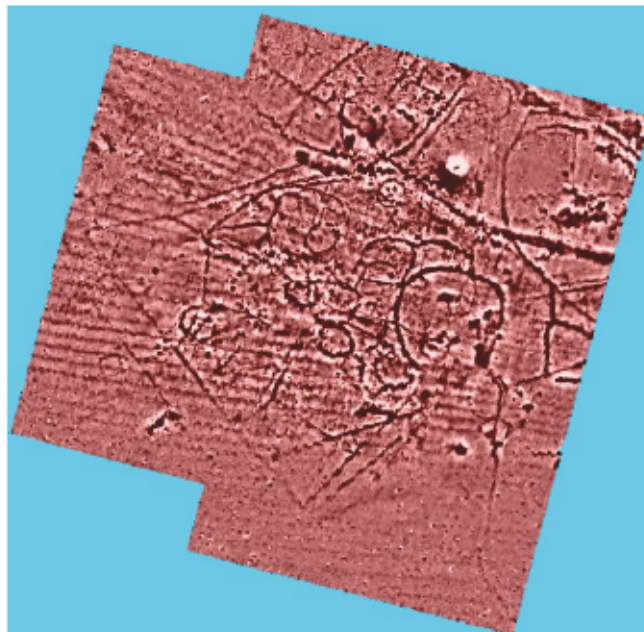




Northamptonshire
County Council

Northamptonshire Archaeology

Geophysical Survey at
Towcester Vale, Towcester
Northamptonshire
March 2007



Adrian Butler

May 2007

Report 07/78

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**NORTHAMPTONSHIRE COUNTY COUNCIL
NORTHAMPTONSHIRE ARCHAEOLOGY
MAY 2007**

**GEOPHYSICAL SURVEY
AT TOWCESTER VALE,
TOWCESTER, NORTHAMPTONSHIRE
MARCH 2007**

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QUALITY CONTROL

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Checked by	P Chapman	<i>PC</i>	25/05/07
Verified & Approved by	A Chapman	<i>AC</i>	25/05/07

OASIS REPORT FORM

PROJECT DETAILS		
Project name	Towcester Vale	
Short description (250 words maximum)	<i>Geophysical survey comprising 145ha Magnetic Susceptibility (MS) reconnaissance and 22ha targeted detailed Magnetometry were carried out at Towcester Vale, encompassing the southern hinterland of Towcester town. Five areas of interest were identified by MS. Follow up survey revealed a 5ha palimpsest of possibly late prehistoric curvilinear enclosures, roundhouses, pits and linear ditches west of Watling Street. A probable occupation site including an ovoid enclosure and roundhouses was identified central to the west of the survey area. Other small enclosures and ditches were found around the area, including a probable part of the medieval Wood Burcote.</i>	
Project type (e.g. DBA, evaluation etc)	Geophysical Survey	
Site status	None	
Previous work		
Current Land use	Arable	
Future work	Unknown	
Monument type/ period		
Significant finds		
PROJECT LOCATION		
County	Northamptonshire	
Site address (including postcode)		
Study area (sq.m or ha)	145ha	
OS Easting & Northing (use grid sq. numbers)	SP 689,479 – 692,465	
Height OD		
PROJECT CREATORS		
Organisation	University of Leicester Archaeological Services (ULAS)	
Project brief originator	-	
Project Design originator	ULAS	
Director/Supervisor	Carol Simmonds / James Aaronson	
Project Manager	Adrian Butler	
Sponsor or funding body	Halcrow	
PROJECT DATE		
Start date	Feb 2007	
End date	May 2007	
ARCHIVES	Location (Accession no.)	Content (e.g. pottery, animal bone etc)
Paper	NA	Site Notes
Digital	NA	Geophysical & GIS data
BIBLIOGRAPHY	Journal/monograph, published or forthcoming, or unpublished client report (NA report)	
Title	Geophysical Survey at Towcester Vale, Towcester, Northampton	
Serial title & volume	07/78	
Author(s)	Adrian Butler	
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**GEOPHYSICAL SURVEY AT TOWCESTER VALE,
TOWCESTER, NORTHAMPTONSHIRE**

MARCH 2007

ABSTRACT

Geophysical survey comprising 145ha Magnetic Susceptibility (MS) reconnaissance and 22ha targeted detailed Magnetometry were carried out at Towcester Vale, encompassing the southern hinterland of Towcester town. Five areas of interest were identified by MS. Follow up survey revealed a 5ha palimpsest of possibly late prehistoric curved enclosures, roundhouses, pits and linear ditches west of Watling Street. A probable occupation site including an ovoid enclosure and roundhouses was identified central to the west of the survey area. Other small enclosures and ditches were found around the area, including a probable part of the medieval Wood Burcote.

