



ILLUS 2 General view of Field 1, looking north-west



ILLUS 3 General view of Field 2, looking north-east



ILLUS 4 General view of Field 3, looking north

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 is programmed to take readings at a frequency of 10Hz (allowing for a 10–15cm sample interval) on roaming traverses 4m apart. These readings are stored on an external weatherproof laptop and later downloaded for processing and interpretation. The system is 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 has been used to collect and export the data. Terrasurveyor V3.0.29.3 (DWConsulting) software has been used to process and present the data.

Marker canes were laid out using a Trimble VRS differential Global Positioning System (Trimble GeoXR model).

3.2 REPORTING

A general site location plan is shown in Illus 1 at a scale of 1:5,000. Illus 2 to Illus 4 are general site condition photographs. A large scale

(1:3,000) survey location plan showing the processed greyscale magnetometer data and contour detail is presented in Illus 5. Illus 6 is an overall interpretation of the data at the same scale.

Detailed data plots (greyscale and XY trace) and interpretative illustrations are presented at a scale of 1:1,250 in Illus 7 to Illus 12 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.

The survey methodology, report and any recommendations comply with the Written Scheme of Investigation (Headland Archaeology 2016) and guidelines outlined by English Heritage (English Heritage 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All illustrations reproduced from Ordnance Survey mapping are 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.

4 RESULTS AND DISCUSSION

Magnetic background

Generally a variable magnetic background has been detected across the PDA. Numerous anomalies have been identified against this background. 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 or material is common on most sites, often being present as a consequence of manuring or tipping/infilling.

Three high magnitude dipolar linear anomalies (EF1-EF3 see Illus 10–12) can be seen sub-dividing F2. These are caused by electric fencing. The broad area of magnetic disturbance, T, at the intersection of the electric fences is caused by a water trough.

F3 is dominated by high magnitude magnetic disturbance throughout. Disturbance of this magnitude and extent is typical of modern landscaping and is likely to mask any anomalies of archaeological potential, if present, within the affected area. The only anomalies visible against this magnetic background are two high magnitude linear anomalies (SP1 and SP2 see Illus 10–12) which locate buried service pipes.

Other areas of disturbance around the perimeter of the survey areas and individual field edges can be attributed to the proximity of post and wire fencing and/or other ferrous material within the boundaries.

4.2 AGRICULTURAL ANOMALIES

Broadly-spaced parallel linear anomalies are identified across F1 and F2, mostly aligned north/south. The anomalies are relatively evenly-spaced, suggesting an agricultural origin, but they do not conform to the orientation of the historic or extant pattern of land division. It is possible, therefore, that they reflect an earlier strip-field system. If so, these anomalies may be of local historical interest, but are unlikely to be of any archaeological significance. An area of more closely-spaced parallel anomalies, within the north-west of F2 (see Illus 10–12) may be due to the medieval and post-medieval practice of ridge and furrow cultivation. However, these anomalies are isolated and very faint and interpretation is tentative.

4.3 GEOLOGICAL ANOMALIES

As mentioned, a variable magnetic background has been detected across the PDA which is characterised by relatively evenly distributed low magnitude discrete anomalies throughout. The anomalies are thought to be caused by localised variations in the depth and compositions of the soils. These coalesce into a sinuous band (GV see Illus 7–12) across F1 which corresponds to a subtle variation in the topography

(see Illus 5). This band is likely to be caused by a build-up of sediments (colluvium) at the base of the slope.

4.4 QUARRYING ANOMALIES

Broad and amorphous high magnitude anomalies (Q1 see Illus 7–9) at the south-western boundary of F1 are characteristic of localised extraction. The anomalies are caused by the contrast between the material used to backfill the quarry and the surrounding soils. Small quarries are depicted in the surrounding landscape on the first edition OS map (1878). Similar amorphous and high magnitude anomalies (Q2 see Illus 7–9) are identified at the north-western boundary in F1. These may also be due to extraction although a pedological or geological origin is also plausible.

