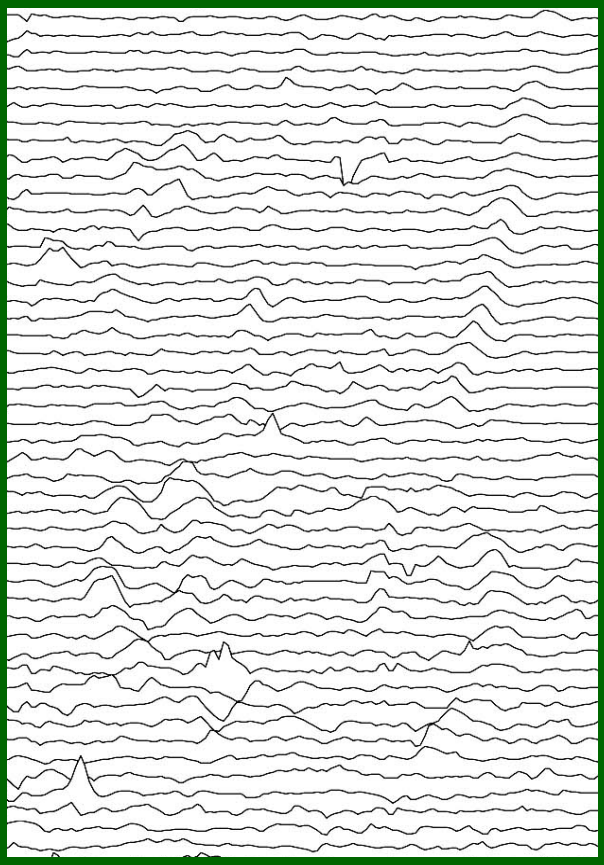
Booth Rise, Northampton
(NGR 478705 264745)

Archaeological Geophysical Survey



Souterrain Archaeological Services Ltd

SOU12-221: January 2012

commissioned by

MetroMOLA

on behalf of

William Davis Limited

Souterrain

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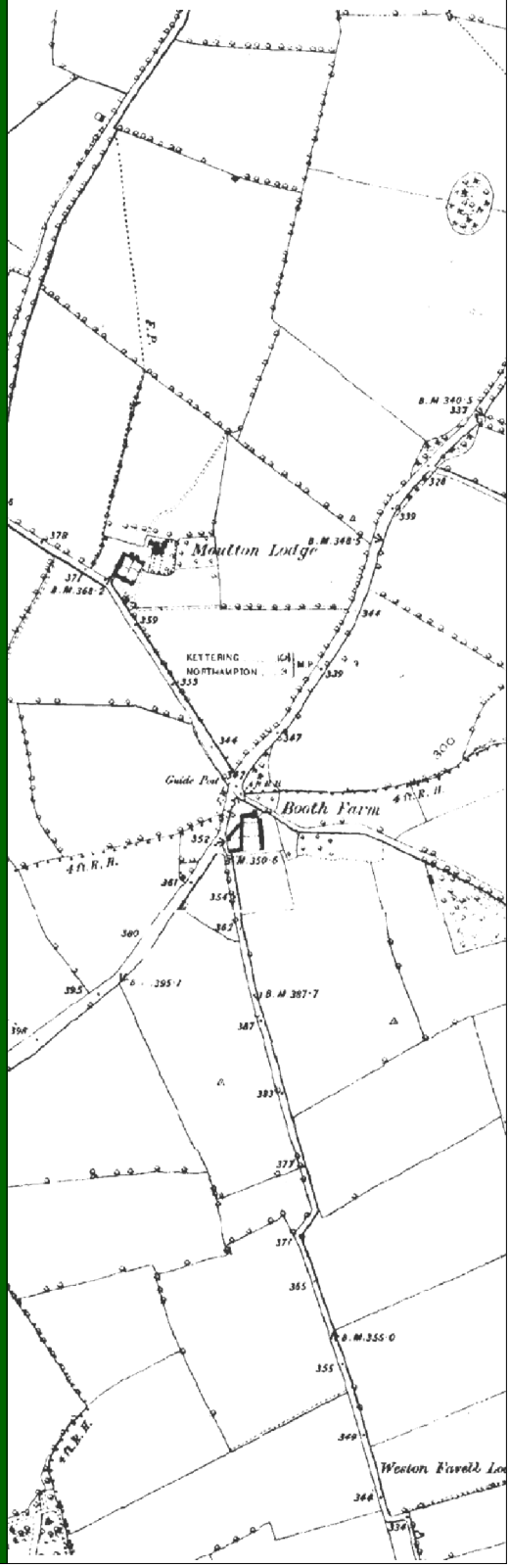

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PREFACE

All statements and opinions in this document are offered in good faith. Souterrain Archaeological Services Ltd (Souterrain) cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party, or for any loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in this document.