1 INTRODUCTION

Archaeological geophysical survey comprising Magnetic Susceptibility reconnaissance (MS) and Magnetometer prospection, was carried out by Northamptonshire Archaeology in February and March of 2007. The work was carried out on behalf of University of Leicester Archaeological Services (ULAS) as part of an Archaeological Assessment of the Towcester Vale project (NGR SP 689,479 – 692,465; Fig 1).

1.1 Previous archaeological work

Towcester is known to have been the defended Roman town of ‘Lactodorum’, situated on the major Roman road of Watling Street at the junction with the Alchester Road. There is some evidence of prehistoric occupation and Roman finds continue extra-murally for up to 500m south of the ancient town, including a villa and possible temple 1km west of Wood Burcote. That village has medieval antecedents and survived in a shrunken state (RCHME 1982, 150-157).

1.2 Topography and geology

‘Towcester Vale’, the 212ha of land immediately to the south of urban Towcester (Fig 1), consists mainly of rolling arable fields. The fields for survey have been numbered F1 - F22, the area between F14 and F4 was not available for survey. Silverstone Brook passes south-west from Towcester through the western part of the area. Central to the site area is the village of Wood Burcote, 28ha of woodland and farms lie to the north-east of the village. A

watercourse passes south from the town, through the woods dividing the site in half. The site area is bounded by the A43 to the west and the A5 Watling Street on the east.

The survey area is dominated by a Boulder Clay geology. This Till lies on and around limestones of the Upper Esturine and Great Oolite series. Other units are known to underlie the various fields. For example F15 and F16 are on alluvium and Upper Lias Clay of the Silverstone Brook valley. A limestone raft is known under F1 and F5, Calcareous Tufa (Travertine) in F19 and F20. Northampton Sand and Ironstone underlies F6, F7 and F17.

2 GEOPHYSICAL SURVEY: METHODOLOGY

Geophysical survey was carried out in accordance with English Heritage and the Institute of Field Archaeologists Guidelines (EH 1995 & Gaffney, Gater and Ovendon 2002).

2.1 Magnetic Susceptibility Survey

Most materials exhibit a property known as magnetic susceptibility (MS) based on their iron oxide (magnetite) content. Negative cut-and-filled features such as ditches and pits usually are detectable as more highly magnetic because of the inclusion of high MS topsoil and cultural material in the fill and also bacterial processes which convert between none and magnetic iron oxides. Kilns, hearths and furnaces gain a thermoremanent magnetism (TRM) from extreme heating and are identifiable from very high magnetic values, other ceramic material such as concentrations of pottery will demonstrate a level of TRM. The greatest magnetism is displayed by iron (ferromagnetic).

Material from archaeological features can become combined with the upper soil layers by worm action, weathering and most importantly, ploughing. In this manner higher MS levels can be detected in the soil over archaeological sites.

Volumetric MS survey is carried out using a Bartington MS2D Susceptibility field coil and meter. Readings are taken at 20m x 20m intervals over the site and plotted as georeferenced greyscale images (Fig 2) scaled between 0-100 x10⁻⁵ SI units (a dimensionless, internally relative measurement). Areas of anomalously high or low MS are identified for follow up detailed magnetometer survey.

2.2 Magnetometer Survey

The contrast in MS between an archaeological feature and the surrounding substratum is often identifiable as a slight perturbation of the geomagnetic field. Such changes can be

detected with a magnetometer. Ditches and pits, for example, with a relatively high MS will provoke a high magnetic anomaly. Stone structures may occasionally be identified, depending on the type of stone, the local geology and the MS contrast between them. Typically a stone wall may be identified as low magnetic anomaly, a depleted MS level compared to the substratum.

Surveys were carried out utilising a type of magnetometer common in archaeological usage, a fluxgate gradiometer. The difference is that 'magnetometers' tend to be 'Total Field' instruments which read the entire geomagnetic field whereas a 'gradiometer' is designed only to detect the subtle magnetic field changes (local magnetic gradient between two vertically mounted sensors) where it is located – just above ground level.

Intensive magnetometer survey was undertaken using Bartington Grad601-2 and Geoscan FM-series fluxgate gradiometers. Survey progresses along a grid system in which 30m x 30m grid squares are traversed at rapid walking pace in zigzag (alternate north-south/south-north) traverses spaced at 1m intervals with data recorded every 0.25m along these (4 readings /m). The Grad601-2 is constructed as a dual-sensor instrument with two vertical gradiometers separated on a yoke to enable two lines of survey to be recorded in tandem. The FM is a single gradiometer system.

A total of 244 separate 30m grid-squares, totalling c22ha, were surveyed in detail. The position of survey blocks was aimed to test both MS anomalies and the overall MS background, providing coverage over the development area.

The data was analysed using Geoplot 3.00s software. Low (negative) magnetism is shown as black and high (positive) magnetism as white in the resultant greyscale plots. The following processing functions were carried out on the data. The 'Zero Mean Traverse' function was applied in order to bring the average level of each line of data into a balanced zero. Small-scale extreme readings were excised and replaced with the local mean value.

