GEOPHYSICAL SURVEY REPORT

Land south of Dicketts Road, Corsham

Client

Cotswold Archaeology Limited

Survey Report

13033

OASIS Ref. No.

sumogeop1-517626

Date

20 July 2023

Survey Report 13033: Land south of Dicketts Road, Corsham

Survey dates	7 July 2023
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Report Date	20 July 2023
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3 SURVEY TECHNIQUE

3.1 Detailed magnetic survey (magnetometry) was chosen as the most efficient and effective method of locating the type of archaeological anomalies which might be expected at this site. All survey techniques followed the guidance set out by CIFA (2014, updated 2020), Historic England (2008), and the European Archaeology Council (EAC) (2016).

Bartington Grad 601-2 Traverse Interval 1.0m Sample Interval 0.25m

The only processes performed on data are the following unless specifically stated otherwise:

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes instrument striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

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4 SUMMARY OF RESULTS

4.1 A magnetometer survey of 1.4 hectares of land south of Dicketts Road, Corsham, Wiltshire has not recorded any magnetic responses that could be interpreted as being of definite archaeological interest. A number of uncertain anomalies have been detected which are likely to have been caused by a combination of agricultural and natural processes. A probable pipe has also been marked in the survey.

5 INTRODUCTION

5.1 **SUMO Geophysics Ltd** were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by **Cotswold Archaeology Limited**.

5.2 Site Details

NGR / Postcode	ST 87457 69269 / SN13 9JR
Location	The site is located 6km north-west of Melksham, 5km south-west of Chippenham and is situated on the southern outskirts of Corsham. The survey area is bounded to the east by the B3353 and to the north by houses off Dicketts Road.
HER	Wiltshire HER
OASIS Ref. No.	sumogeop1-517626
District	N/A
Parish	Corsham Civil Parish
Topography	Flat
Land Use	Pasture
Geology (BGS 2023)	Bedrock: Forest Marble Formation – Mudstone and possibly Limestone in north of site Superficial: None recorded
Soils (CU 2023)	Soilscape 9: Lime-rich loamy and clayey soils with impeded drainage
Survey Methods	Magnetometer survey (fluxgate gradiometer)
Study Area	1.4 ha

5.3 ***Archaeological Background*** *(KYP 2023)*

5.3.1 A search of Know Your Place has revealed that no heritage assets are recorded within the survey area. A number of earthworks are located 100m south and 150m west of the site which have been interpreted as former field boundaries of probable post Medieval date, they were identified on LiDAR imagery (MWI74071 & MWI1722). Medieval ridge and furrow cultivation is recorded in the HER located 350m west of the site (MWI74068).

5.4 ***Aims and Objectives***

5.4.1 To locate and characterise any anomalies of possible archaeological interest within the study area.

6 RESULTS

6.1 *The survey has been divided into three survey areas (Areas 1-3).*

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6.2 *Probable / Possible Archaeology*

6.2.1 No magnetic responses have been recorded that could be interpreted as being of definite archaeological interest.

6.3 *Uncertain*

6.3.1 Numerous discrete anomalies, linear trends and a zone of increased response have been detected in the survey which have been assigned to the category of *Uncertain*. They generally lack the defined morphology of anomalies that would ordinarily be interpreted as being of archaeological interest. The majority are likely to have been caused by ploughing, though they appear too narrow and regular to be ridge and furrow ploughing; they might be due rippling in the mudstone or weathering of the limestone. Isolated linears might be land drains on the poorly drained soils.

6.4 *Service*

6.4.1 A line of positive anomalies has been detected in Area 3 which probably marks the route of an underground pipe, though the response might just indicate former fence posts.

6.5 *Ferrous / Magnetic Disturbance*

6.5.1 Ferrous responses close to boundaries are due to adjacent fences, gates and road to the east. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

7 DATA APPRAISAL & CONFIDENCE ASSESSMENT

7.1 Historic England guidelines (EH 2008) Table 4 states that the typical magnetic response on the local soils / geology is variable. The results from this survey indicate the presence of discrete anomalies and trends; as a consequence, there is no *a priori* reason why archaeological features would not have been detected.