4.5 ARCHAEOLOGICAL ANOMALIES AND POSSIBLE ARCHAEOLOGICAL ANOMALIES

Two circular anomalies (ring-ditches RD1 and RD2 see Illus 7–9) have been clearly identified within the south of F1. The anomalies are caused by the soil-fill of a circular ditch.

The westernmost ring-ditch, RD1, is centred at ST 0107 6945 and measures approximately 35m in diameter. The function of the ring-ditch is not clear although its sub-circular appearance may preclude a barrow. A slight gap within the south-east of the anomaly may indicate an entrance in to an enclosure. No anomalies of definite archaeological potential have been identified within the interior of the enclosure although two discrete anomalies (P1–P2 see Illus 7–9) are ascribed some archaeological potential, perhaps being due to pits.

A second ring-ditch (RD2 see Illus 7–9), probably a barrow, is identified 70m to the east of RD1, centred at ST 0116 6941. This anomaly is more circular in appearance and smaller, measuring 16m in diameter. A gap in the east of the anomaly may be due to an entrance. The anomaly is surrounded by a negative band which may be due to a ploughed-out bank.

No further anomalies of definite archaeological potential have been identified by the survey although two isolated high magnitude anomalies (P3 and P4 see Illus 7–12) within the west of F1 and the east of F2 respectively, may be caused by soil-filled pits.

5 CONCLUSION

The survey has successfully evaluated the PDA and clearly identified two ring-ditches within the south-west of the site. The ring-ditches differ in appearance, and probably function, with the easternmost likely to be due to a barrow, the westernmost probably an enclosure. They appear to be isolated with no further anomalies of definite archaeological potential being identified within the PDA, although two isolated pit-type anomalies are ascribed some archaeological potential.

Elsewhere, parallel linear anomalies have been identified throughout the PDA which may indicate an early strip-field system. If so, these anomalies may be of local historical interest but are not thought

to be of any archaeological significance. Two possible back-filled quarry pits may also be of interest.

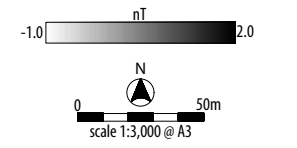
Overall, based on the results and interpretation of the survey, the archaeological potential across the majority of the site is considered to be low to moderate, with a very high archaeological potential ascribed to the two ring-ditches.

6 REFERENCES

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proposed development area
location and direction of ILLUS 2-4