The processed data is presented here in the form of greyscale images highlighting the magnetic anomalies, georeferenced to scale Ordnance Survey base-maps (-4.0nT / +4.0nT scale, Figs 4, 6 & 8). Interpretative plots have been provided on the same base (Figs 5, 7, 9, 10 & 11) and are referred to directly in the following Results section.

3 RESULTS

Reconnaissance Survey

Topsoil Magnetic Susceptibility (MS) survey has been carried out over 145ha of land proposed for the Towcester Vale Expansion. Other fields in the area remain unsurveyed due either to unsuitability or owner objection.

The results, shown in Figure 2, vary broadly between 0 to 100 SI units across the site, due in part to the rolling topography. This is apparent especially in Fields 15-20 situated either side of Silverstone Brook with its alluvial and clay geology. The signal was considerably weaker than that on the hillside Fields 9, 10 and 21.

Smaller scale changes in MS can be attributed in the majority of the area to variation in agricultural regime between fields. A number of former field boundaries have been identified coincident between the 1st Edition Ordnance Survey (1886) and changes in MS over modern fields.

Six enhanced MS zones possibly indicating archaeological material, have been detected. These total an area of c11ha and are labelled A to F on Figure 3. The results are as follows:

Field 2: A large area of enhancement (A), up to 350m in diameter, has a central focus of susceptibility five times higher than the majority of Field 2. The dimensions suggest a core set of features, 60m wide, that have had their magnetic material ploughed out over a large area.

Field 3: This smaller, 60-70m diameter, enhanced area (B) would appear to be an extension to a weakening MS limb from Field 2.

Field 8: An area of MS enhancement (D) was detected behind the housing plots of Wood Burcote. Two possible interpretations may be given. The high MS may be due to earlier features situated outside the modern village area, or simply the relatively recent dumping of magnetic material, e.g. brick, in fields.

Field 9: Enhanced MS readings (C) were noted at the southern corner of this area. The values were of similar degree to the three other enhanced areas and thus considered to be of possible interest.

Field 4: A high MS area (E) was detected in the southern of the two fields known to have existed (1st Edition Ordnance Survey). The spread of the higher MS levels in plough soil as a whole appears to butt against the former boundary.

Field 17: The elongated area of enhancement (F) has no ready modern explanation although it coincides with former boundaries to the east.

Detailed Survey

Detailed magnetometer survey was carried out in sample blocks in all fields other than F12 and F13. The results are presented on a field-by-field basis and should be read in conjunction with the figures (4-11).

Field 1 (Figs 4-6):

1_1: Adjacent to Watling Street this rectangular area contains ridge and furrow and several ferrous type anomalies.

1_2: Other than sparse ferrous anomalies, nothing significant was detected

1_3: A length of possible ditch orientated to the south-east was identified. Ridge and furrow covers much of the area and several unidentifiable amorphous positive anomalies were located in the north.

1_4: This area was found to contain a possible ditch and pit with north-east orientated ploughing and an uninterpreted anomaly to the west.

1_5: Nothing of significance was detected in this area.

1_6: North-east trending plough lines were detected, encompassing the total of useful anomalies in 1_6.

1_7: This survey area was situated at the head of a small dry valley, on the slope of a hill to the east. The group of positive and negative anomalies detected lack definable form and are believed to represent quarrying.

Field 2 (Figs 4-6, 9):

An area comprising 5.31ha was surveyed on a ridge top in F2, directly over the position of the largest enhancement of MS from reconnaissance. Many positive magnetic anomalies were identified, curving, linear and discrete, forming a palimpsest of features up to 0.25km across. There appears to be a core containing curving enclosures, roundhouses and pits surrounded by further linear ditches. It is possible that one or two of the more magnetic pit type anomalies could be sourced from ovens or kilns, but these features cannot be readily separated out. Several areas of positive magnetisation without obvious structure were imaged in the north of the area. These are roughly interpreted as geological in origin, but an archaeological source cannot be discounted. The magnetisation of archaeological features has caused the ridge and furrow cultivation over that part of F2 to become more enhanced than the surrounding field through the add-mixing of fills from plough-struck features.

Field 3 (Figs 4-6):

Other than some disturbance from modern source, the features from F2 to the west did not

continue into F3. Enhanced MS area B may still represent topsoil material moved downhill from F2 (A) naturally, or by plough.

Field 4 (Figs 4-6):

4_1: No meaningful anomalies were encountered.

4_2: Two linear positive anomalies, ditches, orientated to the north-east were detected. An examination of the 1st Edition Ordnance Survey map suggests that these may represent movement and re-cuts of the old field boundary. In the south of area 4_2, two curving positive magnetic anomalies would appear to form part of an enclosure. Ridge and furrow apparently aligns north-west in the data.

Field 5 (Figs 4-6):

An iron pipe was detected crossing the north of the area. Ridge and furrow was imaged orientated north-west – south-east. Other than a ferrous anomaly, little else was recovered from F5.

