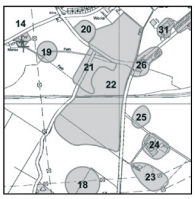
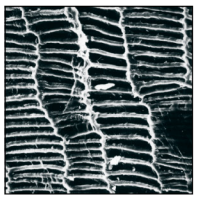
CLIR19










IPSLEY CHURCH LANE, IPSLEY, REDDITCH, WORCESTERSHIRE

GEOPHYSICAL SURVEY

commissioned by CDSL Ltd

July 2019

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

IPSLEY CHURCH LANE, IPSLEY, REDDITCH, WORCESTERSHIRE

GEOPHYSICAL SURVEY

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July 2019

This report adheres to the quality standard of ISO 9001:2015

PROJECT INFO:

HA Project Code **CLIR19** / NGR **SP 0648 6632** / Parish **Redditch** / Local Authority **Worcestershire** / OASIS Ref. **headland5-357494**

PROJECT TEAM:

Project Manager **David Harrison** / Author **Krasimir Dyulgerski** / Fieldwork **Krasimir Dyulgerski, Richard MacGregor-Edwards** / Graphics **Eleanor Winter, Krasimir Dyulgerski**

Approved by **David Harrison** D Harrison.....

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HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

PROJECT SUMMARY

Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 5 hectare site at Ipsley Church Lane, Ipsley, Worcestershire, where a new cemetery is proposed. No anomalies of any archaeological potential have been identified by the survey. A single north/south linear anomaly locates a former field boundary which is shown on historical Ordnance Survey mapping. On the basis of the survey, the archaeological potential of the site is assessed as very low.

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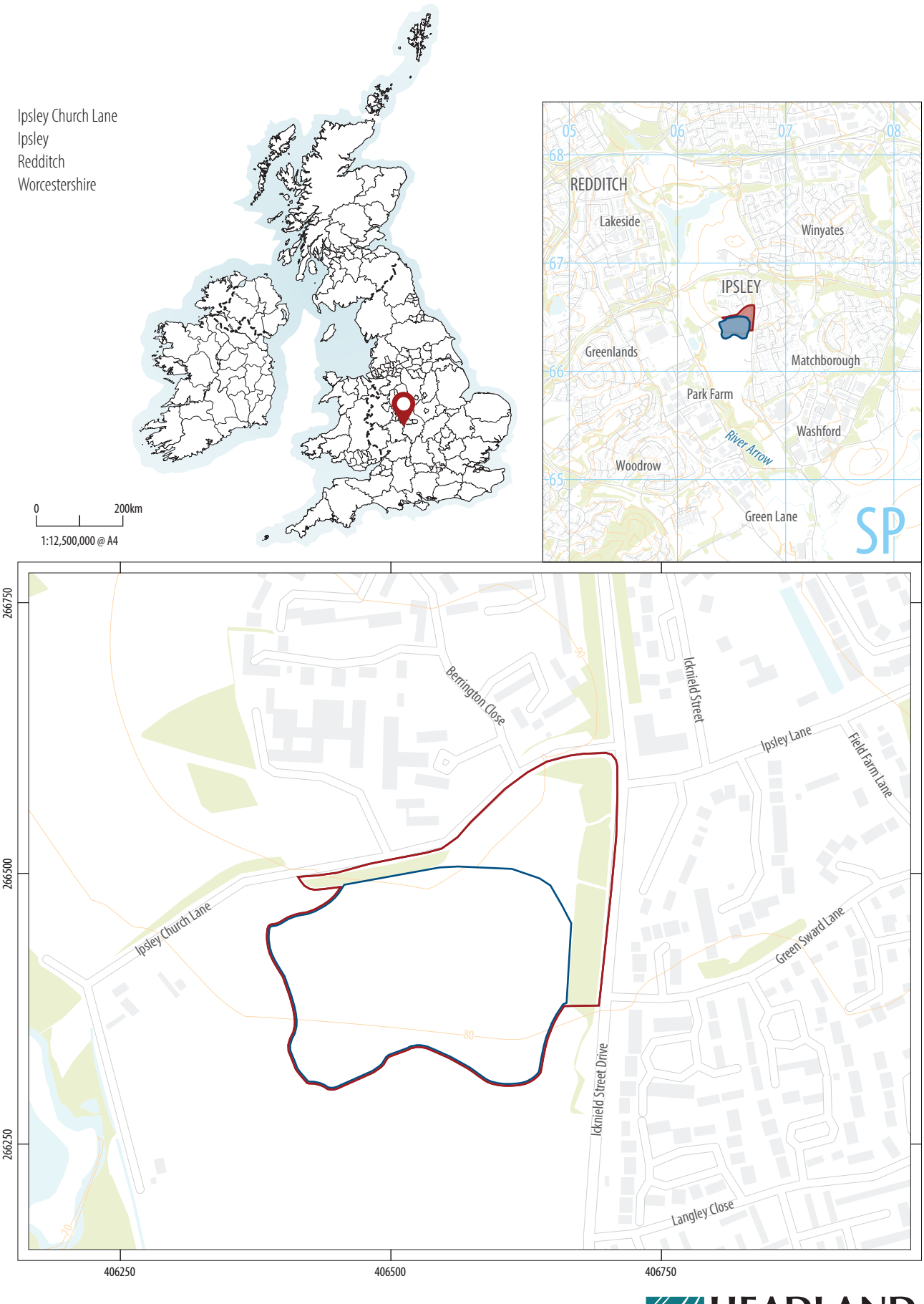