8 CONCLUSION

8.1 The magnetometer survey has not recorded any magnetic responses that could be interpreted as being of definite archaeological interest. A number of discrete anomalies, trends and a zone of increased response have been detected in the survey and assigned to the category of uncertain. They are likely to have been caused by a combination of agricultural and natural processes. A probable underground service has also been marked in the survey.

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9 REFERENCES

BGS 2023 British Geological Survey, Geology of Britain viewer [accessed 18/07/2023] *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps)

CIfA 2014 Amended 2020 *Standard and Guidance for Archaeological Geophysical Survey.* Amended 2020. CIfA Guidance note. Chartered Institute for Archaeologists, Reading https://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_3.pdf

CU 2023 The Soils Guide. Available: www.landis.org.uk. Cranfield University, UK. [accessed 18/07/2023] *website: http://mapapps2.bgs.ac.uk/ukso/home.html*

EAC 2016 *EAC Guidelines for the Use of Geophysics in Archaeology,* European Archaeological Council, Guidelines 2.

EH 2008 *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Swindon (now withdrawn, but used for evaluating suitability of soil types)

KYP 2023 *Know Your Place [accessed 18/07/2023] website: https://www.kypwest.org.uk/*

10 ARCHIVE

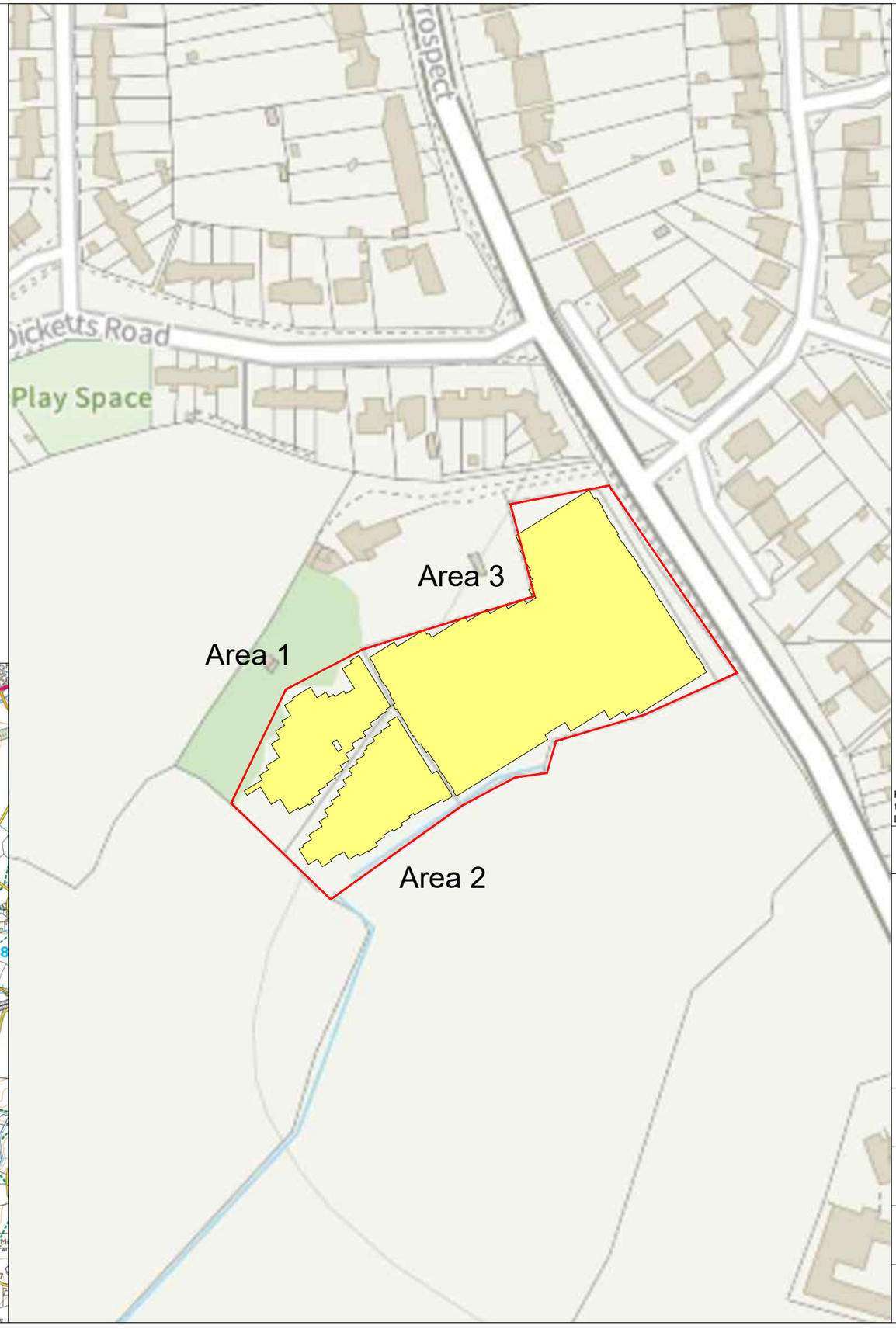
10.1 The minimally processed data, data images, XY traces and a copy of this report are stored in **SUMO Geophysics Ltd.'s** digital archive, on an internal RAID configured NAS drive in the Midlands Office. These data are also backed up to the Cloud for off-site storage**.**

