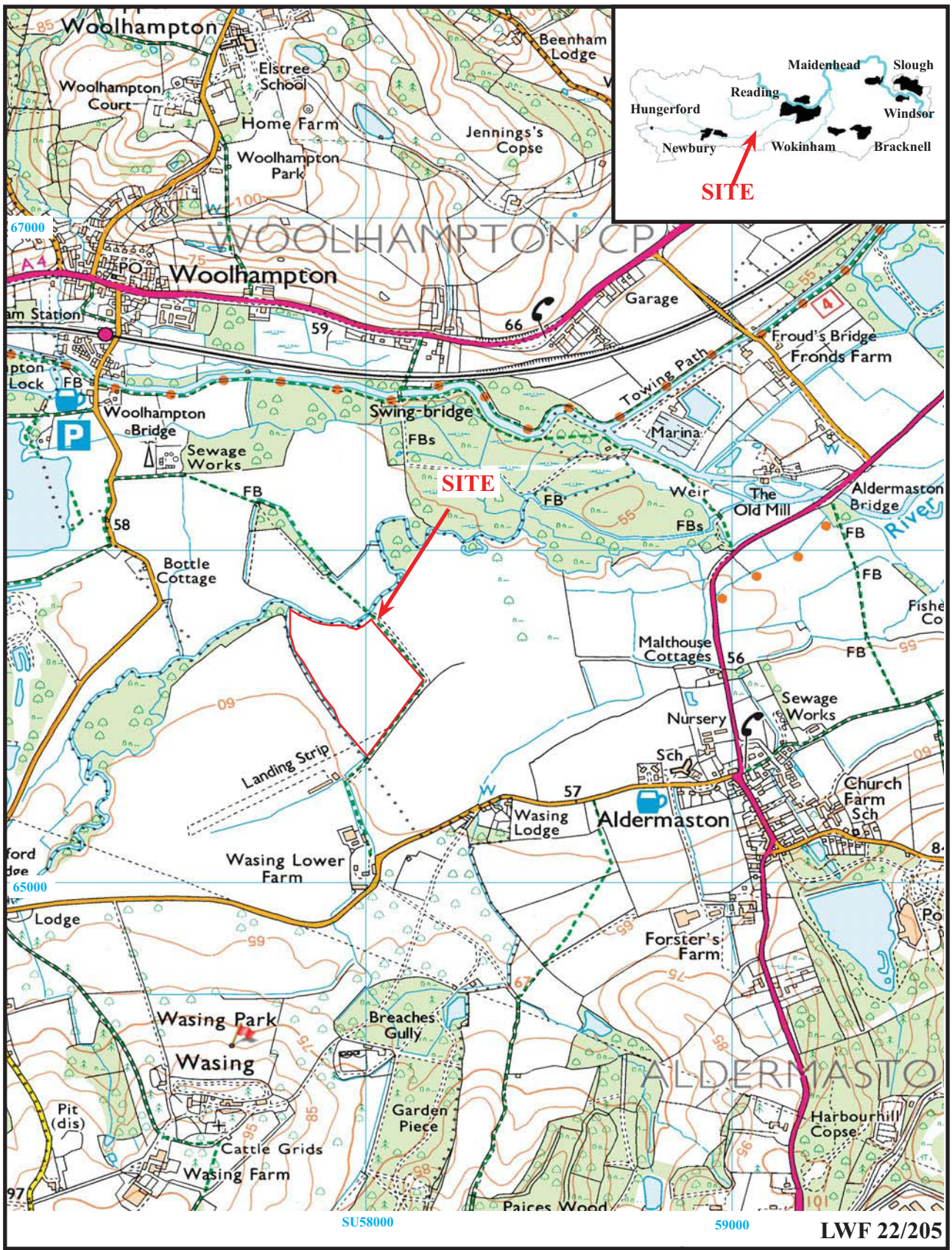
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -1.00 to 1.00

Filename: Wasing B.xcp
Stats
Max: 1.11
Min: -1.10
Std Dev: 0.43
Mean: 0.00
Median: 0.01
Composite Area: 7.6328 ha
Surveyed Area: 3.6671 ha

GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -1.00 to 1.00

Filename: Wasing C.xcp
Stats
Max: 1.11
Min: -1.10
Std Dev: 0.62
Mean: 0.03
Median: 0.02
Composite Area: 0.28616 ha
Surveyed Area: 0.15474 ha

GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -1.00 to 1.00



LWF 22/205

Land at Lower Wasing Farm,
Wasing, West Berkshire
Geophysical (magnetic) Survey

Figure 1. Location of site within Wasing and Berkshire.

