ASUD 895

Springfields Garden Centre, Spalding, Lincolnshire

geophysical surveys

by

Archaeological Services
University of Durham

On behalf of

Gifford and Partners Ltd.

ASUD Report 895
February 2002

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Contents

1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted in advance of the proposed re-development of Springfields Garden Centre, Spalding, Lincolnshire.

1.2 The works were commissioned by Gifford and Partners Ltd. and conducted by Archaeological Services University of Durham (ASUD) in accordance with a Project Specification provided by ASUD.

Results

1.3 Three areas were surveyed. No features of likely archaeological significance have been detected in Areas 1 and 3. At least three former ditches or drains have been identified in Area 2, west of Springfields.

Recommendation

1.4 A programme of trial trenching should be undertaken in order to confirm the results of the geophysical surveys and to investigate those parts of the proposed development area which have not been surveyed.

2. Project background

Location (Figure 1)

2.1 The study area comprises Springfields Garden Centre and adjoining land at the north-eastern limit of Spalding in Lincolnshire (NGR centre: TF 2650 2400). Three areas have been subjected to geophysical survey, as shown on Figure 1.

Development proposal

2.2 The proposal is to construct a leisure complex, along with associated access roads and services.

Objective

2.3 The overall aims and objectives of the project, which will include trial trench evaluation, have been agreed between Gifford and Mr Jim Bonner (Senior Built Environment Officer) of Lincolnshire County Council, and are as follows:

Aims

1 to determine the date, extent, character, quality and state of preservation of any archaeological remains within the evaluation area and to estimate their importance within a local and national context

2 to provide an estimation of the extent and survival of archaeological remains within the rest of the development site and to enable an impact assessment to be undertaken

Specific objectives

1 to establish the environmental potential of the site and the vulnerability of such remains

2 to establish the potential for archaeological remains masked by late flood deposits, particularly relevant to the Late Iron Age and Roman periods

3 to identify and explain inconsistencies between topsoil/ploughsoil assemblages and the presence of associated buried archaeological remains, particularly relevant for the Late Saxon and medieval periods

4 to investigate evidence for the age of Camel Gate

Specification summary

2.4 The surveys have been undertaken over three areas to the immediate east, west and south of the former garden centre, as determined by the Project Specification provided by Archaeological Services and approved by Gifford and the Archaeology Section at Lincolnshire County Council.

Dates

2.5 The fieldwork was undertaken between 12th and 15th February 2002. This report was prepared between 18th and 20th February 2002.

Personnel

2.6 The surveys were conducted by David Graham and Andy Platell. This report was prepared by Duncan Hale, with illustrations by David Graham. The Project Manager was Duncan Hale.

Acknowledgements

2.7 Archaeological Services is grateful to Anthony Martin (Gifford), Jim Bonner (Lincolnshire County Council) and the current occupiers of the site for their assistance and cooperation with this project.

Archive

2.8 The project archive is currently held at Archaeological Services, University of Durham. At the end of the project, the archive will be deposited in the City and County Museum (Lincoln) in accordance with both their guidelines and the county archiving policy as contained within the *Archaeology Handbook* (Lincolnshire County Council 1997). It is anticipated that the survey data archive will be transferred to the Archaeology Data Service in due course.

3. Archaeological and historical background

3.1 The archaeological and historical background of the site was established by Gifford (1999). The potential for archaeological remains to be present on the site was established as medium, and in summary may consist of:

- archaeological deposits, including semi-permanent structures, relating to salt production in the Roman, Anglo-Saxon and medieval periods (all of the area around Spalding may have been exploited for this purpose at some stage)
- archaeological deposits relating to Romano-British settlement in Spalding, as evidenced by features and ceramics of this date
- evidence relating to settlement and exploitation of the landscape in the early-medieval and medieval periods, as evidenced by ceramics, the nearby town of Splading and the Medieval Priory
- evidence for the control of tidal inundation, landscape drainage and fenland exploitation from the Iron Age until the post-medieval period

4. Landuse, topography and geology

4.1 Three parts of the proposed development area were subjected to geophysical survey. Area 1 comprised a small lawn at the south-western limit of the garden centre, with a large building along its northern edge. Area 2 was a pasture field immediately west of Camel Gate and Springfields. Area 3 comprised a slim, triangular set-aside field between the garden centre and the A16 to the east.