10.2 The Grey Literature will be archived with OASIS and the relevant HER within a period of 12 months.

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Survey Areas

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Site Location

Client:
Cotswold Archaeology Limited

Project:
13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale:
NOT TO SCALE

Fig No:
01



N

+2nT

-1nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Greyscale Plots

Client:
Cotswold Archaeology Limited

Project:
13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale:
0 metres 40
1:800 @ A3

Fig No:
02

Area 1

Area 3

Area 2

N

+100nT

-100nT

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:

Magnetometer Survey - Colour Plots

Client:

Cotswold Archaeology Limited

Project:

13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale:

0 metres 40

1:800 @ A3

Fig No:

03



N

KEY

	Uncertain Origin (discrete anomaly / trend / increased response)
	Magnetic disturbance
	Service
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Interpretation

Client:
Cotswold Archaeology Limited

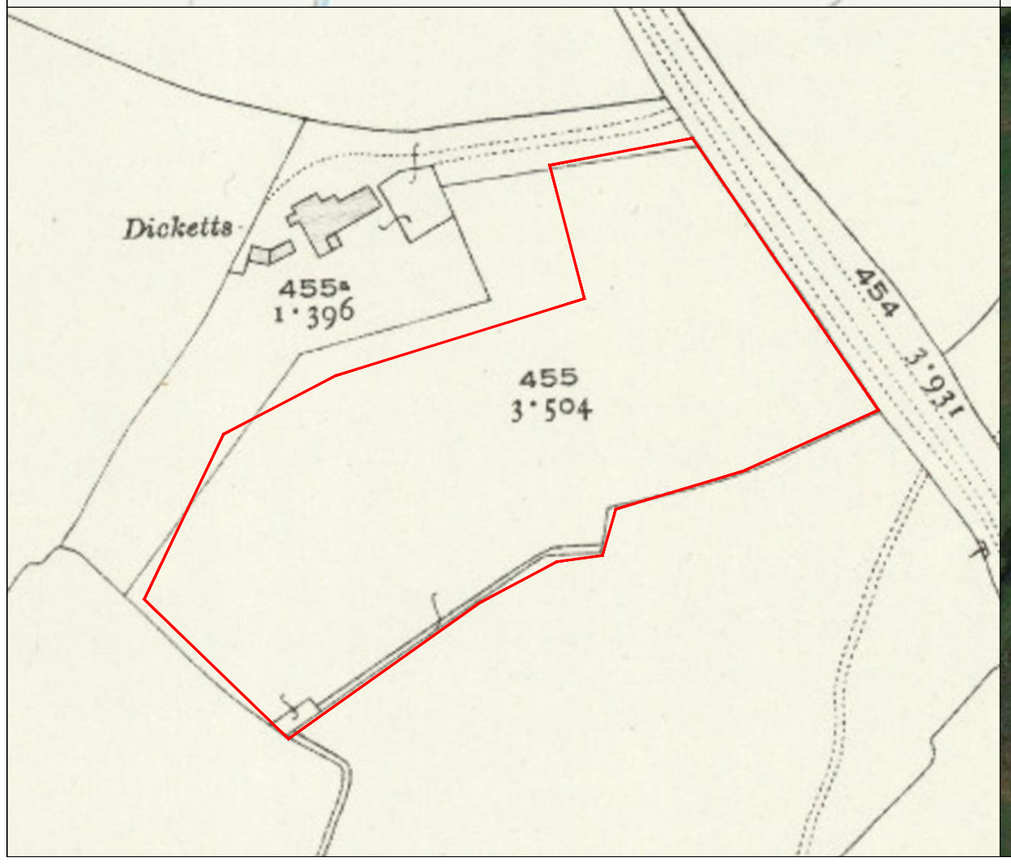
Project:
13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale:
0 metres 40
1:800 @ A3