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SUMMARY

In January 2011, Souterrain Archaeological Services Limited carried out an archaeological geophysical survey in advance of proposed development at Booth Rise, Northampton. The survey was commissioned by MetroMOLA, on behalf of William Davis Limited.

The survey used the technique of fluxgate gradiometer. The aim of the survey was to detect potential buried archaeological remains, the results of which would be used to help develop a strategy for evaluation by trial trenching.

The survey revealed a range of archaeological-type anomalies caused by induced magnetism across the study area. At least two extensive concentrations of buried features were identified which resemble ancient enclosures or field systems. A number of curvilinear forms were also identified, showing as weaker induced magnetic responses, although anthropogenic origin is uncertain.

1. INTRODUCTION

Subject of the Survey

1.1 Full planning permission (ref. 08/0214/FULWNN) was granted on the 29th March 2011 to Paddington Churches Housing Association for the residential development of land at Booth Rise and Lumbertubs Way, Northampton[1] (Figure1). A condition (no.22) attached to the planning consent concerns the archaeological research interest in the site.

1.2 In view of this, a geophysical survey (fluxgate gradiometer) was conducted between the 9th and 12th January 2012 at Booth Rise (NGR 478705 264745) by Souterrain Archaeological Services Ltd. The survey was commissioned by MetroMOLA, for William Davis Limited.

Site description and location

1.3 The site is presently open scrub and grassland covering an area of approximately 2.65 hectares (Figures 1 and 2). It is located on the west side of Lumbertubs Way, bounded by Booth Rise to the north and west and houses and gardens to the south. The perimeter of site to the north and west is enveloped by a deep hedge accentuated by brambles. The perimeter of to the south and east is defined by a new post and wire fence, which forms the boundary of a paddock to the southwest. In the southeast there is a clump of trees and shrubs (c.44sq.m) which is also surrounded by a new post and wire fence.

Geology and soils

1.4 The site lies on the northern edge of the Nene Valley on Northampton Sands, and is between approximately 101m and 104m OD. Observation of geotechnical trial pit excavations in November 2011, revealed the topsoil to be very sandy and generally between 0.35m and 0.4m in thickness, in some areas merging with the subsoil. The subsoil comprised gravelly sand with frequent sandstone fragments, varying in thickness between c.0.35m and c.0.88m. Below the subsoil is a geological stratum of sand-stone understood to be of Middle Jurassic chronology. This was observed to be between 0.7m and 1.2m where its thickness could be established. This is weathered and shattered towards its surface, sometimes appears in pockets within the above subsoil, while at depth it appears to be more or less horizontally bedded. On the east side of the site, Lower Jurassic clay was reached at a depth of c.2.9m

2. ARCHAEOLOGICAL BACKGROUND

2.1 The archaeological potential of the site has been explored in a desk-based assessment prepared by the Museum of London Archaeological Service[2], in accordance with the guidelines published by Northamptonshire Heritage[3]. The assessment concluded that the site lies within an area of prehistoric interest, with medium potential for the survival of locally significant remains dating from the Neolithic to Iron Age periods[4]. The potential for remains of Roman date is understood to be high; a Roman villa is present about 130m south of the site and a Roman settlement was

[1] West Northamptonshire Development Corporation, Town and Country Planning Act 1990 Town and Country Planning (Development Management Procedure) Order 2010, Decision Notice, Application Reference 08/0214/FULWNN

[2] Jamieson, D., *Booth Rise, Northampton. An Archaeological impact assessment, NGR 479705, 264745*, Museum of London Archaeological Services

[3] *Policy and Guidance for Archaeological Fieldwork Projects in Northamptonshire*, Northamptonshire Heritage August 1995

[4] Section 3.2.1, p.11 section 4.2, p.17

excavated in the 1970s approximately 230m to the north[5]. In the post-medieval period the site was a part of Booth Farm, any remains of which are considered to be of local interest.