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ILLUS 1 Site location

IPSLEY CHURCH LANE, IPSLEY, REDDITCH, WORCESTERSHIRE

GEOPHYSICAL SURVEY

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by CDSL Ltd (the Client), to undertake a geophysical (magnetometer) survey of land south of Ipsley Church Lane, Ipsley, Redditch, where a new cemetery is proposed. The results of the survey will inform future archaeological strategy at the site.

The work was undertaken in accordance with a Written Scheme of Investigation (Vansassenbrouck 2019), with guidance within the National Planning Policy Framework (MHCLG 2018) and in line with current best practice (Chartered Institute for Archaeologists 2016, Europae Archaeologia Consilium 2016).

The survey was carried out on 21 May 2019.

1.1 SITE LOCATION, TOPOGRAPHY AND LAND-USE

The application boundary is south of Ipsley Church Lane and west of Ickneild Street Drive, centred on SP 0648 6632 (see Illus 1). It comprises an irregularly-shaped block of parkland which is mostly under short grass, with wooded areas in the north and north-east. The Geophysical Survey Area (GSA) comprises only grassland (Illus 4).

The GSA is located on a south-facing gradient being at 90m Above Ordinance Datum (AOD) in the north and 70m AOD in the south.

1.2 GEOLOGY AND SOILS

The bedrock geology comprises Mercia Mudstone, with a band of siltstone running through the south-west of the GSA. No superficial deposits are recorded (NERC 2019).

The soils are classified in the Soilscape 18 Association, characterised as slowly permeable, seasonally wet loams and clays (Cranfield University 2019).

2 ARCHAEOLOGICAL BACKGROUND

No detailed archaeological background is available at the time of writing.

Analysis of historical Ordnance Survey (OS) maps indicates that a single field north/south boundary has been removed from within the GSA since the publication of the first edition OS map in 1886.

3 AIMS, METHODOLOGY AND PRESENTATION

The general aim of the geophysical survey was to provide sufficient information to establish the presence/absence, character and extent of any archaeological remains within the GSA. This will therefore enable an assessment to be made of the impact of the proposed development on any sub-surface archaeological remains, if present.

The specific archaeological objectives of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore model the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

ILLUS 2 GSA, looking south

3.1 MAGNETOMETER SURVEY

Magnetic survey methods rely on the ability of a variety of instruments to measure very small magnetic fields associated with buried archaeological remains. A feature such as a ditch, pit or kiln can act like a small magnet, or series of magnets, that produce distortions (anomalies) in the earth's magnetic field. In mapping these slight variations, detailed plans of sites can be obtained as buried features often produce reasonably characteristic anomaly shapes and strengths (Gaffney & Gater 2003). Further information on soil magnetism and the interpretation of magnetic anomalies is provided in Appendix 1.