Field 6 (Figs 4-6):

At least one, possibly two, east-west iron pipelines were located in F6.

Field 7 (Figs 4-6):

Two iron pipes were detected, one of which would seem to continue west of a similar pipeline in F6.

Field 8 (Figs 4,7 & 8):

The area to the rear of building plots was found to contain a mass of dipolar (positive/negative) signals, probably a result of the dumping postulated from the MS results.

Field 9 (Figs 4, 7, 8 & 10):

9_1: A curving positive anomaly, possibly an enclosure, was detected in the east of the area.

9_2: The survey imaged two curving anomalies, possibly coincident ring ditches and probable ditches, one of which appears to continue in F10. Two large ferrous anomalies were detected close to the field boundary. Ridge and furrow was orientated to the north-east.

9_3: No significant anomalies were detected, although ridge and furrow appears to align to the south-east.

Field 10 (Figs 4, 7, 8 & 10):

10_1: Results from this area show low level anomalies usually associated with small-scale geological variation.

10_2: Immediately adjacent to 9_2, positive anomalies detected in 10_2 resemble a large ovoid enclosure with possible associated ring and linear ditches. A ferrous anomaly was detected by the field boundary. Together with F9, the results define a one hectare group of archaeological features.

10_3: No anomalies of archaeological import were identified in this survey block.

10_4: Linear positive anomalies, more magnetic than the surrounding furrows, were detected forming a pair of possible parallel ditches, 10m apart, orientated north-east – south-west.

10_5: Ridge and furrow aligned to the north-east was identified in this area.

Field 11 (Figs 4, 7, 8 & 10):

Survey south-east of Wood Burcote village has located a pair of linear ditch anomalies, possibly a part of the shrunken medieval village or at least the field system.

Field 14 (Figs 4, 7 & 10):

No archaeologically significant anomalies were detected in F14, although ridge and furrow appeared to be orientated north-south.

Field 15 (Figs 4, 7 & 10):

15_1: This block suffered from severe magnetic disturbance from the north.

15_2: Survey detected a short (7m N-S) iron pipeline and two concentrations of anomalies either ceramic or ferrous based.

Field 16 (Figs 4, 7 & 10):

A disjointed band of high, ferrous, signals was identified aligned south-east across F16. It is unclear what it may represent, but is possibly a former pipeline.

Field 17 (Figs 4, 7 & 10):

F17 is dominated by a pair of highly magnetised features in the south of the area. These have few diagnostic characteristics, but could represent an area of industrial activity. Curving away to the north of that is a broad anomaly that may be interpreted as a track, though the iron or pipeline detected apparently flanking the east side of the track may suggest an early modern date for the features. The north of the area contains a confusion of

ferrous or ceramic anomalies, together with several highly magnetic features. Ridge and furrow runs south-east through this.

Field 18 (Figs 4, 7 & 10):

No anomalies of interest were detected in F18

Field 19 (Figs 4, 7 & 10):

A ferrous pipeline was detected orientated north-south on the west side of this area.

Field 20 (Figs 4, 7 & 10):

Nothing of significance was located in F20 survey.

Field 21 (Figs 4, 7 & 10):

Positive anomalies reflecting a possible small ditched enclosure was identified in the north of the survey area. Ridge and furrow trends to the east in the south of the area.

Field 22 (Figs 4, 7 & 10):

An area of signals representing ceramic or ferrous waste was located on the east side of F22. This probably accounts for the slightly enhanced MS of this field.

4 CONCLUSION

Two phases of geophysical survey have been carried out 145ha at Towcester Vale. Magnetic susceptibility reconnaissance survey identified five zones of particularly enhanced MS (A, C, D, E, F). All of these were subsequently subject to detailed magnetometer survey, which also covered additional areas, to a total of 22ha.

MS zone A Field 2, near to the Roman Watling Street resolved into a 5ha palimpsest of possibly late prehistoric curved enclosures, roundhouses and pits bounded by linear ditches. Zone C in Field 9 presented only a small enclosure. Field 8, zone D was merely the garbage tipped behind house plots.

Detailed survey of MS zone E, Field 4_2 demonstrated the shifting of a former field boundary, but also revealed a small enclosure. Field 17, zone F, contains a possible industrial site and associated trackway.

Magnetometry of Fields 9 and 10 revealed a set of features not detected by MS, including

an ovoid enclosure, ring ditches and linear ditches. A pair of ditches in F11 may represent a part of the shrunken medieval village of Wood Burcote and associated fields. Survey in Field 21 resolved part of a small enclosure.