4.2 Each survey area was predominantly level at a mean elevation of *c.*4m AOD.

4.3 The drift geology of the area comprises a series of alluvial clays, silts and sands with occasional maritime flood deposits.

5. Geophysical survey

Standards

5.1 The surveys and reporting were been conducted in accordance with English Heritage (1995) Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation*; the Institute of Field Archaeologists (1991) Technical Paper No.9, *The use of geophysical techniques in archaeological evaluations*; and the Archaeology Data Service (2001) *Geophysical Data in Archaeology: A Guide to Good Practice*.

Technique selection

5.2 Geophysical surveying enables the relatively rapid and non-invasive identification of potential archaeological features within landscapes and can involve a variety of complementary techniques such as magnetometry, electrical resistivity, 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 desktop research (Gifford 1999), it was considered likely that cut features, such as ditches and pits, might be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present. Given the shallowness of the targets (*c.*1-2m depth) and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting each of the types of feature mentioned above. This technique involves the use of a hand-held magnetometer to detect and record minute perturbations, or 'anomalies', in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation.

Field methods

5.4 A 20m grid was established across each survey area and tied-in to known, mapped Ordnance Survey points using a Wild T1000 total survey station instrument and SDR33 datalogger.

5.5 Measurements of vertical geomagnetic field gradient were determined using a Geoscan FM36 fluxgate gradiometer fitted with an ST1 sample trigger to enable automatic logging of the data. A zig-zag traverse scheme was employed and data were logged in 20m 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 1600 sample measurements per 20m grid unit.

5.6 Data were downloaded on-site into a RM NoteBook computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.7 InSite v.3 software was used to process the geophysical data and to produce continuous tone greyscale images of the raw data. The results are shown in Figures 2, 4 and 8 where the images have been imported into a digital plan of the site supplied by Gifford. In these figures, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla. A profile plot of the data for Area 2 is provided in Figure 5.

5.8 The following basic processing steps have been applied to the gradiometer data:

DeSpike replaces isolated spikes in the data with the mean of near-neighbours. Such spikes typically arise due to the presence of near-surface ferrous litter.

DeDrift corrects for a linear drift in instrument calibration with time.

DeStripe reduces an apparent striping artefact in magnetometer data collected along zig-zag traverses.

DeShear corrects for apparent shear in geomagnetic anomalies surveyed by zig-zag traversing.

Match adjusts for differences in mean data level between adjacent grids.

Merge interpolates and combines grid data to form one array of regularly-spaced data at 0.25 x 0.25m intervals.

Interpretation: anomaly types

5.9 Colour-coded geophysical interpretation plans are provided in Figures 3, 6 and 9. Two 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.
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous debris and/or fired structures such as kilns or hearths.

Interpretation: Area 1

5.10 A colour-coded archaeological interpretation plan is provided in Figure 7.

5.11 A large building along the northern side of this area has influenced the data collected to the immediate south of the building. The geomagnetic anomaly around the southern side of the building reflects the high magnetic susceptibility materials used in its construction. The effect of the building has been reduced by data processing and does not appear to obscure weaker anomalies of possible archaeological interest.

5.12 A cluster of intense dipolar magnetic anomalies has been detected in the south-western corner of this area. These anomalies almost certainly reflect near-surface ferrous debris or building rubble and are not considered to be of archaeological significance.

Interpretation: Area 2

5.13 Four positive magnetic lineations have been detected in the northern half of the area. These anomalies reflect relative increases in high magnetic susceptibility materials and are likely to represent soil-filled ditches or former drains. One of the features, aligned east-west, appears to be contemporary with two north-south aligned features, as the latter join the former at right-angles. The fourth anomaly of this type is particularly sinuous and is therefore more likely to reflect a natural feature, such as a former stream course.