The survey was undertaken using four Bartington Grad601 sensors mounted at 1m intervals (1m traverse interval) onto a rigid carrying frame. The system was programmed to take readings at a frequency of 10Hz (allowing for a 10–15cm sample interval) on roaming traverses (swaths) 4m apart (Illus 3). These readings were stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system was linked to a Trimble R8s Real Time Kinetic (RTK) differential Global Positioning System (dGPS) outputting in NMEA mode to ensure a high positional accuracy for each data point.

MLGrad601 and MultiGrad601 (Geomar Software Inc.) software was used to collect and export the data. Terrasurveyor V3.0.32.4 (DWConsulting) software was used to process and present the data.

3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:10,000. Illus 2–3 inclusive are site condition photos. Illus 4 is a 1:2,000 survey location plan showing the direction of survey as GPS swaths. Large scale minimally processed (XY trace plot) data, fully processed (greyscale) data and an accompanying interpretative plot are presented at a scale of 1:2,00 in Illus 5–7 inclusive.

Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the site archive. Data processing details are presented in Appendix 4. A copy of the OASIS entry (Online Access to the Index of Archaeological Investigations) is reproduced in Appendix 5.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Vansassenbrouck 2019), guidelines outlined by Europae Archaeologia Consilium (EAC 2016) and by the Chartered Institute for Archaeologists (CIfA 2016). All illustrations from Ordnance Survey mapping are reproduced with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The illustrations in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All illustrations are presented to most suitably display and interpret the data from this site based on the experience and knowledge of management and reporting staff.

ILLUS 3 GSA, looking east

4 RESULTS AND DISCUSSION

Ground conditions were very good across the GSA (Illus 2) and have contributed to a high standard of data throughout.

The survey has detected a homogenous magnetic background throughout manifesting as a monotone greyscale plot. Against this background, numerous anomalies have been identified and these are discussed below and cross-referenced to specific examples on the interpretive figures, where appropriate.

4.1 FERROUS ANOMALIES

Ferrous anomalies, characterised as individual 'spikes', are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris is common on most sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious clustering to these ferrous anomalies which might indicate an archaeological origin. Far more probable is that the 'spike' responses are likely caused by the random distribution of ferrous debris in the upper soil horizons.

Magnetic disturbance along the northern and eastern edges of the GSA is caused by ferrous material within the adjacent footpaths and is of no archaeological interest.

4.2 AGRICULTURAL ANOMALIES

The clear north/south linear anomaly within the centre of the dataset corresponds to a former field boundary which is shown on the first edition OS map in 1886. The anomaly is caused by the magnetic contrast between the soil-fill of a ditch and the surrounding soils.

4.3 GEOLOGICAL ANOMALIES

Numerous discrete low-magnitude anomalies have been identified throughout the GSA. The anomalies are caused by localised variation in the depth and composition of the topsoil.

The faint curving trend aligned north-west/south-east in the north of the GSA corresponds with the contours of the site and is interpreted as being topographical in origin (Illus 5–7).

5 CONCLUSION

The survey has successfully evaluated the GSA and has not identified any anomalies of archaeological potential. A single north/south linear anomaly locates a former field boundary which is shown on historical Ordnance Survey mapping. On the basis of the survey, the archaeological potential of the site is assessed as very low.

