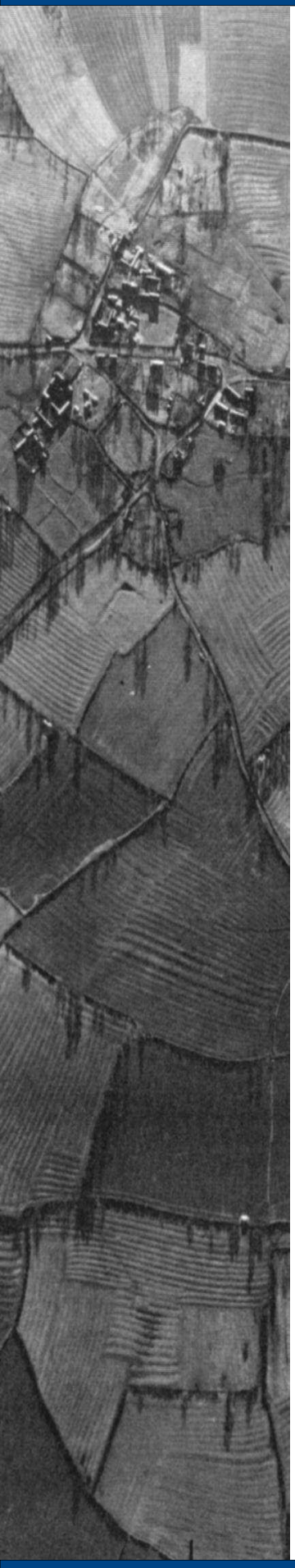

Cadbury Somerdale Factory
Keynsham
Bath & North East Somerset

MAGNETOMETER SURVEY REPORT

for

Cadbury plc

David Sabin and Kerry Donaldson

April 2009

Ref. no. 278

ARCHAEOLOGICAL SURVEYS LTD

Cadbury Somerdale Factory
Keynsham
Bath & North East Somerset

Magnetometer Survey

for

Cadbury plc

Fieldwork by David Sabin
Report by David Sabin BSc (Hons) MIFA and Kerry Donaldson BSc (Hons)

Survey date - **14th and 15th April 2009**
Ordnance Survey Grid Reference – **ST 656 691**

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SUMMARY

A magnetometry survey was carried out over 5ha on the recreation ground to the south of the Cadbury Somerdale Factory in Keynsham.
The results revealed positive linear anomalies indicative of ditch-like features that form a possible rectilinear enclosure close to the western edge of the survey area. The site contains several other positive linear and discrete anomalies that may relate to ditches and pits, although the archaeological potential of these cannot be determined. Negative anomalies in the southern part of the site may relate to material with a low magnetic susceptibility and therefore could indicate subsoil or stone features.
The northern and central parts of the site appear to have been affected by ground disturbance or make-up either during construction of the factory and/or the recreation ground. Magnetic disturbance caused by modern ferrous objects and underground services was encountered within the northern and eastern parts of the site and around much of the perimeter.
A substantial land boundary in the southern half of the site appears to form the northern boundary to an area of former ridge and furrow.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Archaeology and Planning Solutions and Atisreal Ltd, on behalf of Cadbury plc, to undertake a geophysical survey of the recreation ground at the Cadbury Somerdale Factory in Keynsham. The site has been outlined for potential development. The survey forms part of an archaeological assessment of the site.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2009) and approved by Richard Sermon, Archaeological Planning Officer for Bath & North East Somerset council.

1.1.3 During construction of the Somerdale Factory in 1922, immediately to the north of the survey area, a Roman building and several Romano-British artefacts were located. Previous limited archaeological investigations, including partial geophysical survey within three discrete areas on the recreation ground, had located a number of ditches and pits that may relate to prehistoric features. A further geophysical survey of the entire recreation ground was therefore considered an important method of fully analysing the site prior to any potential development.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin so that they may be assessed

prior to any potential development of the site.

1.2.2 Magnetometry is a highly effective and efficient means of archaeological prospection recommended for survey over large areas. The survey and report generally follow the recommendations set out by English Heritage, 2008: *Geophysical survey in archaeological field evaluation. .*

1.3 Site location, description and survey conditions

1.3.1 The site is located on the northern side of Keynsham, in Bath & North East Somerset, within the confines of the Cadbury Somerdale factory. It is centred on Ordnance Survey National Grid Reference ST 65625 69190.

1.3.2 The geophysical survey covers an area of approximately 5ha and consists of a recreation ground. The site contains several items associated with its use as a sports ground including, goal posts, fencing surrounding a football pitch and a cricket square. In the southern part of the site, a linear earthwork feature indicates a former land boundary. The site is bounded to the east and north by the site access road, to the west by the Fry Club Pavilion and to the south by housing.

