Archaeological Services
University of Durham

Land east of Swindon, Wiltshire

geophysical surveys - phases 2 and 3

on behalf of
CgMs Consulting

Report 1746
March 2008

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1. Summary

The project

1.1 This report presents the results of further geomagnetic surveys conducted in advance of proposed development of land east of Swindon. The first phase comprised surveys of 16 areas (Archaeological Services 2005). The current Phase 2 and Phase 3 works comprised a further 18 geomagnetic surveys totalling approximately 37ha.

1.2 The works were commissioned by CgMs Consulting and conducted by Archaeological Services in accordance with instructions provided by CgMs and a WSI provided by Archaeological Services and approved by the Wiltshire County Archaeologist.

Results

1.3 Soil-filled features including ditches, enclosures, pits and gullies have been identified across the survey areas; these can be roughly divided into five foci.

1.4 A large multi-phased area of occupation possibly of late prehistoric/Romano-British date has been identified around South Marston Farm (survey areas Phase 1: B1; Phase 2: 2A, 2B, 4; Phase 3: 1, 2A, 2B). This settlement extends beyond the surveyed areas.

1.5 Trackways and enclosures have also been identified in Phase 3: Area 3A to the east of South Marston Farm. These may be related to the much larger area of occupation to the west.

1.6 An area of probable occupation identified during the Phase 1 surveys (Area E1) south of Marston Farm has been found to extend beyond the original survey. Possible stone walls and ditch features have been identified across the survey extension Phase 3: Area 4.

1.7 A probable prehistoric enclosure has been identified in Phase 3: Area 5.

1.8 Three possible prehistoric roundhouses have been identified in Phase 2: Areas 6A and 6B.

1.9 Traces of probable medieval ridge and furrow cultivation have been identified in Phase 2: Areas1A, 2B, 7B; Phase 3: 1, 2A, 2B, 3A, 5.

2. Project background

Location (Figure 1)

2.1 The study area is located on land to the east of Swindon, Wiltshire (NGR centre: SU 1980 8600). A table in Section 4 details the size, topography and land use of each area surveyed during the Phase 2 and 3 surveys.

Development proposal

2.2 The survey has been carried out in order to provide information for the Swindon Strategic Plan

Objective

2.3 The principal aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within specified areas, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in advance of development.

Methods statement

2.4 The surveys have been undertaken in accordance with instructions provided by CgMs and a Written Scheme of Investigation provided by Archaeological Services and approved by the Wiltshire County Archaeologist.

Dates

2.5 The current fieldwork was undertaken in two phases: Phase 2 between 24th September and 5th October 2007 and Phase 3 between 18th and 22nd February 2008. This report was prepared between 25th February and 14th March 2008.

Personnel

2.6 Fieldwork was conducted by Graeme Attwood (Supervisor), Jamie Armstrong, Edward Davies, Lorne Elliott, Andy Platell, Natalie Swann and Richie Villis. This report was prepared by Graeme Attwood, with illustrations by David Graham, and edited by Duncan Hale, the Project Manager.

Archive/OASIS

2.7 The site code is **ESD08**, for **E**ast **S**windon **D**evelopment 20**08**. The survey archive will be supplied on CD to CgMs Consulting for deposition with the project archive in due course. Archaeological Services is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-39240**.

Acknowledgements

2.8 Archaeological Services is grateful for the assistance of the landowners, tenants and Andy Birch of Hallam Land in facilitating this scheme of works.

3. Archaeological and historical background

3.1 A desk-based assessment detailing the archaeological and historical background of the proposed development area has been prepared by CgMs Consulting (Chadwick & Pugh 2004).

3.2 There are a number of Roman sites that fall within the proposed development area; these are mostly concentrated along two Roman roads and around the Roman town of *Durocornovium*. The majority of these sites are to the south of the Phase 2 and 3 survey areas.

3.3 The SMR indicates that many of the villages within the proposed development area have probable origins in the early medieval and medieval periods. South Marston, which is situated to the immediate north of many of the survey areas, is one such village.