2.2 The site does not lie in an Area of Acknowledged Archaeological Value as designated by Northampton Borough Council, nor does the site contain any listed buildings or Scheduled Monuments.

2.3 In view of the site's archaeological potential the assessment advanced an outline of significant research themes, as follows:

- What is the depth of natural deposits on the site?
- Is there evidence of prehistoric activity on the site?
- Is there any evidence of Roman activity on the site?
- What is the extent of the Roman villa system? Does it extend on to the site?
- Is there any evidence for medieval activity on the site? Is there any evidence for buildings associated with Booth Farm?

2.4 The assessment recommended field evaluation to provide further information on the nature and levels of buried deposits. This will enable an appropriate mitigation strategy to be recommended by the Local Planning Authority.

3. OBJECTIVES

3.1 The geophysical survey represents the first stage of a programme of archaeological field evaluation. The purpose of the survey was to identify potential sub surface archaeological features, which would aid the development of an evaluation excavation site strategy.

4. METHODOLOGY

Technique

4.1 The aim of the magnetic (gradiometer) survey is to detect changes, referred to as anomalies, in the Earth's magnetic field caused by underground archaeological features. The types of anomaly and how they relate to buried archaeological remains are explained at Sections 5.3 and 5.4 below.

Survey Grid

4.2 A survey grid at 20m intervals was set out on alignment to the Ordnance Survey national grid (Figure2) by RTK GPS.

Instrumentation, configuration and software

4.3 The instrumentation used for the survey was a *Geoscan Research* Fluxgate Gradiometer FM36 with an external digital encoder (*Geoscan Research* Sample Trigger Unit ST1). A tuning location and 'Zero Point' for the survey was selected where relatively uniform measurements were found, indicative of the background geology of the site. The 0.1ηT range was selected in order to provide greater resolution and to detect any weaker archaeologically magnetic responses.

[5] Section3.2.2, p.12 and section 4.2.2

One sample reading was logged every 0.25m, on traverses set at 1m intervals. The results were produced using *Geoplot* v.3 software.

Survey conditions and constraints

4.4 Conditions and constraints observed during data collection have been taken into consideration in the examination and interpretation of the survey data. Whenever possible, attempts to reduce unwanted affects were taken in the field. The ground cover of the area surveyed (Figure 2) comprised just over 50% short grass (c.0.1m -0.15m). The remainder, which consisted of brambles to a height of 0.4m / 0.6m and some 1,200sq.m of dead plant growth to a height of c.1.6m, was roughly cut by the surveyors to c.0.3m to facilitate survey. Where scrub vegetation and high grass was encountered the instrument had to be raised sufficiently during traverses to avoid buffeting. This was a particularly problematic in the east and south parts of the survey area. Data collection traverses were subsequently repeated on occasions. Beyond the gridded area the land was not favourable for survey.

4.5 The weather condition throughout the survey was cold, consistent, and favourable to gradiometer survey, since there was very rarely drift of the measurements away from the zero (the modal value).

5. SURVEY RESULTS

Presentation of the data

5.1 The results of the survey in this report are presented as Shade Plots and Trace plots (Figure 4 and 5) and an Interpretative Diagram (Figure 3). The composite data in Figures 4 and 5 is presented after smoothing and rectification of minor variations in the zero drift, removal of high "noise" spikes caused by presumably modern magnetic disturbances/ ferrous litter, and re-alignment of lines of traverse in areas where high vegetation impeded walking pace. The data is unfiltered.

Types of response

5.2 Magnetic anomalies fall into two categories, *induced* magnetism and *thermoremanent* magnetism. Induced magnetism is caused by magnetically susceptible material which is found in features cut into the subsoil, such as pits and ditches. Thermoremanent magnetism is caused by structures such as hearths, kilns, foundations, brick walls and brick rubble.

5.3 Areas of high magnetism (positive anomalies) are presented on the grey scale plot as dark shades and areas of low magnetism (negative anomalies) as lighter shades. The intermediate shade represents the background geology.

5.4 In the interpretative diagram (Figure 3) individual anomalies or groups of anomalies are numbered, and assigned to the following categories:

- *Positive linear responses/anomalies.* These are the result of *induced* magnetism, which is caused by features that have been 'cut' into the natural geology and subsequently in-filled with magnetically susceptible material (i.e. rich in iron oxides). Features of this type include ditches, gullies, foundation trenches, or in-filled ruts of track-ways. The strength of these features depends on the sufficiency of magnetically susceptible material in the fill, to enable a contrast against the local background geology. Some of these are clearly visible whilst others merely ephemeral. Non-anthropogenic forms may comprise in-filled

hollows where trees or substantial shrubs had formerly stood, or in-filled cavities caused by burrowing animals.