Plate 1: Northern part of survey area

1.3.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. The presence of modern ferrous objects both above the ground and below the surface, in the case of services, was considered to be major sources of magnetic disturbance.

1.4 Site history and archaeological potential

1.4.1 An Archaeological Desk Based Assessment, carried out by Archaeology and Planning Solutions (2008), has identified the archaeological potential of the site. Immediately to the north of the survey area a Roman building was uncovered during the construction of the Somerdale Factory. Further Roman buildings have also been identified to the west of the factory and there is some possibility that these relate to the Roman town of *Traiectus.* In 1995 an archaeological evaluation of the recreation ground, consisting of a limited geophysical survey and trial trenching, located an undated enclosure, postholes, ditches and pits which may be prehistoric in date.

1.5 Geology and soils

1.5.1 The solid geology is Lower Lias white and blue limestones with some over lying deposits of 2nd river terrace gravels in the north and west of the site (BGS, 1962)

1.5.2 The soils directly overlying the site have not been mapped due to the urban location. It is possible that the soils overlying the lias geology relate to the Sherborne association which is a brown rendzina. The soils overlying the river terrace gravels are likely to relate to the Badsey 1 association which are typical brown calcareous earths.

1.5.3 The geologies and soil types that underlie the site are suitable for detailed magnetometry survey and typically result in good contrast between the fill of cut features and the material into which they have been cut.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.

2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can be mapped by magnetic prospection.

2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures, such as in a kiln, hearth, oven etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes, associated with the formation of some igneous and

metamorphic rock, may also result in magnetic thermoremnance.

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is an SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a Bartington Grad601-2 gradiometer. This instrument effectively measures a magnetic gradient between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally. The instrument is extremely sensitive and is able to measure magnetic variation to 0.03nanoTesla (nT). All readings are saved to an integral data logger for analysis and presentation.

2.2.2 The instrument is operated according to the manufacturer's instructions, with consideration given to the local conditions. An adjustment procedure is required, prior to collection of data, in order to balance the sensors and remove the effects of the Earth's magnetic field; further adjustment is required during the survey due to instrument drift often associated with temperature change. It may be very difficult to obtain optimum balance for the sensors, due to localised magnetic vectors that can be associated with large ferrous objects, geological/pedological features, 'magnetic' debris within the topsoil and natural temperature fluctuations. Imperfect balance results in a heading error, often visible as striping within the data. This can be effectively removed by software processing and generally has little effect on the data unless extreme. Archaeological Surveys use a non-magnetic tripod, with an additional supporting structure, to raise the instrument during the set-up procedure; this has been found to improve the sensor balance.

2.2.3 The Bartington gradiometer undergoes regular servicing and calibration by the manufacturer. A current assessment of the instrument is shown in Table 1 below.

Date of calibration/service	16th May 2008
Sensor type	Bartington Grad - 01 – 1000 Nos. 084 and 085
Bandwidth	12Hz (100nT range) both sensors
Noise	<100pT peak to peak
Adjustable errors	<2nT

Table 1: Bartington fluxgate gradiometer sensor calibration results

The instrument was considered to be in good working order prior to the survey, with no known faults or defects.

2.2.4 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 40m by 40m grids giving 6400 recorded

measurements per grid. This sampling interval is very effective at locating archaeological features, the grid size was selected in order to minimise the disturbance to the playing field.

2.2.5 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS and aligned on the western edge of the site. The GPS is used in conjunction with Leica's Smartnet service, where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system.

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger are analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display. Survey grids are assembled to form an overall composite of data (composite file) creating a dataset of the complete survey area. Appendix B contains specific information, concerning the survey and data attributes, and is derived directly from ArcheoSurveyor; this should be used in conjunction with information provided by Figure 02.

2.3.2 Only minimal processing is carried out, in order to enhance the results of the survey for display. Raw data are always analysed as processing can modify anomalies. The following schedule sets out the data and image processing used in this survey:

- clipping of the raw data at ±30nT to improve greyscale resolution,
- clipping of processed data at ±3nT to enhance low magnitude anomalies,
- zero median/mean traverse is applied in order to balance readings along each traverse.

(Reference should be made to Appendix B for details on the processing used for each survey area).

Data processing explanation notes:

Clipping
Clipping replaces the values outside the specified minimum and maximum with those values. The process is useful for displaying detail, as extreme values are removed, allowing greyscale shades to be allocated to a narrower range of values which improves the definition of anomalies.

Zero Median/Mean Traverse
The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and can remove striping.

2.3.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid assessment of features within the survey area. Where further interpretation is possible, or where a number of possible origins should be considered, more detailed discussion is set out in Section 4.