3.4 Spot-finds and undated earthwork features have previously been recorded across the study area.

4. Landuse, topography and geology

4.1 Summary information for each survey area is provided in the following table:

Phase	Area	Size (ha)	Landuse	Topography	NGR
2	1A	2.86	Rough Pasture	Level	SU 204 880
2	1B	1.43	Arable	Level	SU 206 879
2	2A	0.56	Arable (Turf)	Level	SU 194 872
2	2B	0.78	Arable (Turf)	Level	SU 195 872
2	4	1.53	Arable (Turf)	Level	SU 193 870
2	5A	1.31	Scrub	Level	SU 194 868
2	5E	0.27	Scrub	Level	SU 195 869
2	6A	3.53	Arable	Level	SU 195 862
2	6B	1.82	Arable	Level	SU 196 862
2	7A	5.49	Arable	Level	SU 204 866
2	7B	1.62	Arable	Level	SU 203 866
3	1	0.29	Arable (Turf)	Level	SU 191 870
3	2A	1.26	Arable (Turf)	Level	SU 192 872
3	2B	1.14	Arable (Turf)	Level	SU 192 871
3	3A	5.22	Pasture	Level	SU 197 871
3	3B	1.55	Pasture	Level	SU 198 873
3	4	4.27	Pasture	Level	SU 194 866
3	5	2.09	Arable	Level	SU 209 878

4.2 The study area was predominantly level at a mean elevation of *c*.90-95m to the south of the A420 and *c*.95-100m to the north of the A420.

4.2 The underlying solid geology of the area comprises Kimmeridge Clays of the Jurassic and Upper and Lower Greensands of the Cretaceous, which are overlain in parts by alluvium.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation (2nd edition,* David forthcoming); the Institute of Field Archaeologists Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2001).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a variety of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar and electromagnetic survey. Some techniques are more suitable than others in particular situations, depending on a variety of site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance, based on previous work, it was considered likely that cut features such as ditches and pits would be present, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.

5.4 Given the anticipated shallowness of targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

5.5 A 30m grid was established across each survey area and tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system (GPS) with real-time correction providing sub-metre accuracy.

5.6 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 30m grid units. The instrument

sensitivity was set to 0.1nT, the sample interval to 0.25m and the traverse interval to 1.0m, thus providing 3600 sample measurements per 30m grid unit.

5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.8 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (unfiltered) data. The greyscale images and interpretations are presented in Figures 3-8; the trace plots are provided in Figure 9. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.

5.9 The following basic processing functions have been applied to each data set.

clip	clips, or limits data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic.
zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities.
destagger	corrects for displacement of anomalies caused by alternate zig-zag traverses.
despike	locates and suppresses iron spikes in gradiometer data.
interpolate	increases the number of data points in a survey to match sample and traverse intervals. In this instance the data have been interpolated to 0.25 x 0.25m intervals.

Interpretation: anomaly types

5.10 Colour-coded geophysical interpretation plans are provided in Figures 4 and 7. Three types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches.
negative magnetic	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids.
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths.

Interpretation: features

5.11 Colour-coded archaeological interpretation plans are provided in Figures 5 and 8.

General comments

5.12 Except where stated otherwise in the text below, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as furrows, ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning.

5.13 Series of parallel, weak, positive magnetic anomalies which almost certainly reflect former ridge and furrow cultivation have been detected across Phase 2: Areas 1A, 2B, 7B; Phase 3: 1, 2A, 2B, 3A, 5.

5.14 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plans, however, they have been omitted from the archaeological interpretation plans and the following discussion.

5.15 In the text below the surveys are described with Phase 2 followed by Phase 3. Potential archaeological features have been assigned feature numbers [Fx], which are also indicated on the archaeological interpretation drawings.

Phase 2: Areas 1A and 1B (Figures 6-8)

5.16 Two positive magnetic anomalies [F1, F2] have been detected at the southwestern end of Area 1A. These may reflect soil-filled features, possibly pits or ditches.

5.17 A farm track situated next to and parallel with the northeastern field boundary of Area 1A has been detected as a series of intense dipolar magnetic anomalies. A farm gate has also been detected as a dipolar magnetic anomaly on the northern boundary of this survey area.

5.18 A group of dipolar magnetic anomalies [F3] at the northwestern end of Area 1A almost certainly reflects a concentration of ferrous or fired materials.

5.19 Also detected:
Traces of ridge and furrow cultivation [F4] oriented northwest-southeast in Area 1A.
The modern plough regime has been detected in Phase 2: Area 1B. This is probably on the same alignment as the medieval ridge and furrow however it is not possible to differentiate the two.

Phase 2: Areas 2A, 2B and 4; Phase: 3 Areas 1, 2A and 2B (Figures 3-5)

5.20 An extensive complex of predominantly linear, rectilinear and sub-circular positive magnetic anomalies has been identified across these areas. The vast majority of these anomalies reflect soil-filled features, which define roads, trackways and ditches while the smaller anomalies reflect pits and gullies (a sample of these features is discussed in the following text). Together these form a palimpsest of features of several phases over six hectares of survey but clearly extending beyond those surveys in all directions.