Fig No:
04









N

+2nT

-1nT

KEY

	Uncertain Origin (discrete anomaly / trend / increased response)
	Magnetic disturbance
	Service
	Ferrous

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

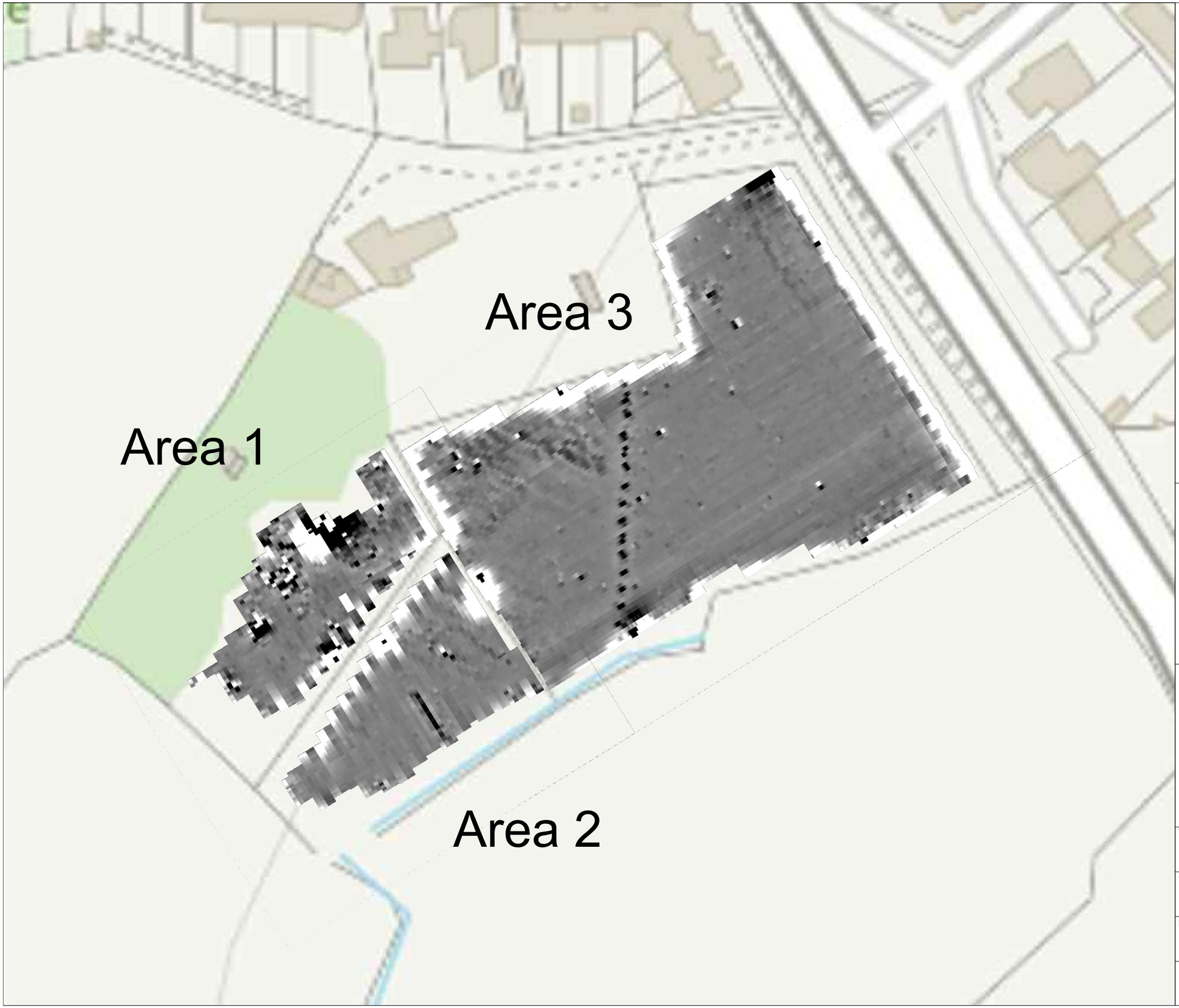
Title: Greyscale Plots / Interpretation / 1898-1939 Ordnance Survey Map (KYP 2023) / 2021 Aerial Image