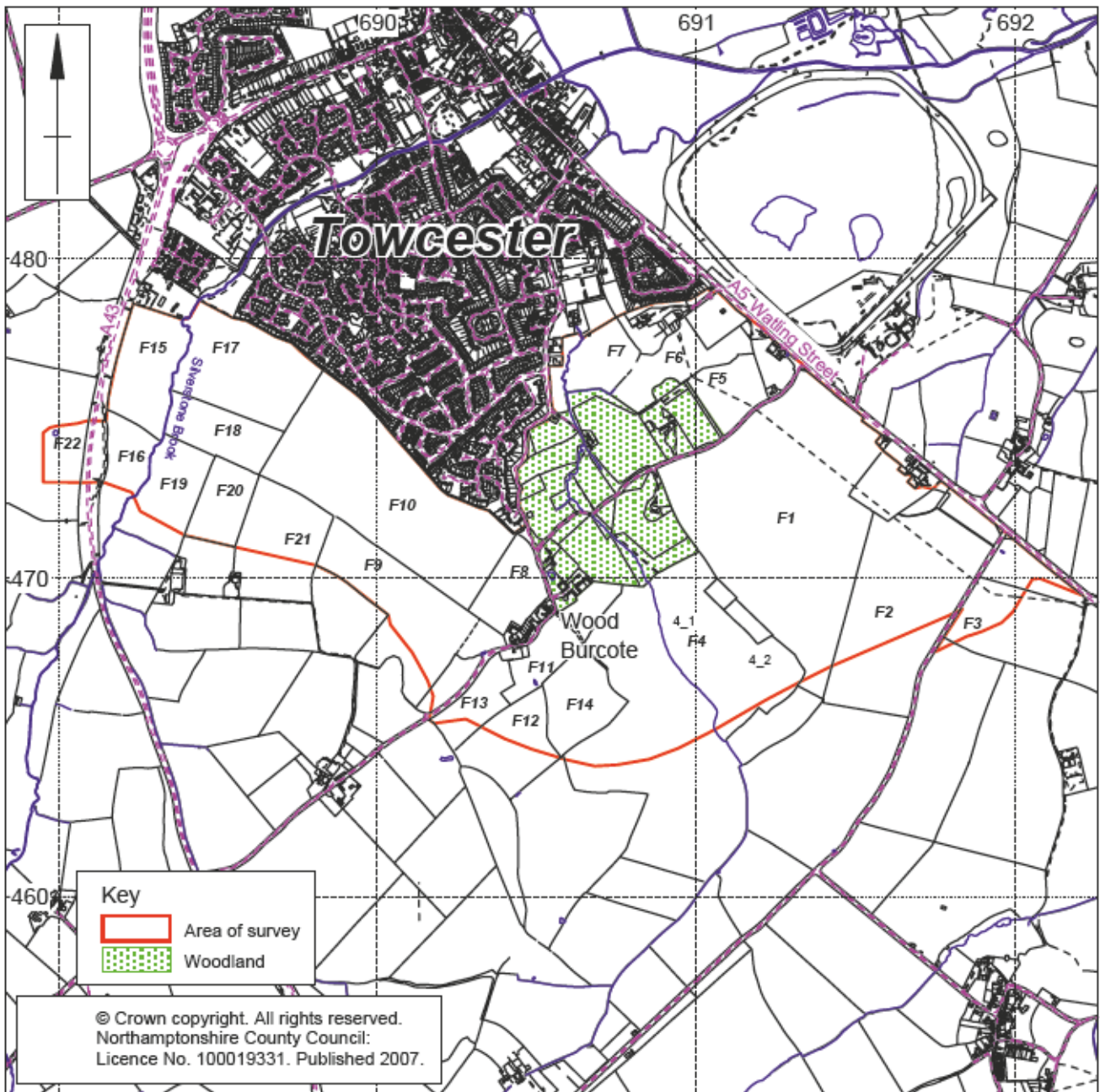
Survey of the Towcester Vale area has identified a landscape intensely cultivated in the medieval period and likely to have been subject to occupation in the late prehistoric period.