2.3.4 The main form of data display used in this report is the greyscale plot. Magnetic data are also displayed as a trace plot. Both 'raw' and 'processed' data have been shown, followed by an abstraction and interpretation plot.

2.3.5 Graphic raster images in bitmap format (.BMP) are initially prepared in ArcheoSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by ArcheoSurveyor from left to right. Prior to displaying against base mapping, raster graphics require a rotation of 56° anticlockwise to restore north to the top of th e image. Greyscale images are rotated by AutoCAD, traceplots are rotated using ArcheoSurveyor. Rotated traceplots are derived from interpolated datasets and can be considered as representative only, as the raw data will have been modified to a minor degree.

2.3.6 The raster images are combined with base mapping using AutoCAD LT 2007, creating DWG file formats. All images are externally referenced to the CAD drawing, in order to maintain good graphical quality. Quality can be compromised by rotation of graphics in order to allow the data to be orientated with respect to grid north; this is considered acceptable as the survey results are effectively georeferenced allowing relocation of features using GPS, resection method etc.. A digital archive, including raster images, is produced with this report allowing separate analysis if necessary, see Appendix C below.

2.3.7 A georeferenced vector map of the underlying topographic data was prepared using MapInfo by digitising from an orthorectified aerial photograph (© Getmapping plc). The method produces highly accurate background mapping suitable for displaying the geophysical data.

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over approximately 5ha. Geophysical anomalies located can be generally classified as positive linear responses of archaeological potential, anomalies associated with possible former field boundaries, positive and negative linear anomalies of an uncertain origin, discrete positive responses of uncertain origin, linear anomalies of an agricultural origin, anomalies relating to ground disturbance/make-up, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines. Anomalies have been numbered and will be outlined

below with subsequent discussion in Section 4.

3.1.2 The listing of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation. A basic key is indicated to allow cross-reference to the abstraction and interpretation plot. Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Anomalies with archaeological potential

Positive anomalies

The category is used where anomalies have the characteristics of a range of archaeological features such as pits, ring-ditches, enclosures etc..

Anomalies relating to possible former field boundaries

Positive anomalies

Anomalies within this category appear as positive linear anomalies which may be responses to the magnetically enhanced fill of cut features such as ditches. The anomalies may be long and/or form rectilinear elements.

Anomalies with an uncertain origin

Positive anomalies
Negative anomalies

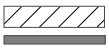
The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered.

Anomalies with an agricultural origin

Agricultural anomalies
Former ridge and furrow

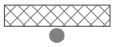
Where confidence is high that anomalies have been caused by agricultural features, this category is applied. The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing.

Anomalies with a modern origin

Magnetic disturbance
Strong multiple dipolar linear anomaly - pipeline/service 

The magnetic response is often strong and dipolar, indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux, which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present.

Anomalies associated with magnetic debris

Magnetic debris
Strong discrete dipolar anomaly 

The response often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. Magnetic debris often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material, such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

3.2 List of anomalies

Anomalies of archaeological potential

(1) – Positive linear anomalies form two sides of a possible rectilinear enclosure close to the western edge of the survey area. This enclosure was also identified in trench 1 of the 1995 evaluation.

Anomalies with an uncertain origin

(2) – Weak, positive linear anomalies appear to extend towards the southeastern corner of anomaly (1); however, it is not possible to determine if they are associated.

(3) – Two parallel positive linear anomalies, within the confines of anomaly (1), may relate to former agricultural activity although an association with anomaly (1) cannot be ruled out.

(4) – A positive linear anomaly extends across the football pitch in the northern part of the site. It is possible that this has a modern origin although it is parallel with the southern edge of anomaly (1) and may extend towards the northern part of the

eastern edge of anomaly (1).

(5) – A strong, positive rectilinear anomaly located in the centre of the site. There is no direct correlation between the anomaly and any modern sports apparatus; however, the strength and form of the anomaly suggests that it may relate to a relatively modern feature such as a former tennis court or bowling green. This feature was also identified as a modern feature during the 1995 evaluation.

(6) – Fragmented positive linear and possible rectilinear anomalies located within the eastern half of the survey area. Although it is possible that they relate to cut features, their form and magnitude does not allow for confident interpretation. During the 1995 evaluation no archaeological features were identified within trenches in this area.

(7) – A positive linear anomaly located close to the south western boundary. It is located within an area of strongly enhanced magnetic debris and may be related.

(8) – Negative linear and possible rectilinear anomalies in the southern part of the site appear to be a response to material of lower magnetic susceptibility than the surrounding soil. This may indicate a feature associated with sub-soil or perhaps structural remains; positive responses also appear to be associated with it.