5.21 Two double-ditched trackways or roads [F6, F7] were detected as strong positive magnetic anomalies. The first [F6], oriented north-south, crosses Phase 3: Areas 2A and 2B, and possibly continues into Phase2: Area 4, though it may pass just to the east of this area. The second road [F7] joins the first at its widest point (nearly 10m across) in Phase 3: Area 2B, to form a T-junction. It then winds northeast through Phase 2: Areas 2A and 2B; the irregular nature of [F7] may indicate that it was routed around another feature or structure to the north of the survey area.

5.22 A large rectilinear enclosure [F8], approximately 40m by 60m and oriented on a northwest-southeast alignment, frames the T-junction of the two roads. This suggests that the roads are not contemporary with this enclosure ditch.

5.23 Two further rectilinear enclosures [F9] have been identified in Phase 2: Area 4 to the south of [F8]. These contain many positive magnetic anomalies, almost certainly reflecting internal ditches, pits and gullies. Two large probable pits [F10, F11] are present at the edge of these enclosures, one at the interchange of three ditches.

5.24 A possible boundary or enclosure ditch [F12] at the northwestern extent of Phase 3: Area 2A appears to define the limit of settlement there.

5.25 Two narrow positive magnetic anomalies [F13], probably soil-filled ditches, form a T-junction with another ditch and a large probable pit feature [F14] in the centre of Phase 2: Area 2A. These represent a different phase of activity to the track [F7] which they cut or are cut by. A further ditch [F15] orientated northwest-southeast appears to be associated with these features.

5.26 Several positive magnetic linear anomalies [F25] have been detected in Phase 3: Area 1, probably reflecting soil-filled ditch and pit features.

5.27 Also detected:
Traces of medieval ridge and furrow cultivation [F16, F17] oriented northeast-southwest and northwest-southeast. The ridge and furrow anomalies are of a higher intensity here, due to the large amounts of relatively high magnetic susceptibility material which has been ploughed up from the underlying features.

Traces of ridge and furrow cultivation [F26] orientated east-west in Phase 3: Area 1.

Phase 2: Areas 5A and 5E (Figures 3-5)

5.28 A number of positive magnetic anomalies [F18] have been detected across these areas, which may reflect soil-filled features, possibly pits, gullies and ditches.

5.29 A chain of dipolar magnetic anomalies orientated north-south on the western edge of the survey area almost certainly reflects a modern service.

5.30 The magnetic nature of the field boundaries, the railway to the north and the main A-road to the south have all been detected as large dipolar magnetic anomalies.

Phase 2: Areas 6A and 6B (Figures 6-8)

5.31 Three circular positive magnetic anomalies [F19, F20 and F21] have been detected which may be associated with prehistoric roundhouses. Each anomaly is fairly uniform in both size (8-10m diameter) and strength and each has a positive or dipolar magnetic anomaly to its centre, which may reflect a central hearth within the building.

5.32 Several other positive magnetic anomalies [F22] have been detected in Phase 2: Area 6B which may reflect soil-filled pits or ditches.

Phase 2: Areas 7A and 7B (Figures 6-8)

5.33 Three positive magnetic anomalies [F23] have been detected in this area. These may reflect soil-filled features.

5.34 Large concentrations of dipolar magnetic anomalies have been detected at the entrances to the field in which survey 7A took place. These reflect a water trough and plough which were present at the northern and central entrances respectively. Around these items were concentrations of ferrous and fired materials such as brick, which had been used to create a firm track.

5.35 Also detected:
Traces of possible ridge and furrow cultivation [F24] orientated northwest-southeast in Phase 2: Area 7B.

Phase 3: Areas 3A and 3B (Figures 6-8)

5.36 A complex of positive, negative and dipolar magnetic anomalies has been detected across the western extent of Phase 3: Area 3A. These could reflect an area of former occupation that may be part of, or related to, the large area of settlement detected to the west.

5.37 A linear negative magnetic anomaly [F27] oriented northwest-southeast has been detected. This may reflect the metalled surface of a former road or trackway. This probable trackway diverges around enclosure [F28]. Internal structures and pits have been detected within this enclosure.

5.38 A second enclosure [F29] has been detected to the east of [F27]. This follows a similar pattern of a rectilinear negative anomaly, possibly reflecting a walled

enclosure, an associated metalled track, and internal positive and dipolar magnetic anomalies probably reflecting structures, pits and gullies.