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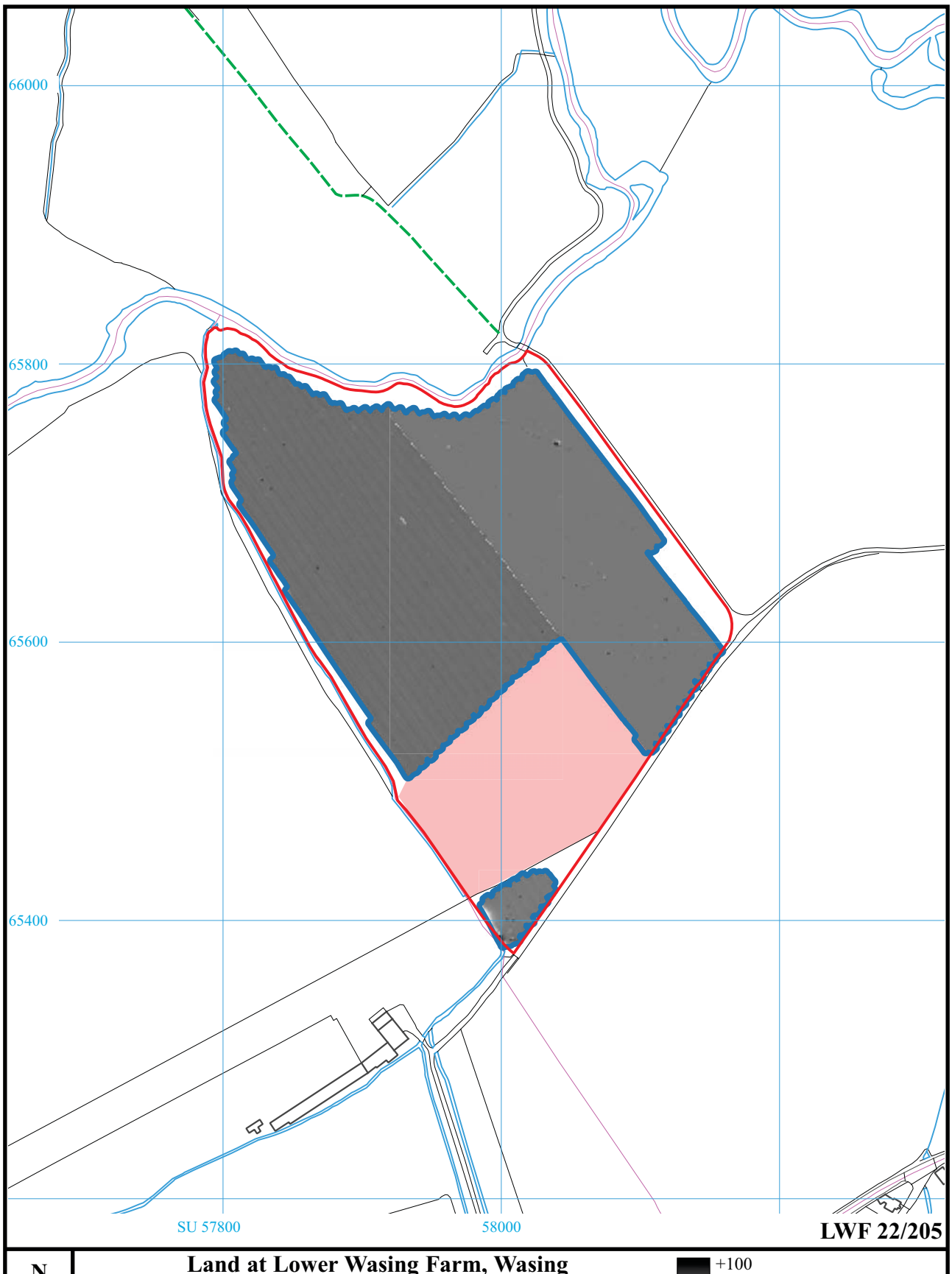
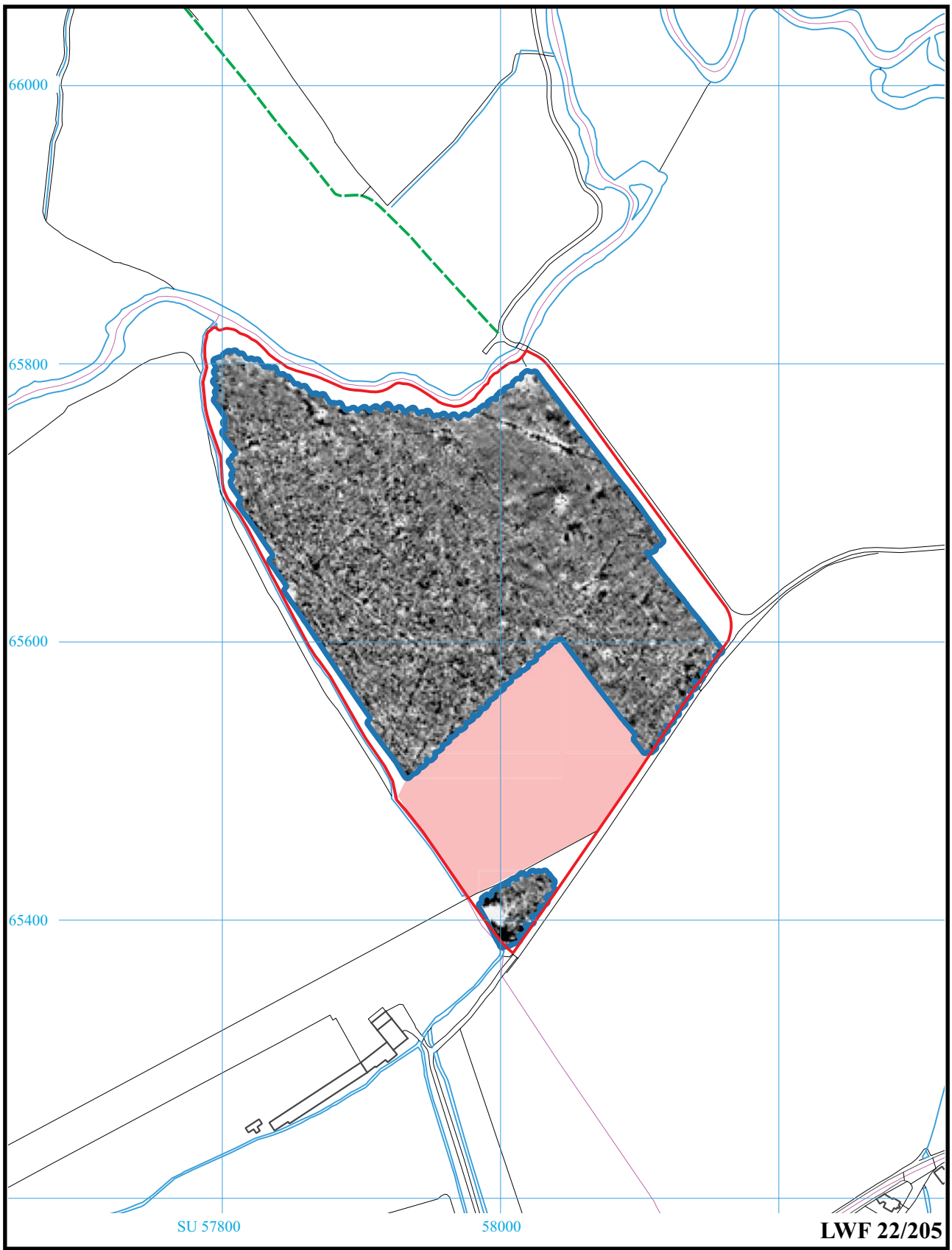