(9) – Discrete positive anomalies located within the confines of anomaly (5) may indicate pit-like features, however their origin or relationship with anomaly (5) cannot be determined. Medieval quarry pits were recorded in the south of the site during the 1995 evaluation and it is therefore possible that anomalies (9) and (10) have a similar origin.

(10) – Three weak pit-like responses appear to form a cluster and are located to the south of anomaly (1).

(11) – Negative linear anomaly appears to extend southwards from anomaly (14) and it is possible that there is some association.

Anomalies relating to possible former field boundaries

(12) - Extending almost east – west across the southern part of the survey area are two parallel positive linear anomalies. They form the northern boundary to a series of ridge and furrow and appear to relate to a former field boundary visible on early Ordnance Survey mapping.

Anomalies with an agricultural origin

(13) – A series of parallel linear anomalies located in the southern part of the site and bounded on their northern edge by anomaly (12). These anomalies appear to relate to former ridge and furrow.

Anomalies associated with magnetic debris

(14) – A rectangular patch of magnetic debris in the southern part of the site may relate to material associated with the cricket pitch. A series of strong dipolar anomalies to the east may also be associated.

(15) – A widespread zone of magnetic debris is located along the south western edge of the site and is likely to relate to magnetically thermoremnant material that has been dumped on the site or used as ground make-up.

(16) – A zone of magnetic debris along the central part of the eastern side of the site is a response to material used within hardstanding and ground make-up.

(17) – The site contains many strong discrete dipolar anomalies. These relate to ferrous objects within the topsoil, many of which are associated with the use of the site as a recreation ground.

Anomalies associated with ground disturbance/make-up

(18) – Two amorphous zones of positive and negative response with a north-east to south-west axis were located in the northern part of the site. It is possible that these anomalies are a response either to ground that has been disturbed and backfilled, or to material that has been used in ground make-up.

Anomalies with a modern origin

(19) – The results have been affected by widespread magnetic disturbance from ferrous material within and surrounding the site. These include fencing, goal post and other sports apparatus and buried services.

(20) – Strong multiple dipolar linear anomalies relate to buried services. These are primarily located in the most northern part and around the eastern edge of the site.

4 DISCUSSION

4.1.1 The southern and eastern sides of a possible rectilinear enclosure have been located close to the western edge of the survey area. The southern edge extends towards the car park, and the eastern edge extends towards the Fry Club Pavilion. It is likely that this is the rectilinear enclosure found during earlier archaeological investigations of the site in 1995.

4.1.2 The site also contains several other positive linear and discrete responses and negative linear anomalies. It has not been possible to confidently interpret these anomalies due to their low magnitude and fragmented nature. It is possible that some of the positive responses relate to cut features such as ditches and pits and that the negative anomalies are responses to material such as subsoil or stone.

4.1.3 A former land boundary, indicated on early Ordnance Survey mapping, has been located within the southern part of the site. It bounds a series of linear anomalies that appear to relate to former ridge and furrow, suggesting a long period of agricultural activity within the southern part of the site.

4.1.4 Two large zones of positive and negative response have been located in the central and northern parts of the site. It is possible that they have been caused by material used within ground make-up when constructing the sports pitches. The variable magnetic response associated with these zones may obscure other features.

5 CONCLUSION

5.1.1 The magnetometry data have revealed the southern and eastern edges of a possible rectilinear enclosure. The anomalies relate to cut ditch-like features that appear to extend westwards towards the carpark and northwards towards the Fry Club Pavilion. It seems likely that this anomaly relates to a rectilinear enclosure found during archaeological investigations in 1995.

5.1.2 Further positive linear and discrete responses have been located and it is possible that these relate to cut features, such as ditches and pits; however, their archaeological potential cannot be determined. Negative anomalies may indicate material with a lower magnetic susceptibility than the surrounding soils, such as subsoil or stone, and may, therefore, indicate features with an anthropogenic origin.

5.1.3 There is some evidence for ground disturbance or make-up and this is likely to be associated with either the construction of the factory and/or the sports pitches. The site also contains, and is surrounded by, modern ferrous and magnetically thermoremnant material that has caused widespread magnetic disturbance and debris. Ground make-up and magnetic disturbance may obscure weak anomalies.