5.39 Further positive magnetic anomalies [F30] have been detected between enclosures [F28] and [F29]. These almost certainly reflect further enclosures, trackways, pits and possibly structural features.

5.40 A large area of dipolar magnetic anomalies towards the middle of the survey area reflects the large amounts of ferrous and fired debris which surround a large cattle feeder.

5.41 Further small, weak positive magnetic anomalies [F31] have been detected in the eastern part of Phase 3: Area 3A and Area 3B. These may reflect the truncated remains of further pits and gullies.

5.42 A pair of perpendicular positive magnetic anomalies in Phase 3: Area 3A may reflect soil-filled features, possibly former field boundaries.

5.43 A former animal water-hole, now backfilled, has been detected as large dipolar magnetic anomalies.

5.44 The existing wire fence boundary which traverses part of Phase 3: Area 3A on a northwest-southeast alignment has been detected as a chain of small dipolar magnetic anomalies.

5.45 Also detected:
Traces of ridge and furrow cultivation [F32, F33] both oriented northeast-southwest. The westernmost ridge and furrow anomalies are of a higher intensity due to the large amounts of magnetic material that the plough has brought up from the features beneath.

Phase 3: Area 4 (Figures 3-5)

5.46 An area of probable occupation [F34] has been identified within this land parcel. It comprises a series of strong linear and discrete positive magnetic anomalies which almost certainly form a complex of ditches and enclosures. Intense dipolar magnetic anomalies detected in the southern part of this complex may reflect hearths or kilns [F35], indicating that some industrial activity was taking place. The complex appears to extend to the south and north, however, it will have been severely truncated at its northern end by the Wilts and Berks Canal [F36] (now in-filled in this section).

5.47 To the west of the main complex are several negative magnetic linear anomalies [F37] which could reflect possible stone structures. These again seem to form walled enclosures.

5.48 The Wilts and Berks Canal has been detected as a series of intense dipolar magnetic anomalies on a northeast-southwest alignment. Three large dipolar magnetic anomalies and several concentrations of discrete dipolar magnetic

anomalies have been detected adjacent to the canal, which may all indicate features associated with the waterway.

5.49 Several other dipolar magnetic anomalies have been detected in this survey area, which reflect a variety of modern farm items such as a barn, wire fences, metal gates and a water trough.

Phase 3: Area 5 (Figures 6-8)

5.50 A weak, discontinuous, positive magnetic anomaly [F38] with curved corners has been detected which may reflect an enclosure of prehistoric date. It is approximately 40m square and contains two further positive magnetic curvilinear anomalies: a possible ditch or gully [F39] and a possible a ring-ditch or internal structure such as a roundhouse [F40].

5.51 A further two positive magnetic linear anomalies [F41] have been identified to the northwest of the square enclosure which may reflect associated land boundaries for activities such as stock raising.

5.52 Several other positive magnetic anomalies are present within the survey area, which could reflect pits and gullies associated with the possible enclosure.

5.53 Also detected:
Traces of ridge and furrow cultivation [F42] oriented northwest-southeast.
Probable land drains, identified as a complex of negative magnetic anomalies.

6. Conclusions

6.1 Thirty-seven hectares of geomagnetic survey were undertaken on land to the east of Swindon.

6.2 Soil-filled features including ditches, enclosures, pits and gullies have been identified across the survey areas; these can be roughly divided into five foci.

6.3 A large multi-phased area of occupation possibly of Romano-British date has been identified around South Marston Farm, (survey areas Phase 1: B1; Phase 2: 2A, 2B, 4; Phase 3: 1, 2A, 2B). This settlement extends beyond those areas already surveyed.

6.4 Trackways and enclosures have also been identified in Phase 3: Area 3A to the east of South Marston Farm. These may be related to the much larger area of occupation to the west.

6.5 An area of occupation identified during the Phase 1 surveys (Area E1) south of Marston Farm has been found to extend beyond the original survey. Possible stone walls and ditch features have been identified across the survey extension Phase 3: Area 4.

6.6 A probable prehistoric enclosure has been identified in Phase 3: Area 5.

6.7 Three possible prehistoric roundhouses have been identified in Phase 2: Areas 6A and 6B.

6.8 Traces of probable medieval ridge and furrow cultivation have been identified in Phase 2: Areas1A, 2B, 7B; Phase 3: 1, 2A, 2B, 3A, 5.