- *Discrete positive anomalies*. Dependent on the cause of this type of anomaly, the magnitude of the response will be of varying strength. Features of anthropogenic origin may include pits, hearths and ovens. A pit containing sufficient magnetically susceptible material (*induced* magnetism) will normally show on the trace plot as a localised gentle to moderate positive peak with a negative halo. A broad positive response with a negative return may indicate a possible hearth. Isolated areas of abrupt strong magnetic disturbance may include kilns, industrial activity or burnt material.

- *Negative responses*. These anomalies are caused by features that are less magnetic than the surrounding geology. They may result from track ways, natural features, or even banked material or building stone.

- *Discrete ferrous anomalies, or iron 'spikes'*. These are caused by buried ferrous objects. They are characterised on the trace plot by a sharp positive peak and a sharp negative return.

Description and interpretation (Figure 3)

5.5 Feature group **1** denotes an area of at least three linear positive anomalies caused by induced magnetism of varying strength. The southernmost feature has the strongest response, which is generally in the range of +4ηT to +8ηT, with peaks in the region of +12ηT and c.+14ηT. It is curvilinear, c20m in length, aligned roughly east-west. It has the characteristics of a ditch. The other features, also of probably of anthropogenic origin, are relatively weak, between c.+2.4ηT and +4.55ηT, trend either east, north-east/west, south-west or northwest/southeast.

5.6 Feature group **2** consists of two adjoining faint linear positive anomalies (induced magnetism) on the northern edge of the survey area, each about 11m in length. They are generally in the range of +2ηT to +3ηT, and possibly anthropogenic in origin.

5.7 Feature group **3** comprises at least four linear positive anomalies of low strength induced magnetism are discernible. These include a rectilinear form. They are generally in the range of +4ηT to +6ηT, but increasing in places to +10ηT/+11.2ηT, and very occasionally between +15ηT and +19ηT. They are likely to be of anthropogenic origin.

5.8 It is noted that there are a number of weaker curvilinear and linear positive anomalies (c.<+2.5ηT) in the wider area of feature group **3**. It is plausible however, that these represent geological phenomena, a consequence of *cryoturbation*, whereby near-surface stratum has been disturbed by freeze-thaw processes. It is not impossible that the surface of the sandstone bedrock which is known to be shattered through weathering in this locality (*ante*. 1.4), has become extensively fissured, with the gaps subsequently in-filled with material of greater magnetic susceptibility the surrounding geology.

5.9 To the west of feature group **3** there are areas of sub-surface (topsoil) litter including ferrous objects (showing in the trace plot data as 'iron spikes') which hinders interpretation of subsurface anomalies.

5.10 Feature group **4** denotes a cluster of positive linear anomalies caused by induced magnetism, generally +3.7ηT to +4.7ηT with very occasional peaks of c.<+9.6ηT. They have the characteristics of ditches and gullies and could possibly be part of a field system. In the south part of feature group **4**, on the south edge of the survey area, there are two distinct parallel positive linear features about 5m apart. These are aligned west/east for a distance of some 18m to 20m, before turning abruptly south at their eastern end, for up to 10m, and presumably continuing beyond the survey area. A similar southern angle may be present at the west end, although the anomalies in this area appear disorderly, seemingly to correspond largely with surface disturbance beneath brambles. Notwithstanding the possibility that they are fortuitously arrayed anomalies, it has the appearance of a double-ditched rectilinear enclosure. It is cut by a large negative linear feature **12**, which is presumed to be a relatively modern conduit similar to anomalies **13** to **16**. These negative features are generally between -4ηT to -9ηT (occasionally <c.-15ηT) flanked on either side by a dark band generally in the range of +2.2ηT to +5ηT). To the north west of feature group **4** there is a distinct discrete positive anomaly (**17**) resulting from induced magnetism (c.+8.6ηT to c.+13.5η T) which has the semblance of a pit.