6 REFERENCES

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Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – survey and data information

Raw magnetometry data

Filename: mag-raw.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 16/04/2009
Assembled by: on 16/04/2009
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: Zero

Dimensions
Composite Size (readings): 1600 x 280
Survey Size (meters): 400 m x 280 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 10.14
Mean: -1.92
Median: -0.57
Composite Area: 11.2 ha

Source Grids: 39
1 Col:0 Row:5 29.xgd
2 Col:1 Row:4 27.xgd
3 Col:1 Row:5 28.xgd
4 Col:2 Row:3 26.xgd
5 Col:2 Row:4 30.xgd
6 Col:2 Row:5 31.xgd
7 Col:2 Row:6 32.xgd
8 Col:3 Row:2 24.xgd
9 Col:3 Row:3 25.xgd
10 Col:3 Row:4 33.xgd
11 Col:3 Row:5 34.xgd
12 Col:4 Row:1 21.xgd
13 Col:4 Row:2 22.xgd
14 Col:4 Row:3 23.xgd
15 Col:4 Row:4 35.xgd
16 Col:4 Row:5 36.xgd
17 Col:5 Row:1 19+16.xgd
18 Col:5 Row:2 20+17.xgd
19 Col:5 Row:3 18.xgd
20 Col:5 Row:4 37.xgd
21 Col:5 Row:5 38.xgd
22 Col:6 Row:1 13.xgd
23 Col:6 Row:2 14.xgd
24 Col:6 Row:3 15.xgd
25 Col:6 Row:4 39.xgd
26 Col:6 Row:5 40.xgd
27 Col:7 Row:1 10.xgd
28 Col:7 Row:2 11.xgd
29 Col:7 Row:3 12.xgd
30 Col:7 Row:4 41.xgd
31 Col:8 Row:0 04.xgd
32 Col:8 Row:1 08+05.xgd
33 Col:8 Row:2 09+06.xgd
34 Col:8 Row:3 07.xgd
35 Col:8 Row:4 42.xgd
36 Col:9 Row:1 01.xgd
37 Col:9 Row:2 02.xgd
38 Col:9 Row:3 03.xgd
39 Col:9 Row:4 43.xgd

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

Processed magnetometry data

Filename: mag-proc.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 16/04/2009
Assembled by: on 16/04/2009
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: Zero

Dimensions
Composite Size (readings): 1600 x 280
Survey Size (meters): 400 m x 280 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.94
Mean: -0.37
Median: -0.27
Composite Area: 11.2 ha

Source Grids: 39
1 Col:0 Row:5 29.xgd
2 Col:1 Row:4 27.xgd
3 Col:1 Row:5 28.xgd
4 Col:2 Row:3 26.xgd
5 Col:2 Row:4 30.xgd
6 Col:2 Row:5 31.xgd
7 Col:2 Row:6 32.xgd
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14 Col:4 Row:3 23.xgd
15 Col:4 Row:4 35.xgd
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19 Col:5 Row:3 18.xgd
20 Col:5 Row:4 37.xgd
21 Col:5 Row:5 38.xgd
22 Col:6 Row:1 13.xgd
23 Col:6 Row:2 14.xgd
24 Col:6 Row:3 15.xgd
25 Col:6 Row:4 39.xgd
26 Col:6 Row:5 40.xgd
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29 Col:7 Row:3 12.xgd
30 Col:7 Row:4 41.xgd
31 Col:8 Row:0 04.xgd
32 Col:8 Row:1 08+05.xgd
33 Col:8 Row:2 09+06.xgd
34 Col:8 Row:3 07.xgd
35 Col:8 Row:4 42.xgd
36 Col:9 Row:1 01.xgd
37 Col:9 Row:2 02.xgd
38 Col:9 Row:3 03.xgd
39 Col:9 Row:4 43.xgd

Processes: 5
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 Clip from -10.00 to 10.00 nT
4 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
5 Clip from -3.00 to 3.00 nT

Appendix C – digital archive

Survey results are produced in hardcopy using A4 for text and A3 for plots (all plots are scaled for A3). In addition digital data created during the survey are supplied on CD. Further information on the production of the report and the digital formats involved in its creation are set out below.

This report has been prepared using the following software on a Windows XP platform:

- ArcheoSurveyor version 2.4.0.24 (geophysical data analysis),
- AutoCAD LT 2007 (report figures),
- OpenOffice.org 3.0.0 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

Digital data are supplied on CD ROM which includes the following files:

- ArcheoSurveyor grid and composite files for all geophysical data,
- CSV files for raw and processed composites,
- geophysical composite file graphics as Bitmap images,
- AutoCAD DWG files in 2000 and 2007 versions,
- report text as OpenOffice.org ODT file,
- report text as Word 2000 doc file,
- report text as rich text format (RTF),
- report text as PDF,
- PDFs of all figures,
- photographic record in JPEG format.

The CD ROM structure is formed from a tree of directories under the title J278 Somerdale – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data and hold Grid, Composite and Graphic files with CSV composite data held in Export.