5.14 A chain of intense dipolar magnetic anomalies has been detected in the northern part of this area, aligned broadly east-west. This anomaly almost certainly reflects the presence of a ferrous pipe.

5.15 A diffuse positive magnetic anomaly, which has been detected in the south-western part of the area corresponds to an existing track in this part of the field.

5.16 This area is characterised by a scatter of small dipolar magnetic anomalies, which are interpreted as reflecting surface or near-surface ferrous litter.

Interpretation: Area 3

5.17 No features of likely archaeological interest have been detected in this area. A series of anomalies along the eastern limit of the survey correspond to a line of reinforced concrete posts. The only other anomalies here almost certainly reflect surface or near-surface ferrous litter.

6. Conclusions and recommendations

6.1 Three parts of the proposed development area have been geomagnetically surveyed. The surveys have established the potential for archaeological remains within those areas.

6.2 No features of likely archaeological significance have been detected in Areas 1 and 3. At least three former ditches or drains have been identified in Area 2, west of Springfields.

6.3 It is recommended that the findings of these surveys are confirmed by a programme of trial trenching.

6.4 Since the vast majority of Springfields Garden Centre has not been evaluated by the geophysical surveys, due to unsuitable ground conditions, it is recommended that the trial trenching programme covers that area also.

7. References

Archaeology Data Service (2001) *Geophysical Data in Archaeology: A Guide to Good Practice*. Arts and Humanities Data Service.

English Heritage (1995) Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation*. London.

Gifford and Partners (1999) *A report on an archaeological desk-based assessment of Springfields, nr Spalding, Lincolnshire*. Gifford & Partners Report B1888A.03 for Thornfield Development Ltd.

Institute of Field Archaeologists (1991) Technical Paper No.9, *The use of geophysical techniques in archaeological evaluations*. Birmingham.

Lincolnshire County Council (1997) *Archaeology Handbook*. Published on the internet by Lincolnshire County Council.