5.11 Feature **5** is a positive linear anomaly, again a result of induced magnetism, which is discernible for a distance of some 90m on an uneven north-northeast/south-southwest alignment. It is variably defined in terms of its magnetic susceptibility, but is generally in the range of c.+1ηT and c.+2.5ηT. It is likely to reflect the remains of a field boundary ditch, which appears to terminate at its southern end in the vicinity of feature group **4**, and therefore could be contemporary with at least some of the latter linear features. Notably, there are at least four linear anomalies (again induced magnetism) of varying strength adjoining, and perpendicular to the east side of boundary feature **5**. The latter are more or less equidistance apart, between c.12 and 15m, resembling rectangular land apportionments or enclosures.

5.12 The most unambiguous of the aforementioned enclosures adjoining boundary feature **5**, is a quasi-rectangular feature (**6**), which measures c.55m x c.10-c.14m, and has a large D-shaped enclosure (**7**) appended to its east end, the latter measuring c.20m north-south by c.14m east west. The northern side of the enclosure (**6**) notably displays stronger magnetic susceptibility (generally between +5ηT to +12.3ηT) than the south side (generally 3ηT to 4ηT).

5.13 The interior of the rectangular enclosure (**6**) appears to have faint linear features at its western end and there is a possible opening to the northwest. The western boundary, which more or less coincides with boundary feature **5**, shows as a strong magnetic response, in the general range of +4ηT and +8ηT. This contrasts greatly with boundary feature **5** (*ante*. 6.9), which could mean either a re-affirmation of the west ditch of **6**, or else that the layout of the two features (i.e. **5** and **6**) belong to different periods.

5.14 The junctures of the rectangular enclosure (**6**) and the D-shaped enclosure (**7**) seem to suggest that they are part of the same feature. There are two gaps in the western perimeter of the D-shaped enclosure, although these may simply be the result of differential magnetically susceptible material in an otherwise continuous circuit (the stronger sections of the northern and southern range widely between +3ηT and +14ηT). There are other linear features present within the D-shaped enclosure, one of which, in the south, appears to pre-date the enclosure.

5.15 Immediately southeast of the D-shaped enclosure are at least three linear and/or angular positive features (**8**) caused by induced magnetism of varying strength (c.+1ηT to +4ηT, though occasionally <+7ηT). They have the semblance of gullies or ditches, and at least two phases are discernible.

5.16 South of rectilinear enclosure **6** are at least three small discrete positive anomalies (**11**) caused by induced magnetism (generally in the range of c.+5ηT to c.+16ηT, though occasionally c.<19ηT). These have the appearance and characteristics of pits.

5.17 In the southeast part of the survey area, several weak positive linear anomalies (c.<+3.55ηT) are discernible (**9**) as a result of induced magnetism, although they may be the result of modern agricultural trends or geological processes. High vegetation precluded further characterisation beyond the survey grids in this area.

5.18 This is a very distinct weak positive linear anomaly (**10**) resulting from induced magnetism (generally in the range of +3.5ηT and +6ηT). It is aligned east-northeast/west-southwest and resembles a ditch. Its full extent could not be determined due to high vegetation to the southwest and a fenced compound of trees and shrubs to the northeast.

6. CONCLUSIONS

6.1 The purpose of the gradiometer survey was to attempt to identify potential sub surface archaeological features that may be affected by the development proposals. A grid-by-grid examination of field conditions was undertaken to identify and eliminate surface phenomena and litter that might have a detrimental effect on the data and its interpretation.

6.2 The survey reveals little modern disturbance other than uniform ploughing striations on a northwest/southeast orientation that are just discernible as a background 'noise' marginally either side of zero across the entire data set.

6.3 A range of archaeological-type responses were revealed as a result of induced magnetism. There are at least two concentration distinct features of anthropogenic origin, which resemble ancient field enclosures or field systems.

6.4 The data reveals clusters of poorly defined weak curvilinear and linear positive anomalies, particularly throughout the central zone of the survey area (especially in the vicinity of feature group **3**). Given the known nature and depth of the near-surface geological stratum from geotechnical observations, it is a strong plausible that these anomalies are a result of cryoturbation, perhaps exacerbated by ploughing regimes. Nonetheless, since distinct anthropogenic forms have been identified in the survey area, the presence of archaeological features of a more ephemeral nature (i.e. in terms of magnetic susceptibility) should not be precluded.