The CAD file contains externally referenced graphics that may be rotated, see 2.3.5, with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen. (Note – CAD files are prepared using AutoCAD's eTransmit function to produce a directory containing the digital drawing along with any externally referenced graphics which may need reloading).

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Map of survey area

Survey location

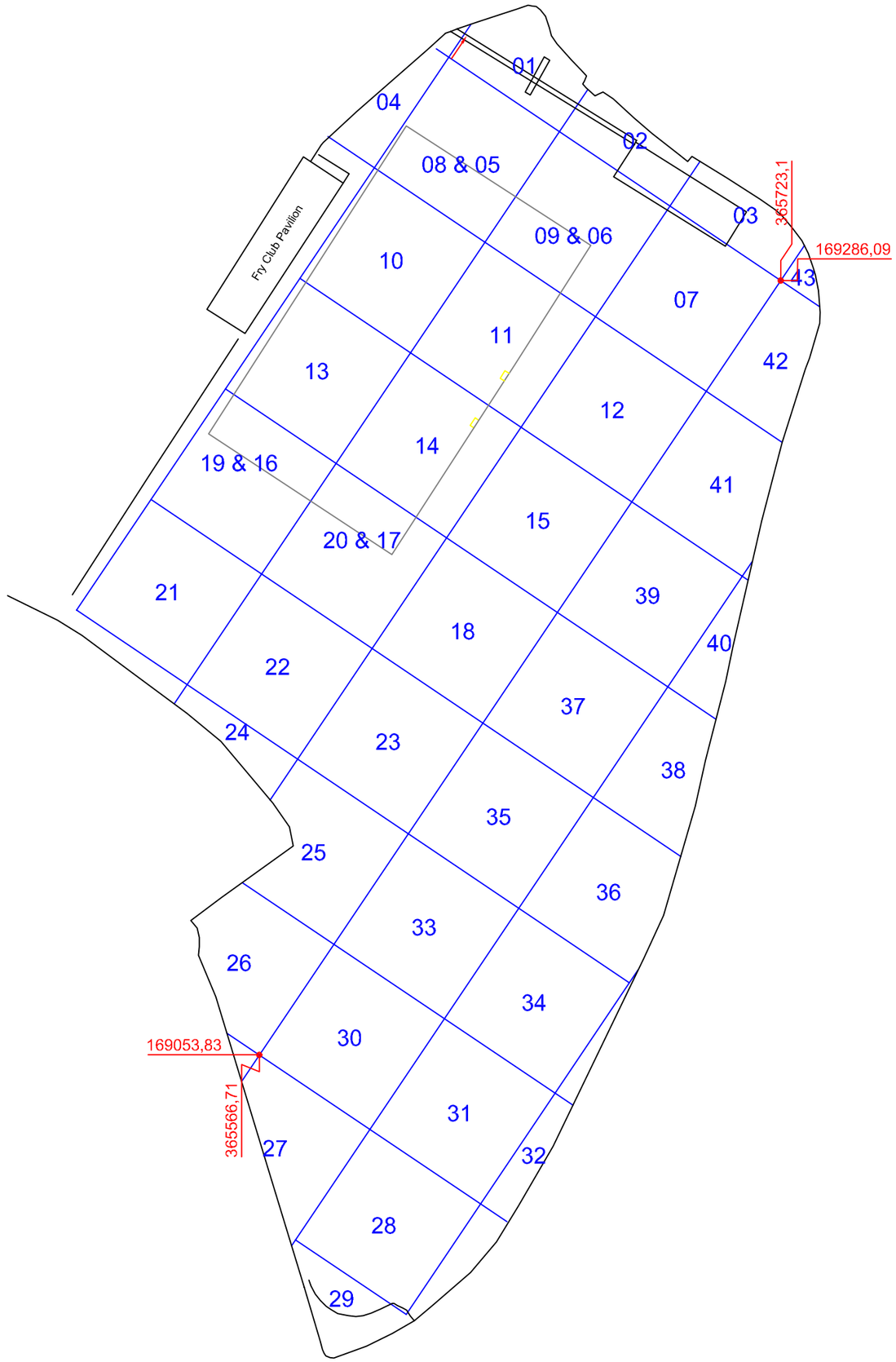
Site centred on OS NGR
ST 656 691

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01



Base mapping derived from Getmapping aerial photograph

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Referencing information

Grid coordinates based on Ordnance Survey OSGB36 datum

Grids set out using RTK GPS with Leica Smartnet correction data RTCMv2 format

Survey grid size = 40m

Survey start and traverse direction

01 Grid reference number and filename

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 02

N

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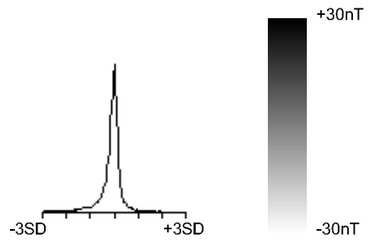
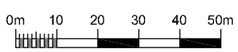
Greyscale plot of raw magnetometer data