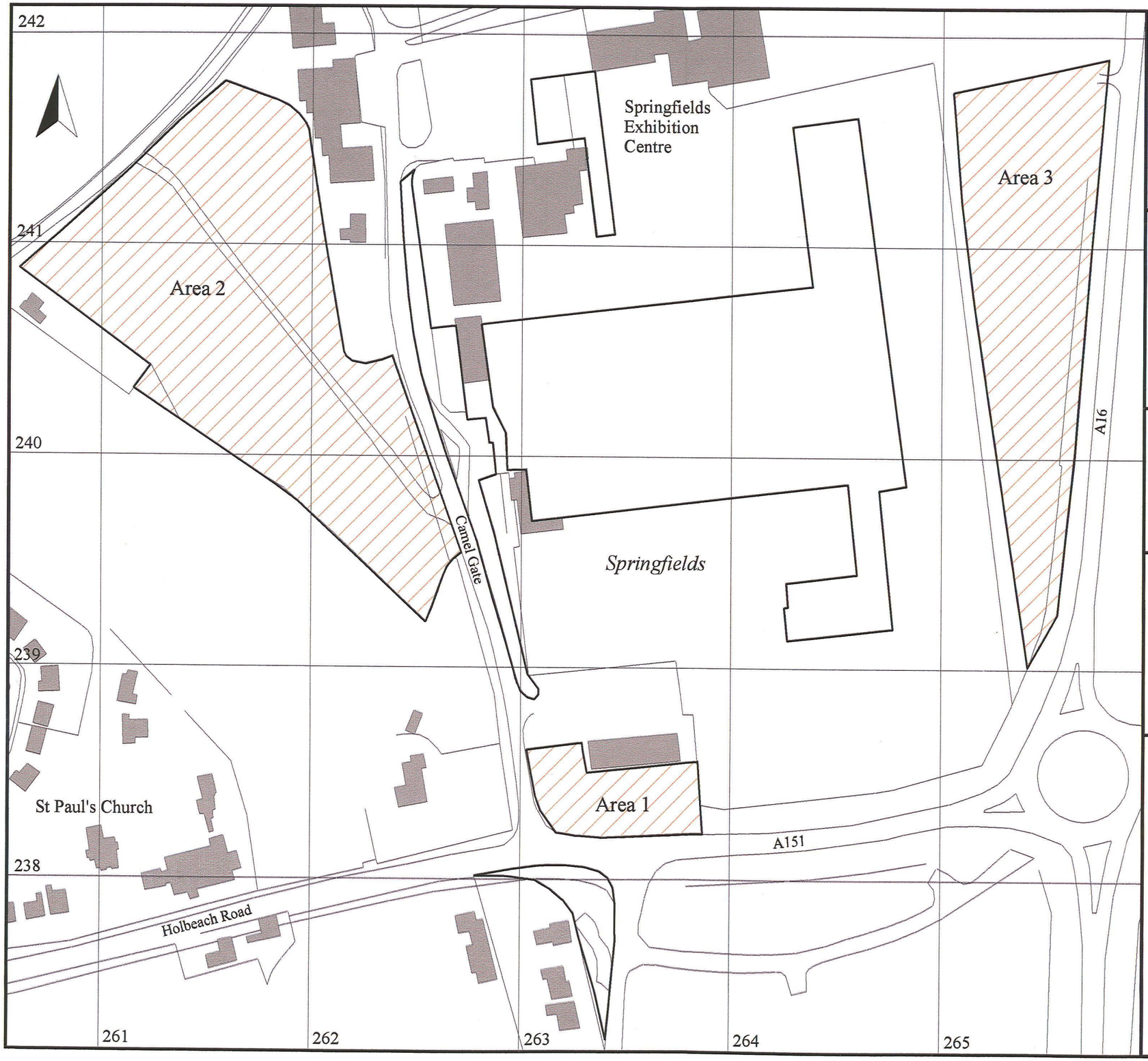

Figure 1:

Springfields Garden Centre, Spalding.
Areas of geophysical survey
(based on plan provided by Gifford and Partners Ltd)

Archaeological Services
University of Durham

On behalf of

Gifford and Partners Ltd

0 100m

Scale 1:2000

Geophysical survey areas

Buildings

240

239

238

Area 1

263

264

Key:

Area of survey

Plans supplied by:
Watson & Batty Architects

Archaeological Services
University of Durham

On behalf of

Gifford and Partners Ltd

Figure 2:

Springfields Garden Centre, Spalding.
Area 1 gradiometer data displayed as a greyscale image

0 50m

Scale 1:1000

-99.8 -13.9 -4.0 4.2 14.2 99.8 nT

Key:

Dipolar geomagnetic anomaly

Positive geomagnetic anomaly

Plans supplied by:
Watson & Batty Architects

Archaeological Services
University of Durham

On behalf of

Gifford and Partners Ltd

Figure 3:

Springfields Garden Centre, Spalding.
Area 1 geophysical interpretation of gradiometer data

0 50m

Scale 1:1000

242

Area 2

241

240

261

262

263

Key:

Area of survey

Plans supplied by:
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Figure 4:

Springfields Garden Centre, Spalding.
Area 2 gradiometer data displayed as a greyscale image