7. GENERAL

Statement of Indemnity

7.1 All statements and opinions presented in this report arising from the programme of investigation are offered in good faith and compiled according to professional standards. Whilst every effort has been made to ensure that interpretation of the survey presents a good indication of the nature of sub-surface remains, any conclusions derived from the results form an entirely subjective consideration of the data. Geophysical survey enables the collection of data relating to variations in the form and nature of buried soils. This may only reveal certain

archaeological features, and may not record all. No responsibility can be accepted by the author of the report for any errors of fact or opinion resulting from data supplied by any third party, or for loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in any such report(s), howsoever such facts and opinions may have been derived.

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7.3 Souterrain undertakes to respect all requirements for confidentiality about the Applicant's proposals provided that these are clearly stated. It is expected that owners respect Souterrain's and the Institute for Archaeologists' general ethical obligations not to suppress significant archaeological data for an unreasonable period.

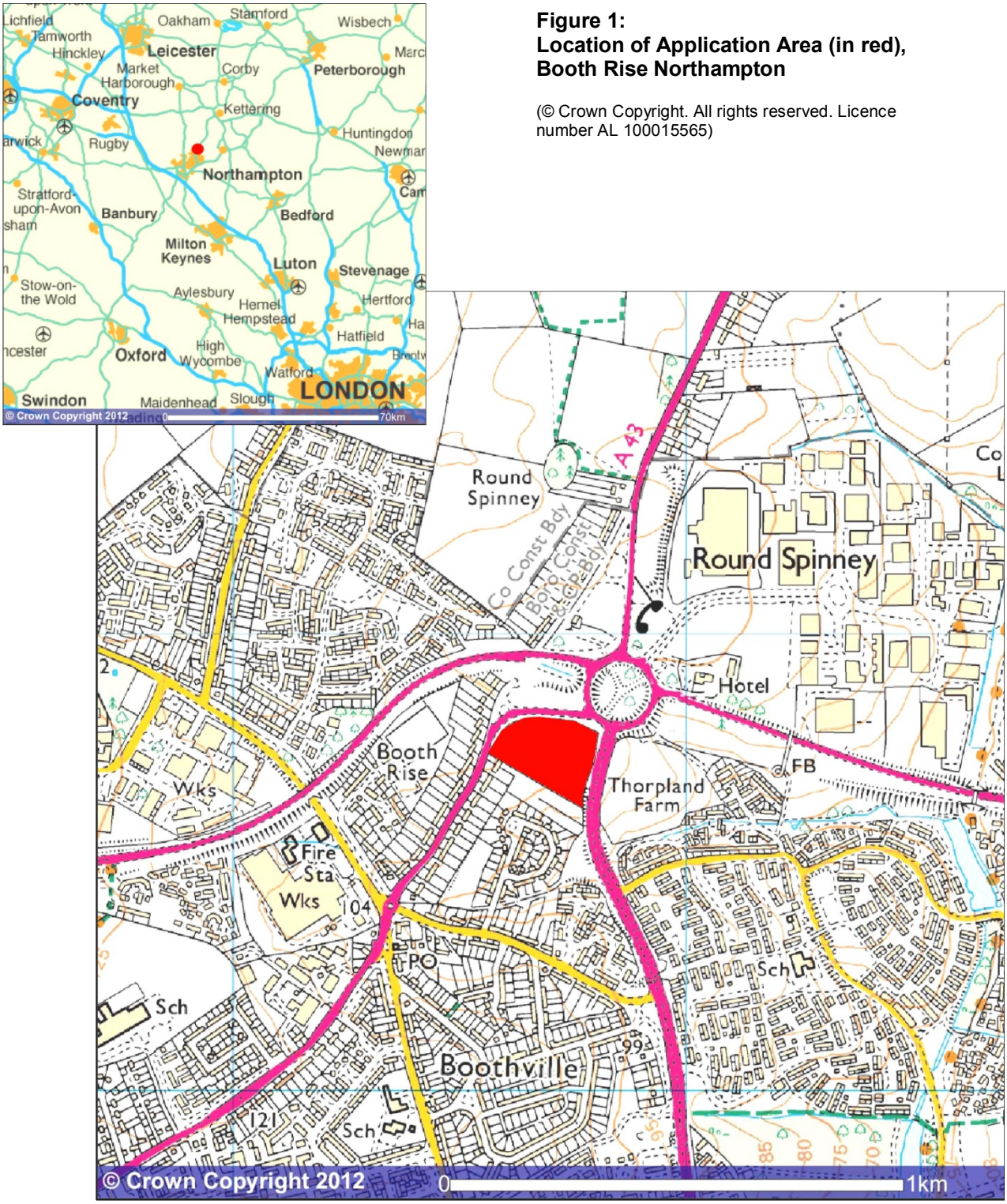


Figure 1:
Location of Application Area (in red), Booth Rise Northampton

Figure 2: Location of survey grid

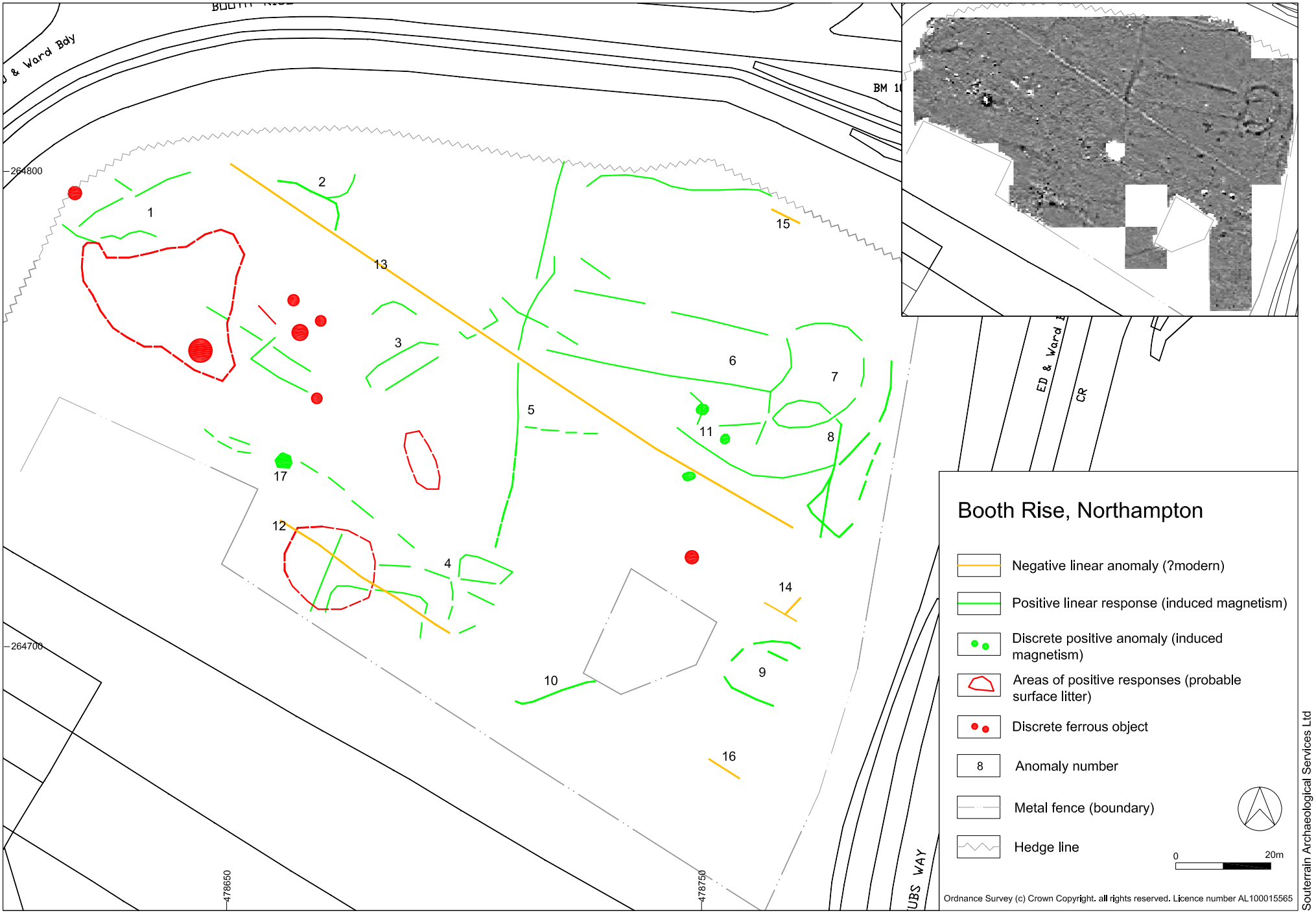
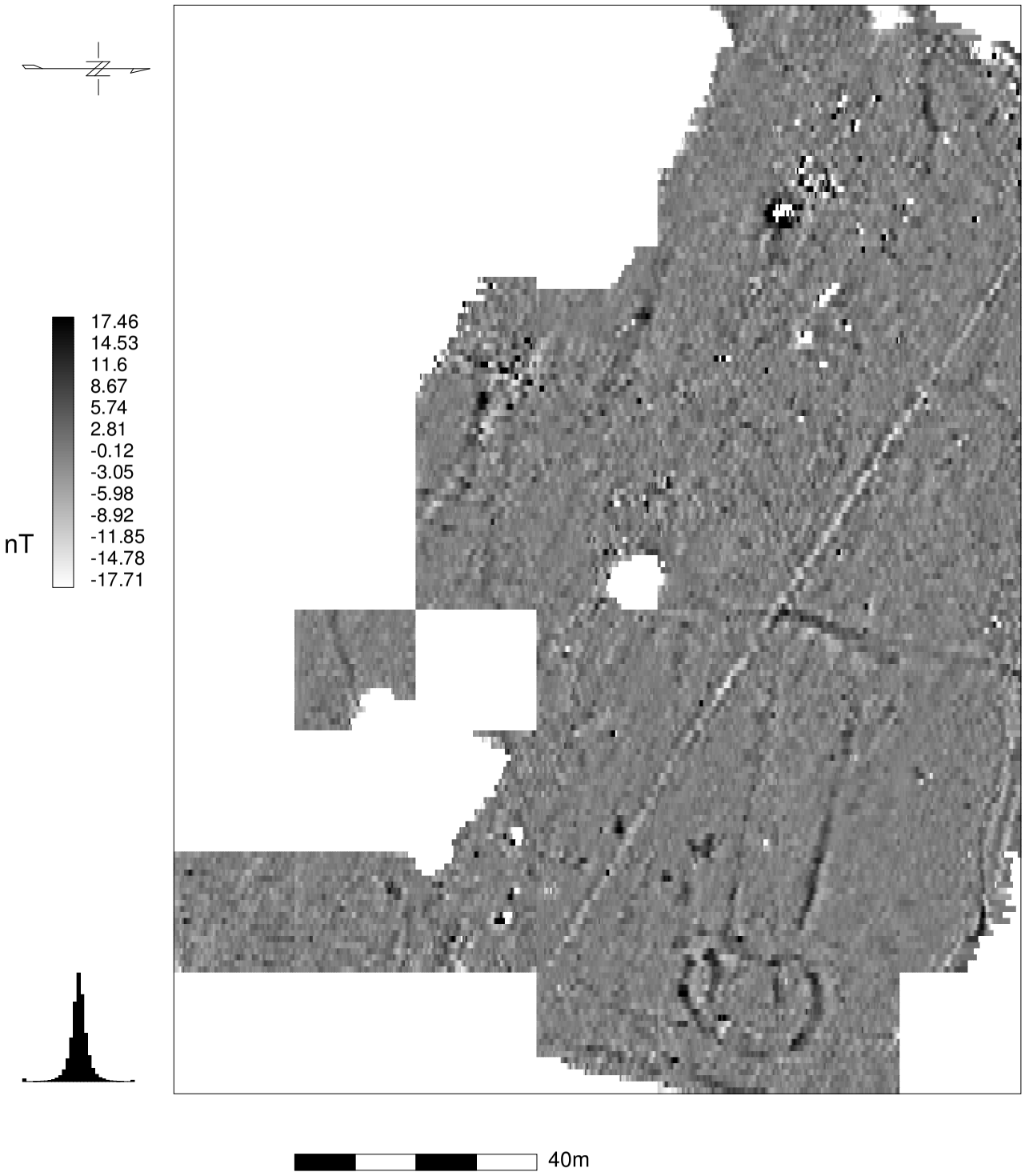


Figure 3: Gradiometer survey, interpretative diagram

Booth Rise, Northampton (NGR 478705, 264745):
Fluxgate Gradiometer Survey, January 2012. Grey Scale Plot



Booth Rise, Northampton (NGR 478705, 264745):
Fluxgate Gradiometer Survey, January 2012. Stacked Trace Plot

Figure 6. General overviews of the site (taken in November 2011). Top: facing east from the site entrance at Booth Rise. Bottom: facing northwest from the southeast perimeter fence.