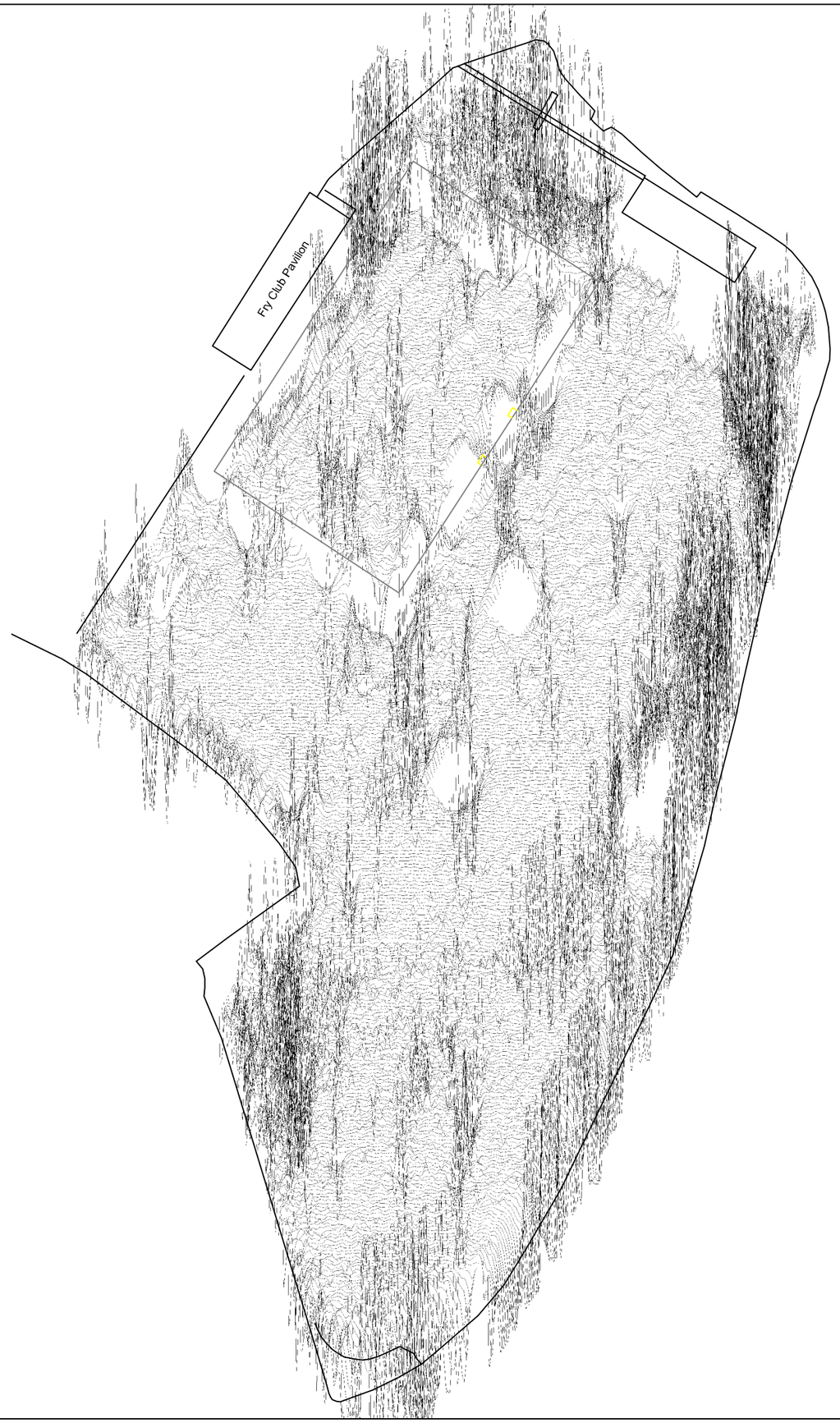
SCALE 1:1500



SCALE TRUE AT A3

FIG 03

Base mapping derived from Getmapping aerial photograph



N

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Traceplot of raw magnetometer data

+50nT
+25nT
0nT
-25nT
-50nT

Approx 25nT/ cm vertical displacement.