7. Sources

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Swindon

A420

A419

1A
1B
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A
3B
2B
2B
2A
3A
2A
1
4
B
5E
5A
D1
D2
E2
4
E1
7B
7A
6B
F
6A
G1
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Figure 1

Location of survey areas, phases 1-3

on behalf of
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0 500m
scale 1:15 000 - for A3 plot

site boundary
phase 1 survey area
phase 2 survey area
phase 3 survey area

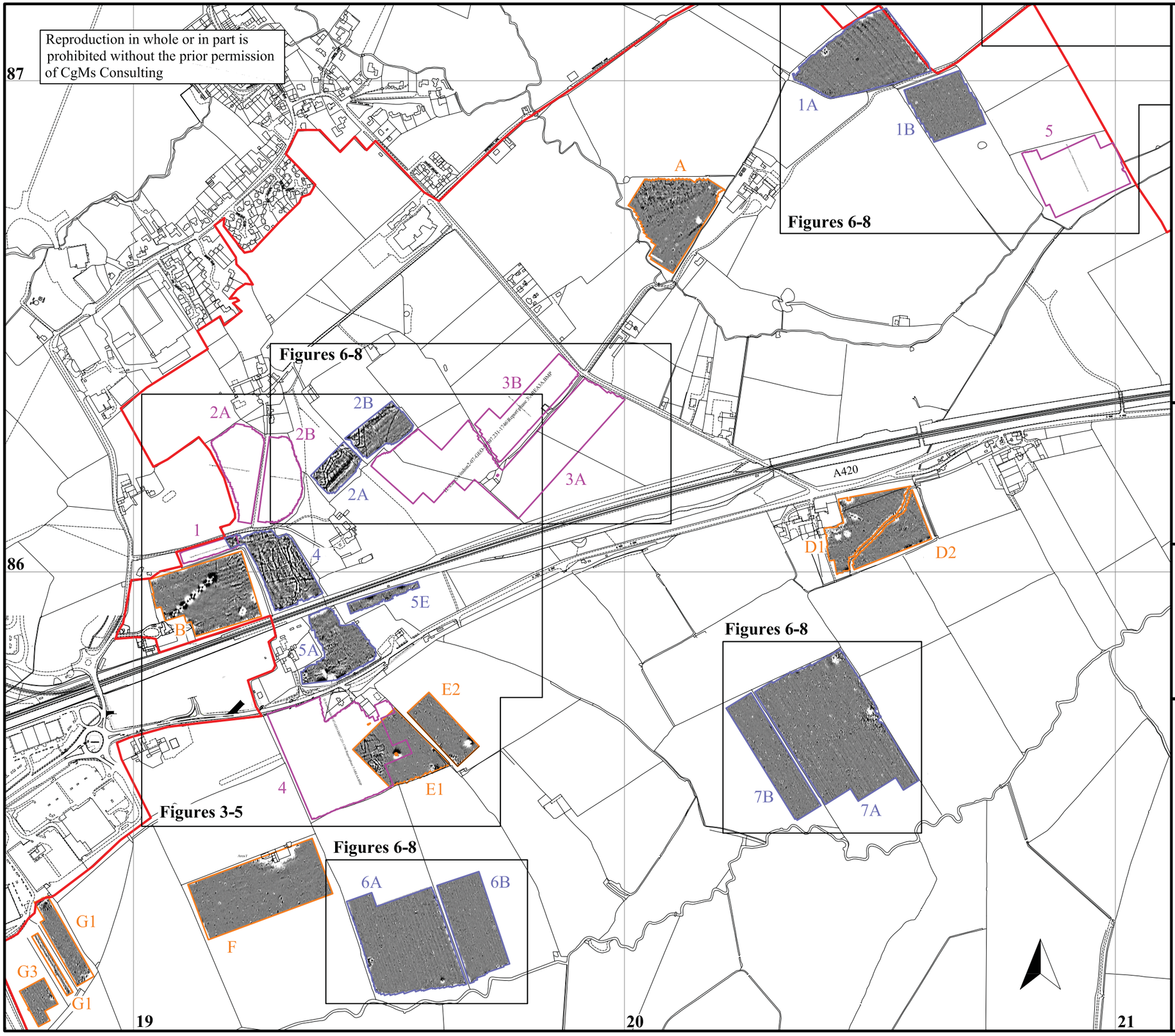

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Figure 2

Phase 2 and 3 surveys, guide to figures

on behalf of
CgMs Consulting

0 400m

scale 1:8000 - for A3 plot

- site boundary
- phase 1 survey area
- phase 2 survey area
- phase 3 survey area