Client: Cotswold Archaeology Limited

Project: 13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale: NOT TO SCALE

Fig No: 05



N

+10nT

-10nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Minimally Processed Data - Greyscale Plots

Client:
Cotswold Archaeology Limited

Project:
13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale:
0 metres 40
1:800 @ A3

Fig No:
06



N

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
XY Trace Plots (clipped at +/-15nT)

Client:
Cotswold Archaeology Limited

Project:
13033 - Land south of Dicketts Road, Corsham, Wiltshire

Scale:
0 metres 40
1:800 @ A3

Fig No:
07

Appendix A - Technical Information: Magnetometer Survey Method, Processing and Presentation

Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

Instrumentation: Bartington *Grad* 601-2

Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

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Presentation of results and interpretation

The presentation of the results includes a ‘minimally processed data’ and a ‘processed data’ greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the ‘Interpretation’ drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as: Abbey Wall or Roman Road. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: Probable, or Possible Archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification Possible.

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Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology	This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.
Service	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* / *Natural* or (in the case of linear responses) *Possible Archaeology* / *Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

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Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns; material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried feature. The difference between the two sensors will relate to the strength of a magnetic field created by this feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

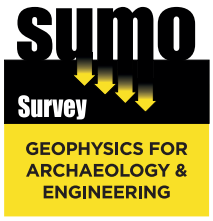
Factors affecting the magnetic survey may include soil type, local geology, previous human activity and disturbance from modern services.

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OASIS Summary for sumogeop1-517626

OASIS ID (UID)	sumogeop1-517626
Project Name	Geophysical Survey, Magnetometry Survey at Land south of Dicketts Road, Corsham
Sitename	Land south of Dicketts Road, Corsham
Sitecode	13033
Project Identifier(s)	13033
Activity type	Geophysical Survey, Magnetometry Survey, MAGNETOMETRY SURVEY
Planning Id	
Reason For Investigation	Planning requirement
Organisation Responsible for work	SUMO Geophysics Ltd.
Project Dates	07-Jun-2023 - 07-Jun-2023
Location	Land south of Dicketts Road, Corsham NGR : ST 87471 69272 LL : 51.42232095119246, -2.181582895738172 12 Fig : 387471,169272
Administrative Areas	Country : England County : Wiltshire District : Wiltshire Parish : Corsham
Project Methodology	A temporary grid system was established over the site and marked out using canes. The location of the grid was set out using an RTK GPS system theoretically accurate to some 0.01m and referenced to OS co-ordinates. Hand Held: Data was collected using a Bartington Grad 601-2. The instrument consists of two paired sensors and readings are logged at 0.25m centres along traverses 1.0m apart across 30m grids. The collection of data at 0.25m centres provides an appropriate methodology balancing cost and time with resolution as per Historic England guidelines. Two sensors mounted 1m horizontally apart and very accurately aligned to nullify the effects of the earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background.
Project Results	The magnetometer survey has not recorded any magnetic responses that could be interpreted as being of definite archaeological interest. A number of discrete anomalies, trends and a zone of increased response have been detected in the survey and assigned to the category of uncertain. They are likely to have been caused by a combination of agricultural and natural processes. A probable underground service has also been marked in the survey.
Keywords	Pipeline - 20TH CENTURY - FISH Thesaurus of Monument Types
Funder	Private or public corporation Cotswold Archaeology Limited
HER	Wiltshire and Swindon HER - unRev - STANDARD
Person Responsible for work	Simon Haddrell
HER Identifiers	
Archives	

Report generated on: 18 Jul 2023, 13:48



- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

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