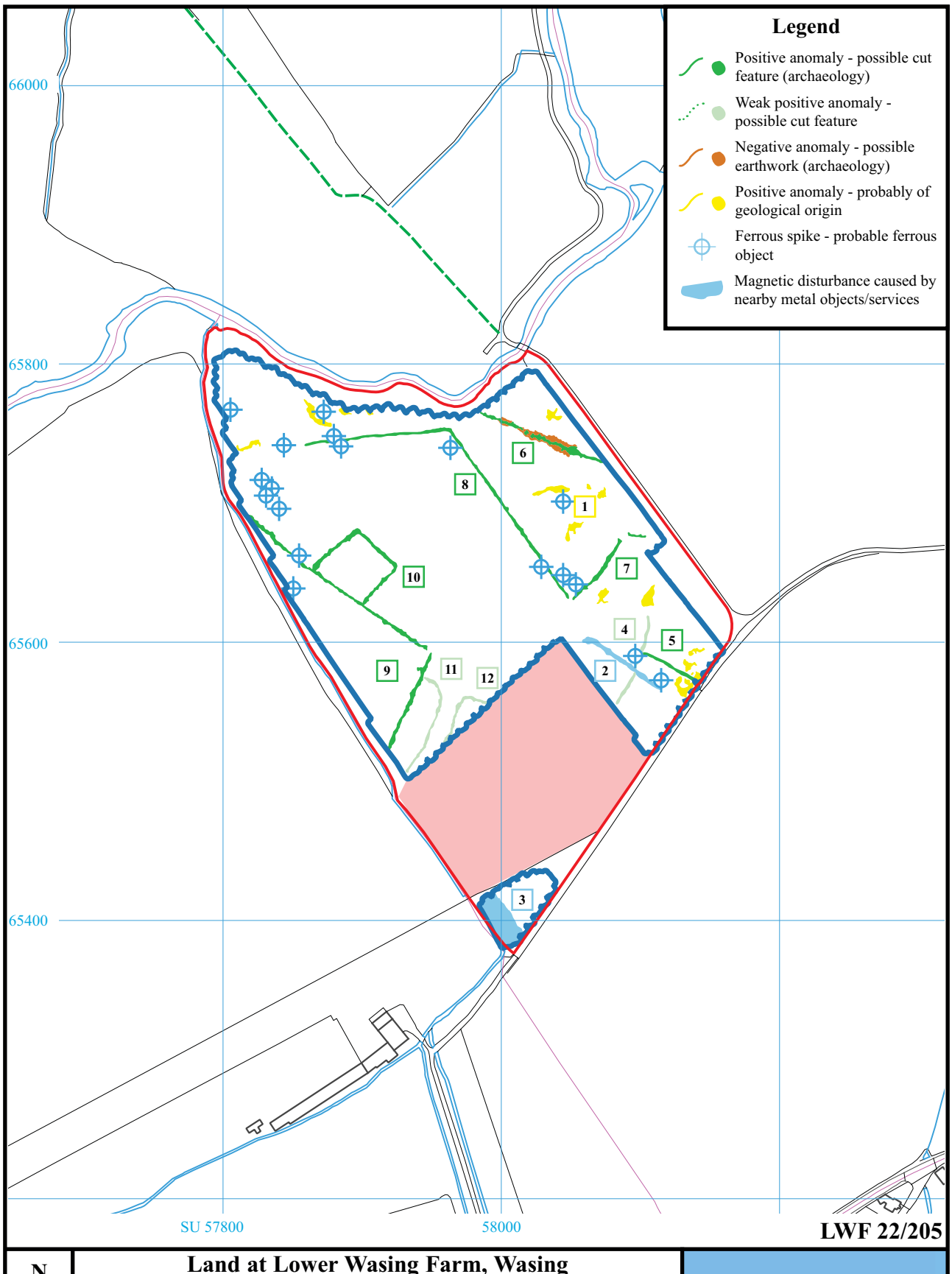