6 REFERENCES

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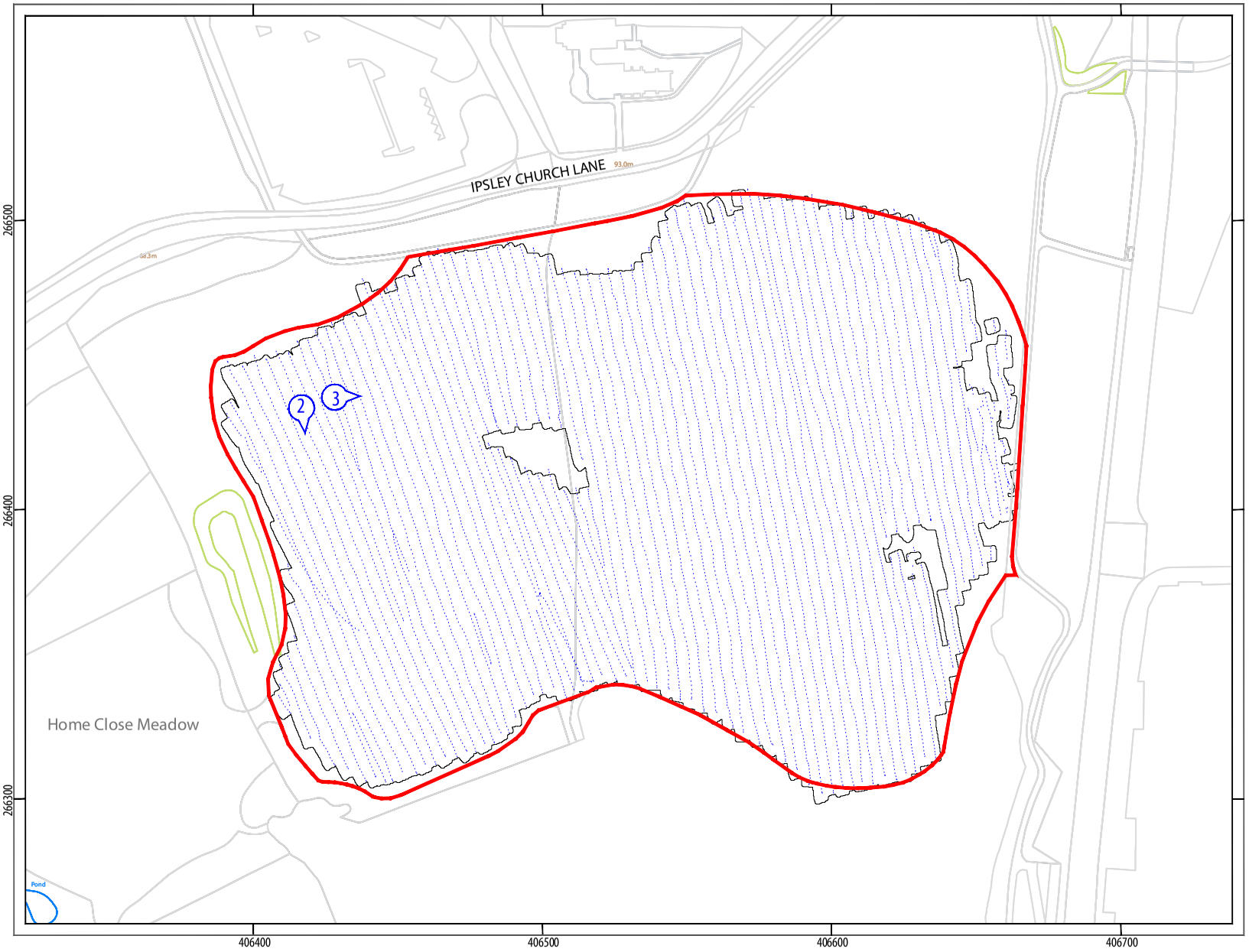