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 04

Base mapping derived from Getmapping aerial photograph

N

Base mapping derived from Getmapping aerial photograph

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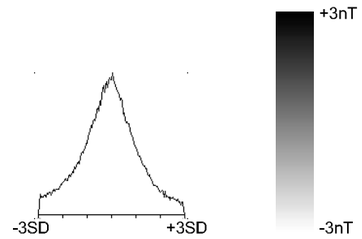
Greyscale plot of processed magnetometer data

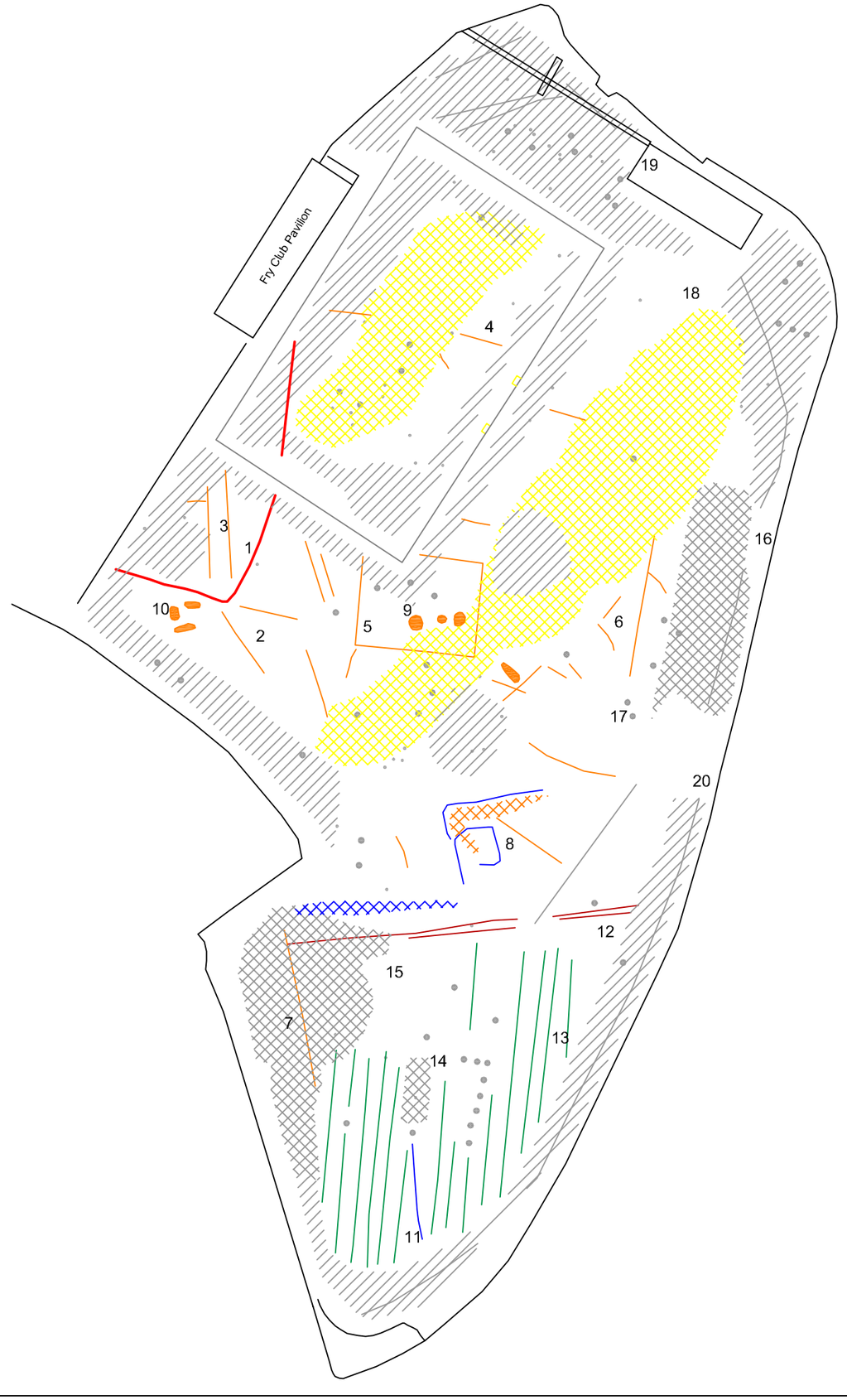


SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05



Base mapping derived from Getmapping aerial photograph

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Geophysical Survey
Cadbury Somerdale Factory
Keynsham

Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - cut feature of archaeological potential
- Positive linear anomaly - of uncertain origin
- Linear anomaly - ridge and furrow
- Positive linear anomaly - possible former field boundary
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - uncertain origin
- Positive anomaly - of uncertain origin
- Negative anomaly - material of low magnetic susceptibility
- Amorphous positive & negative response - material associated with ground disturbance/make up
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 06