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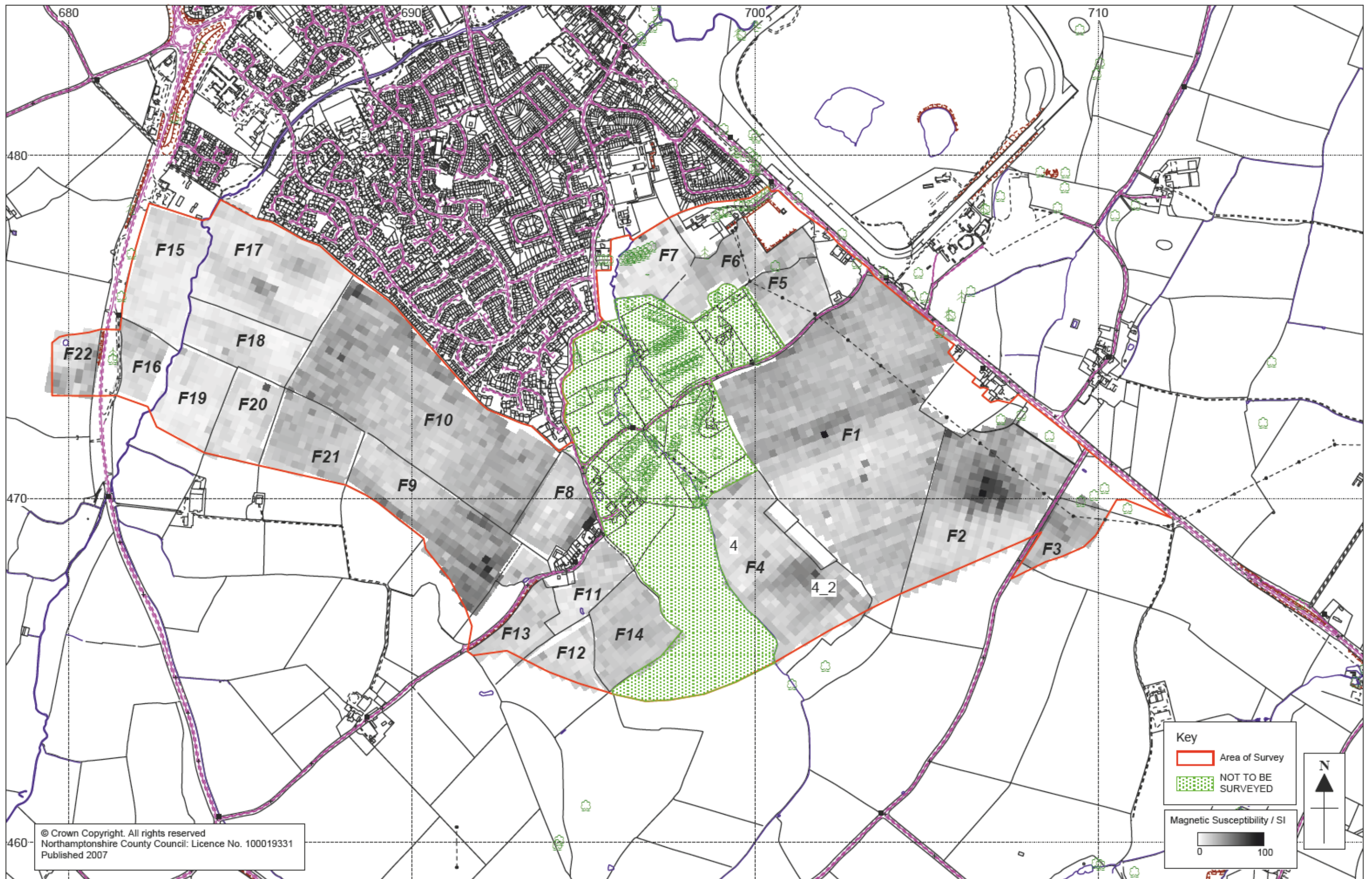
Gaffney, C, Gater, J, and Ovendon, S, 2002 *The Use of Geophysical Techniques in