Geophysical survey area
GPS swaths
Location and direction of Illus 2 and Illus 3

0 40m
1:2,000 @ A4

PROJECT CLIR19
Ipsley Church Lane
Ipsley
Redditch
Worcestershire

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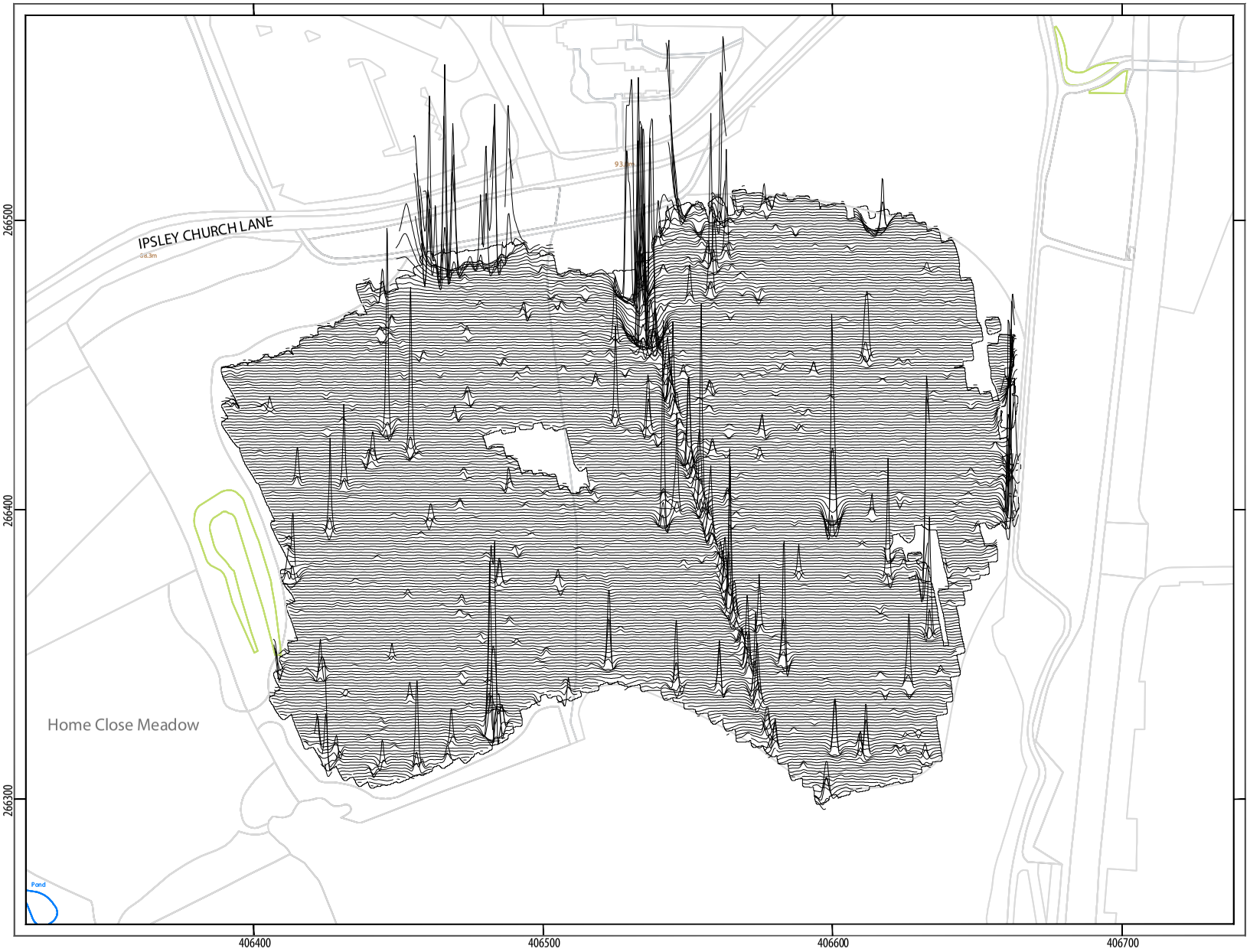
ILLUS 4 Survey location showing geophysical survey area and GPS swaths

ILLUS 5 Processed greyscale magnetometer data



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Ipsley Church Lane
Ipsley
Redditch
Worcestershire