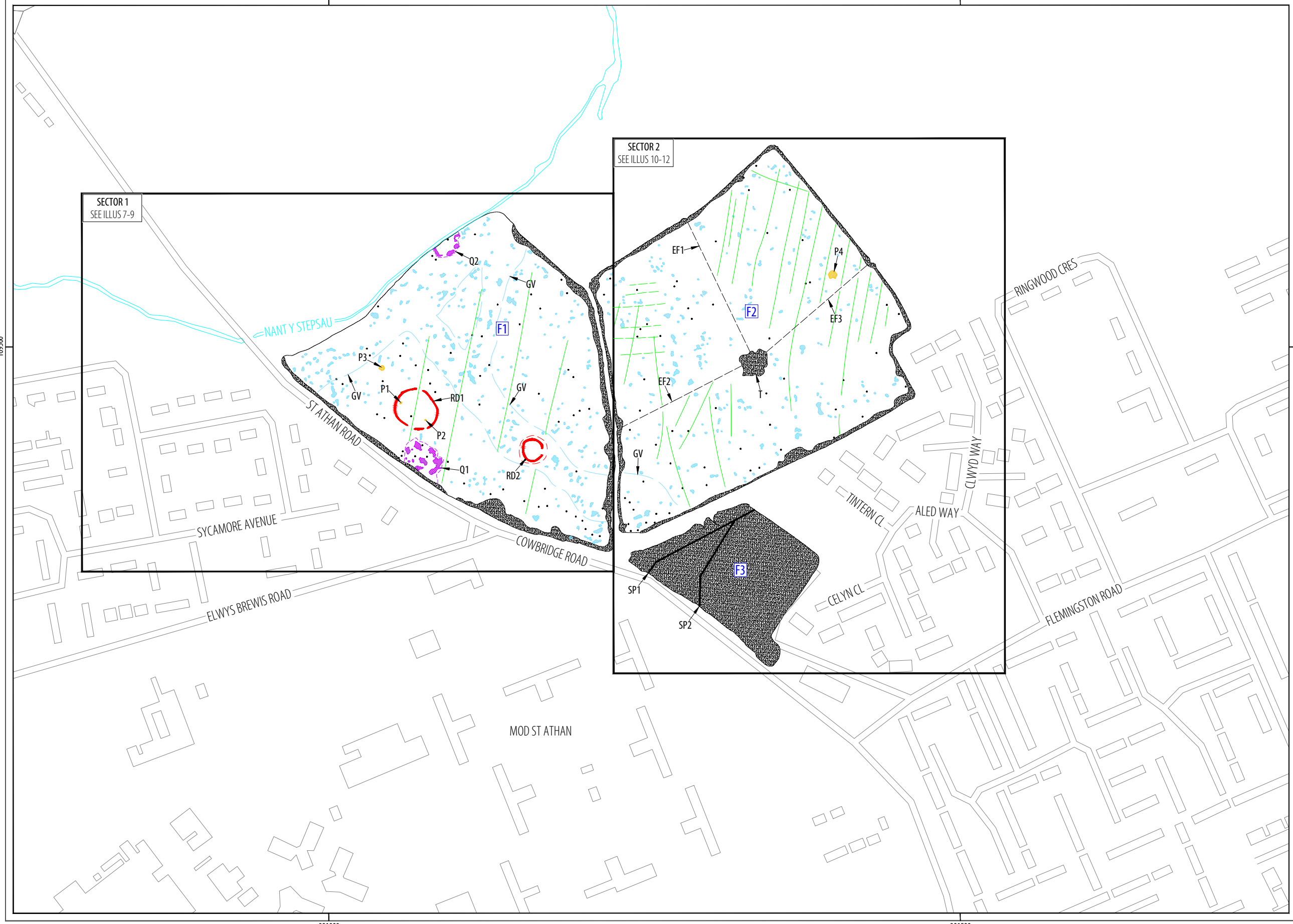
PROJECT CRSA/01
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St Athan
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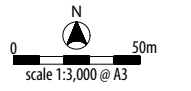
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ILLUS 5 Survey location showing processed greyscale magnetometer data and contour detail



TYPE OF ANOMALY	INTERPRETATION
● dipolar isolated	ferrous material
● magnetic disturbance	ferrous material
— dipolar linear	service pipe
— dipolar linear	electric fence
⊗ magnetic enhancement	quarrying?
— linear trend	ridge and furrow
— linear trend	agricultural
— linear trend	geological variation
⊗ magnetic enhancement	geology
⊗ magnetic enhancement	archaeology?
— negative trend	archaeology - bank?
● magnetic enhancement	archaeology - ditch

ABBREVIATIONS			
EF	electric fence	Q	quarry
GV	geological variation	RD	ring-ditch
P	pit	SP	service pipe
		T	trough



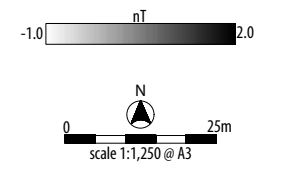
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ILLUS 6 Overall interpretation of magnetometer data

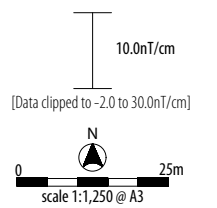


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ILLUS 8 XY trace plot of magnetometer data; Sector 1