Archaeological Evaluations*, Institute of Field Archaeologists Technical Paper, 6

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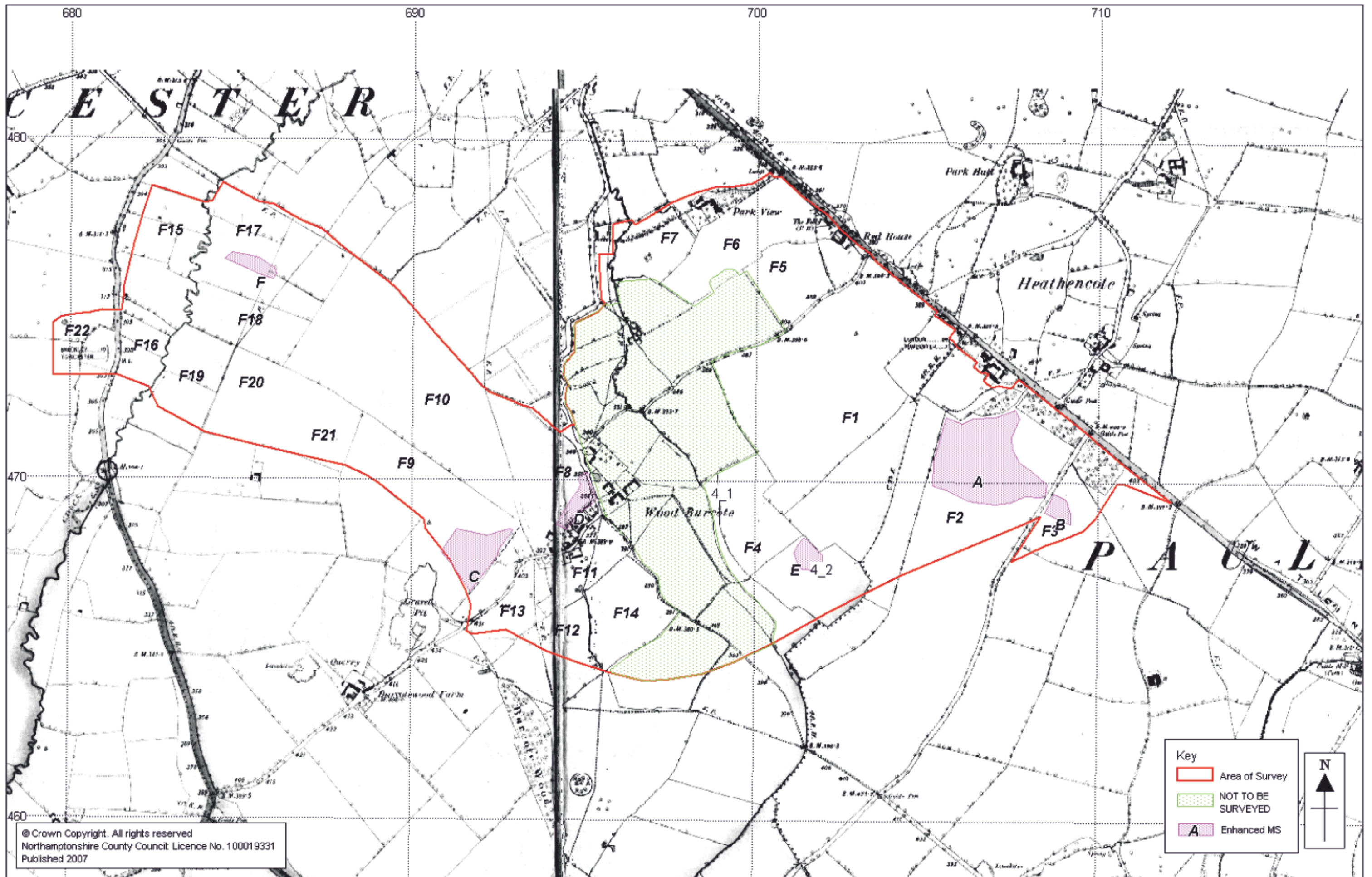
Fig. 1