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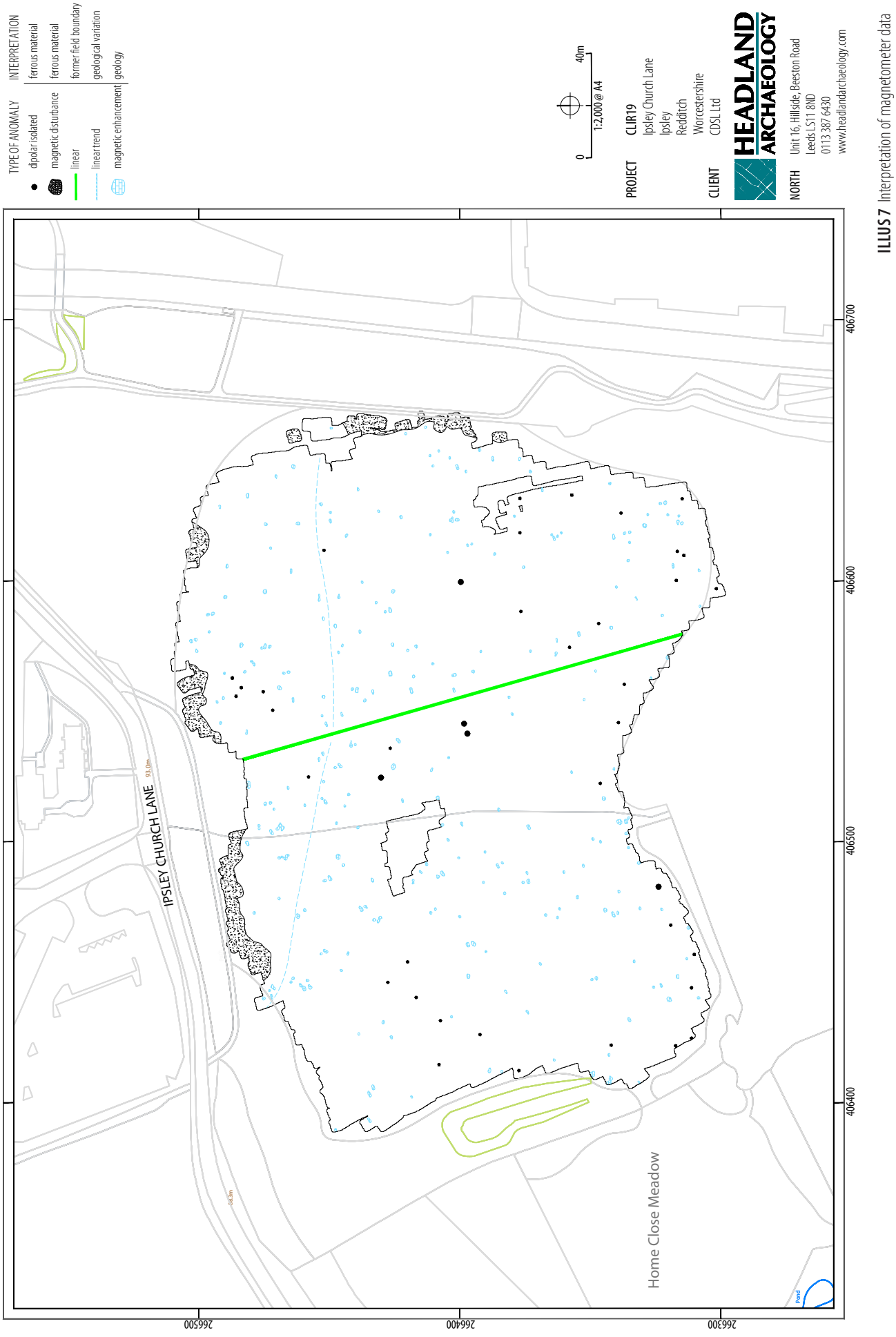
ILLUS 6 XY trace plot of minimally processed magnetometer data



ILLUS 7 Interpretation of magnetometer data

7 APPENDICES

APPENDIX 1 MAGNETOMETER SURVEY

Magnetic susceptibility and soil magnetism

Iron makes up about 6% of the earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms so that by measuring the magnetic susceptibility of the topsoil, areas where human occupation or settlement has occurred can be identified by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected.