0 50m

Scale 1:1000

-14.1 -2.0 -0.6 0.6 2.0 14.1 nT

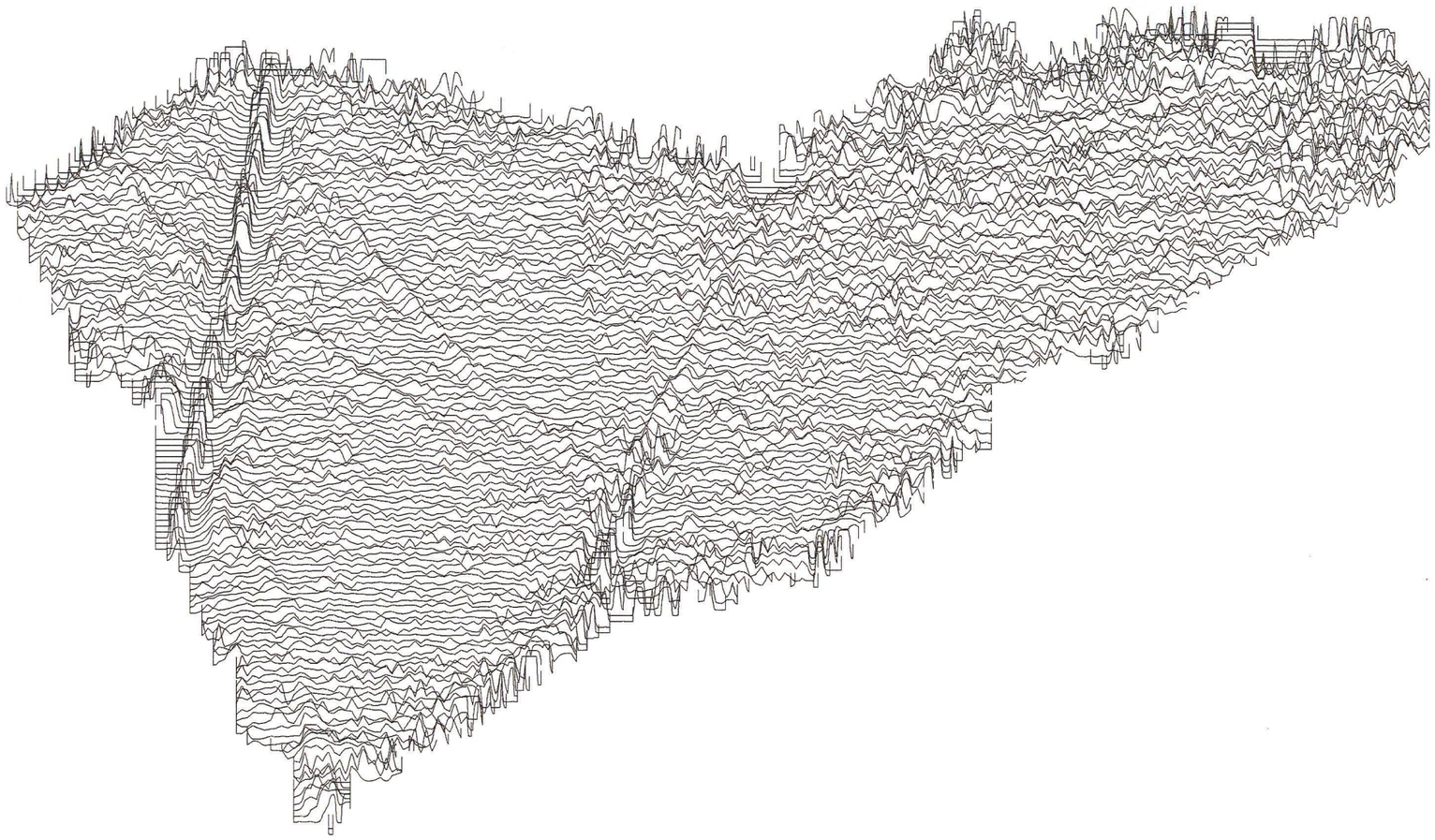

Figure 5:

Springfields Garden Centre, Spalding
Area 2 gradiometer data
displayed as a profile plot

Profiles plotted at 1m intervals

1:1000

0 10 20 30 40 50m

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University of Durham

Key:

Dipolar geomagnetic anomaly

Positive geomagnetic anomaly

Plans supplied by:
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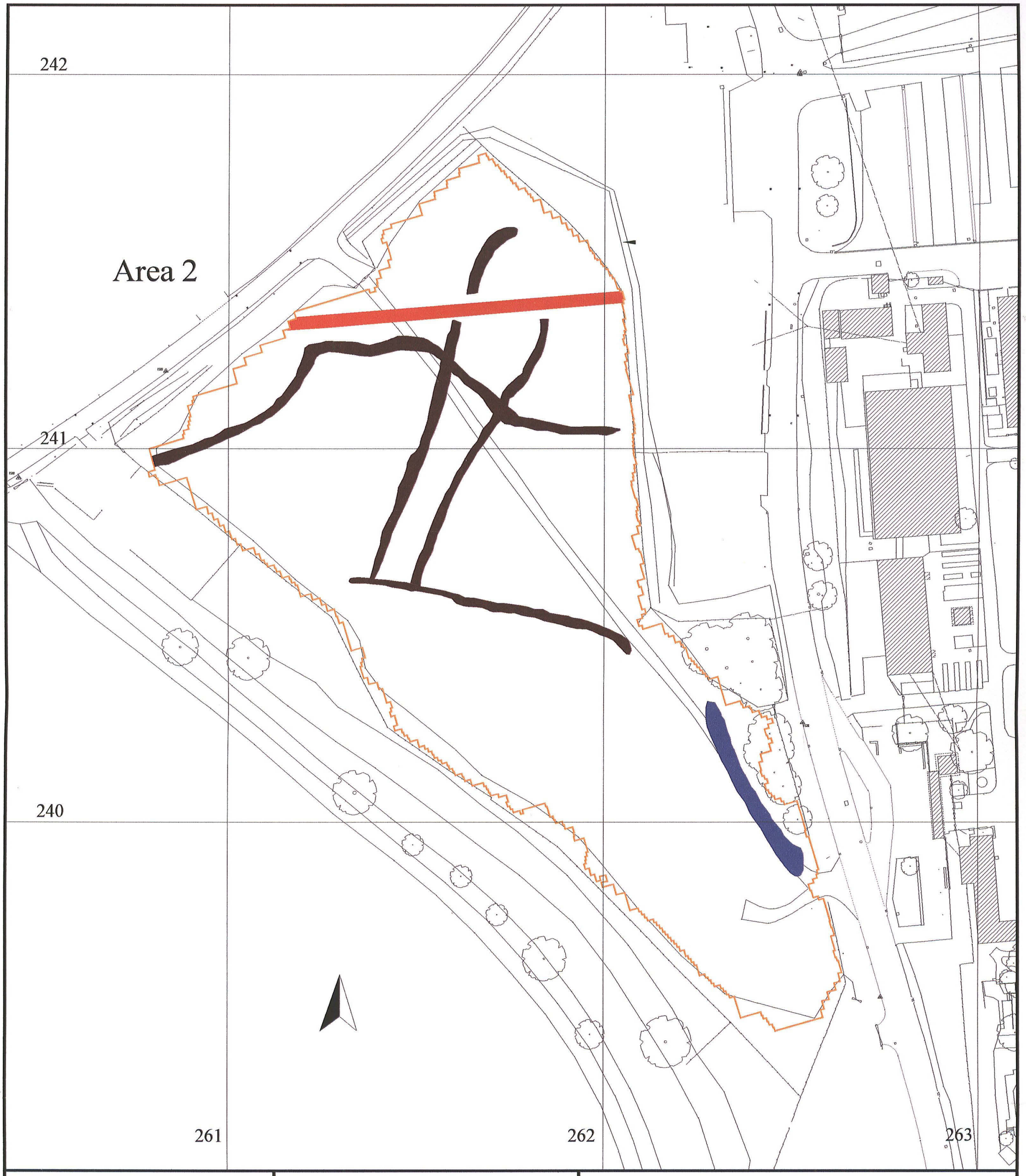
Figure 6:

Springfields Garden Centre, Spalding.
Area 2 geophysical interpretation of gradiometer data

0 50m

Scale 1:1000



Key:

- Soil filled feature
- Gravel track
- Service Pipe

Plans supplied by:
Watson & Batty Architects

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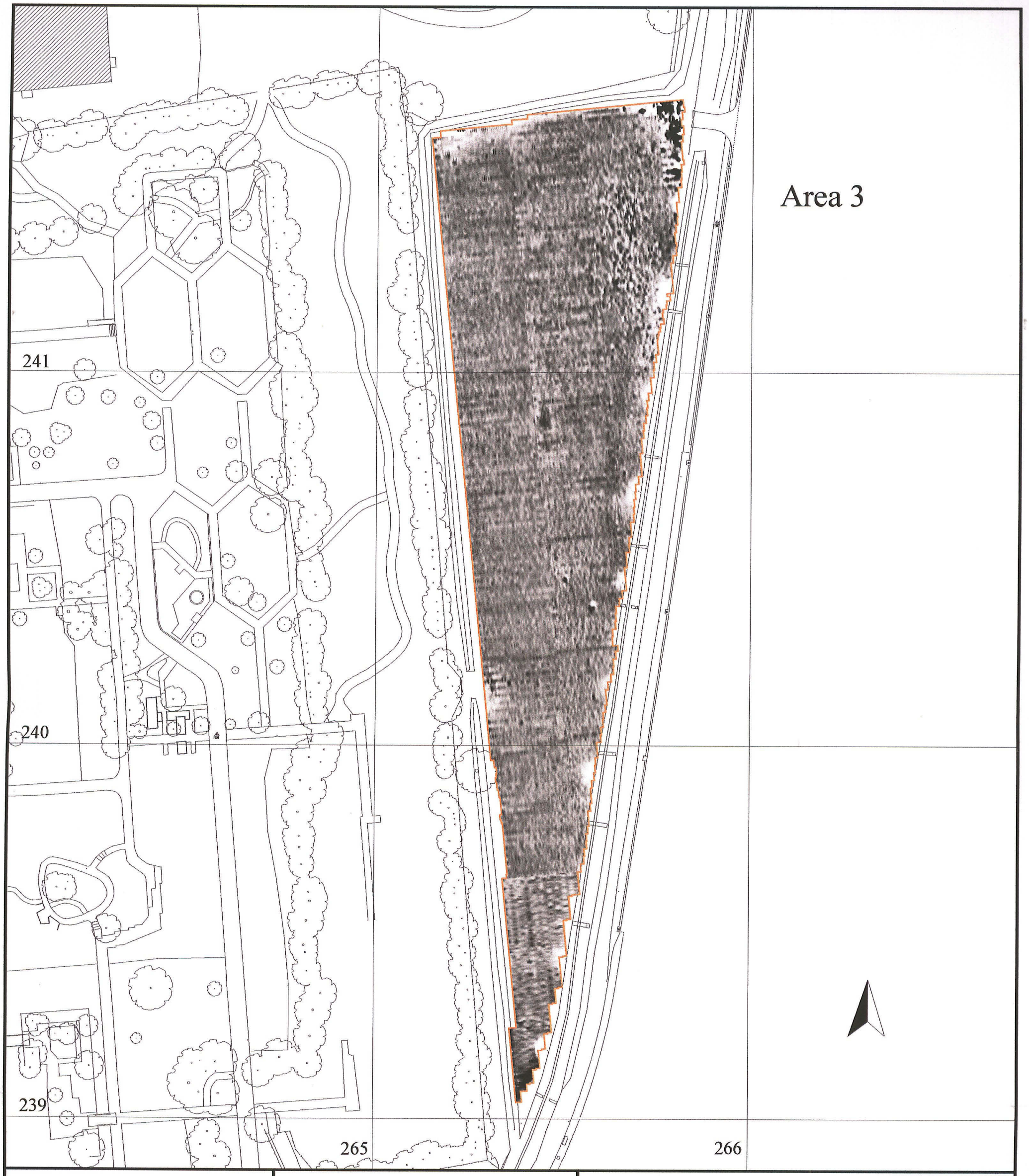
Figure 7:

Springfields Garden Centre, Spalding.
Area 2 archaeological interpretation of gradiometer data

0 50m

Scale 1:1000



Key:

Area of survey

Plans supplied by:
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Figure 8:

Springfields Garden Centre, Spalding. Area 3 gradiometer data displayed as a greyscale image

0 50m

Scale 1:1000

-12.4 -1.7 -0.5 0.5 1.8 12.4 nT

Area 3

241

240

239

265

266

Key:

Dipolar geomagnetic anomaly

Positive geomagnetic anomaly

Plans supplied by:
Watson & Batty Architects

Archaeological Services
University of Durham

On behalf of

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Figure 9:

Springfields Garden Centre, Spalding.
Area 3 geophysical interpretation of gradiometer data

0 50m

Scale 1:1000