Land at Lower Wasing Farm, Wasing
West Berkshire, 2023
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.



Land at Lower Wasing Farm, Wasing
West Berkshire, 2023
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.



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Land at Lower Wasing Farm, Wasing
West Berkshire, 2023
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.

0m 200m

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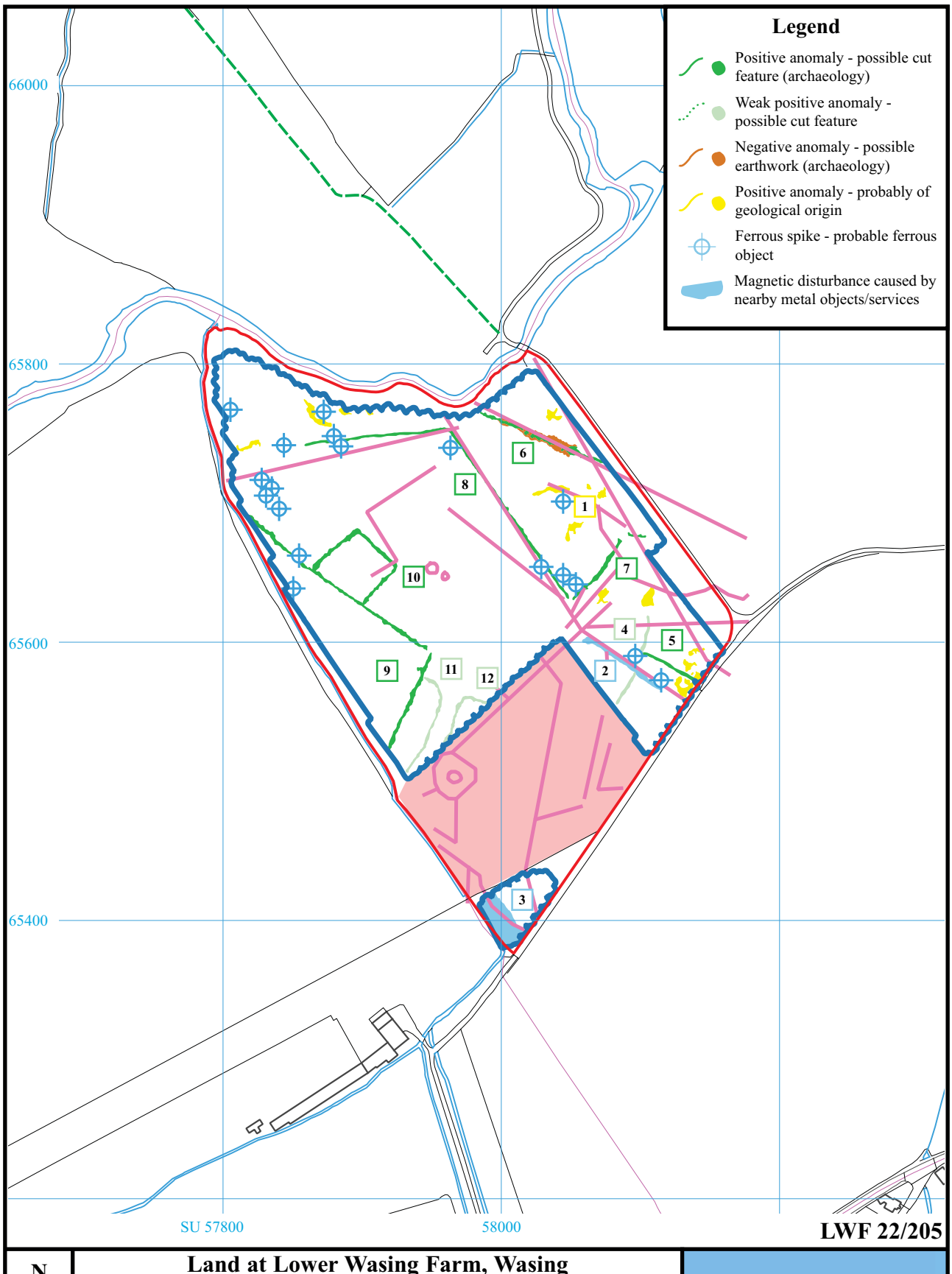

Land at Lower Wasing Farm, Wasing
West Berkshire, 2023
Geophysical Survey (Magnetic)
Figure 5. Interpretation plot with crop mark overlay.

N

0m 200m

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Plate 1. Northern part of survey area looking south

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

LWF 22/205

Land at Lower Wasing Farm, Wasing
West Berkshire, 2023
Geophysical Survey (Magnetic)
Plates 1 and 2.

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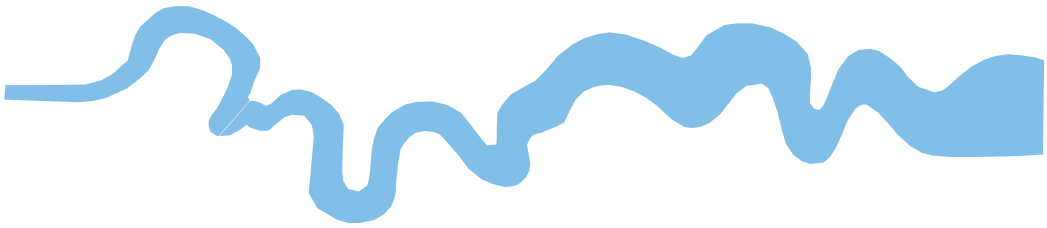
TIME CHART

	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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