The magnetic susceptibility of a soil can also be enhanced by the application of heat. This effect can lead to the detection of features such as hearths, kilns or areas of burning.

Types of magnetic anomaly

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes) These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

Linear trend This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

Areas of magnetic enhancement/positive isolated anomalies Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an XY trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

APPENDIX 2 SURVEY LOCATION INFORMATION

An initial survey base station was established using a Trimble VRS differential Global Positioning System (dGPS). The magnetometer data was georeferenced using a Trimble RTK differential Global Positioning System (Trimble R8s model).

Temporary sight markers were laid out using a Trimble VRS differential Global Positioning System (Trimble R8s model) to guide the operator and ensure full coverage. The accuracy of this dGPS equipment is better than 0.01m.

The survey data were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if coordinates are measured off hard copies of the mapping rather than using the digital coordinates.

Headland Archaeology cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

APPENDIX 3 GEOPHYSICAL SURVEY ARCHIVE

The geophysical archive comprises an archive disk containing the raw data in XYZ format, a raster image of each greyscale plot with associate world file, and a PDF of the report.

The project will be archived in-house in accordance with recent good practice guidelines (http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_3). The data will be stored in an indexed archive and migrated to new formats when necessary.

APPENDIX 4 DATA PROCESSING

The gradiometer data has been presented in this report in processed greyscale and minimally processed XY trace plot format.

Data collected using RTK GPS-based methods cannot be produced without minimal processing of the data. The minimally processed data has been interpolated to project the data onto a regular grid and de-striped to correct for slight variations in instrument calibration drift and any other artificial data.

A high pass filter has been applied to the greyscale plots to remove low frequency anomalies (relating to survey tracks and modern agricultural features) in order to maximise the clarity and interpretability of the archaeological anomalies.

The data has also been clipped to remove extreme values and to improve data contrast.

APPENDIX 5 OASIS DATA COLLECTION FORM: ENGLAND

OASIS ID: headland5-357494

Project details	
Project name	Ipsley Church Lane, Ipsley, Redditch, Worcestershire
Short description of the project	Headland Archaeology (UK) Ltd undertook a geophysical (magnetometer) survey of a 5 hectare site at Ipsley Church Lane, Ipsley, Worcestershire, where a new cemetery is proposed. No anomalies of any archaeological potential have been identified by the survey. A single north/south linear anomaly locates a former field boundary which is shown on historical Ordnance Survey mapping. On the basis of the survey, the archaeological potential of the site is assessed as very low.
Project dates	Start: 21-05-2019 End: 21-05-2019
Previous/future work	No / Not known
Any associated project reference codes	CLIR19 – Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Grassland Heathland 5 – Character undetermined
Monument type	N/A None
Monument type	N/A None
Significant Finds	N/A None
Significant Finds	N/A None
Methods & techniques	"Geophysical Survey"
Development type	Cemetery
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology	TRIASSIC MUDSTONES
Drift geology (other)	None
Techniques	Magnetometry
Project location	
Country	England
Site location	WORCESTERSHIRE REDDITCH REDDITCH Ipsley Church Lane, Ipsley, Redditch, Worcestershire
Study area	5 Hectares
Site coordinates	SP 0648 6632 52.294580178855 -1.904974815664 52 17 40 N 001 54 17 W Point
Project creators	
Name of Organisation	Headland Archaeology
Project brief originator	CDSL Ltd
Project design originator	Headland Archaeology
Project director/manager	Harrison, D
Project supervisor	Dyulgerski, K.
Type of sponsor/funding body	Developer
Project archives	
Physical Archive Exists?	No
Digital Archive recipient	In house
Digital Contents	"other"

Digital Media available	"Geophysics";"Survey"
Paper Archive Exists?	No
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	Ipsley Church Lane, Ipsley, Redditch, Worcestershire; Geophysical Survey
Author(s)/Editor(s)	Dyulgerski, K.
Date	2019
Issuer or publisher	Headland Archaeology
Place of issue or publication	Leeds
Description	PDF[A]
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Entered on	1 July 2019

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