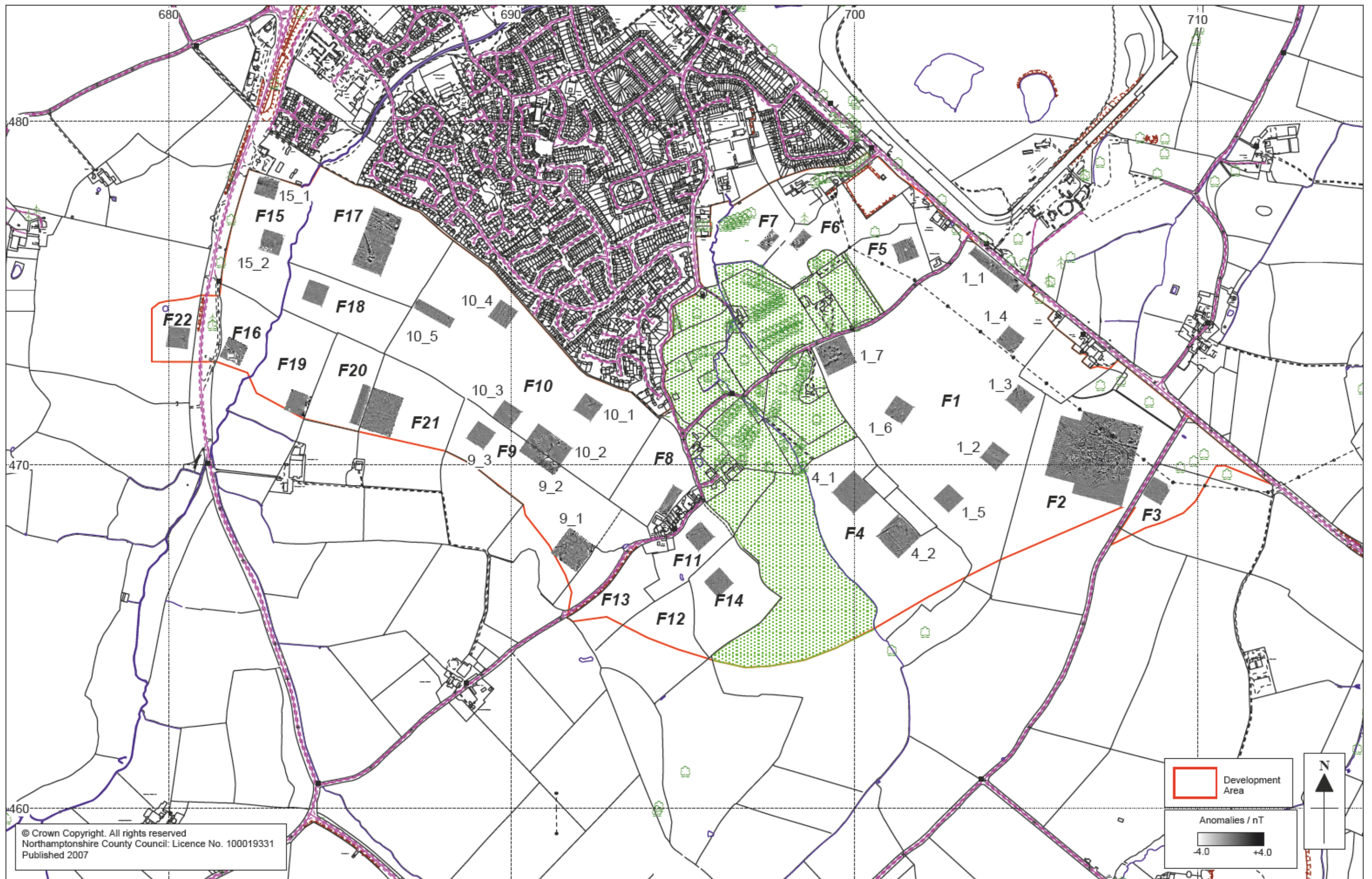


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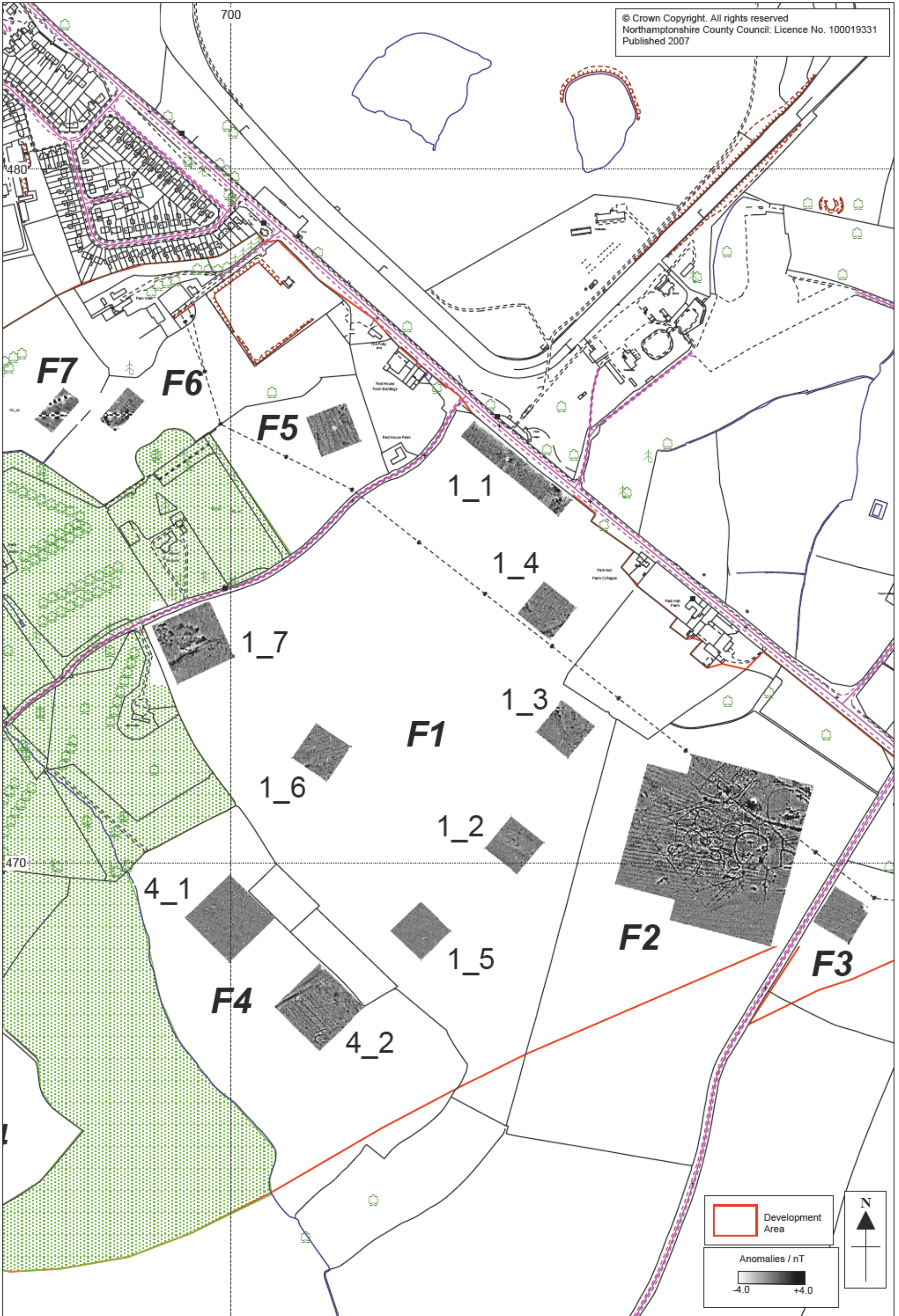
Towcester Vale Reconnaissance Survey Fig 2

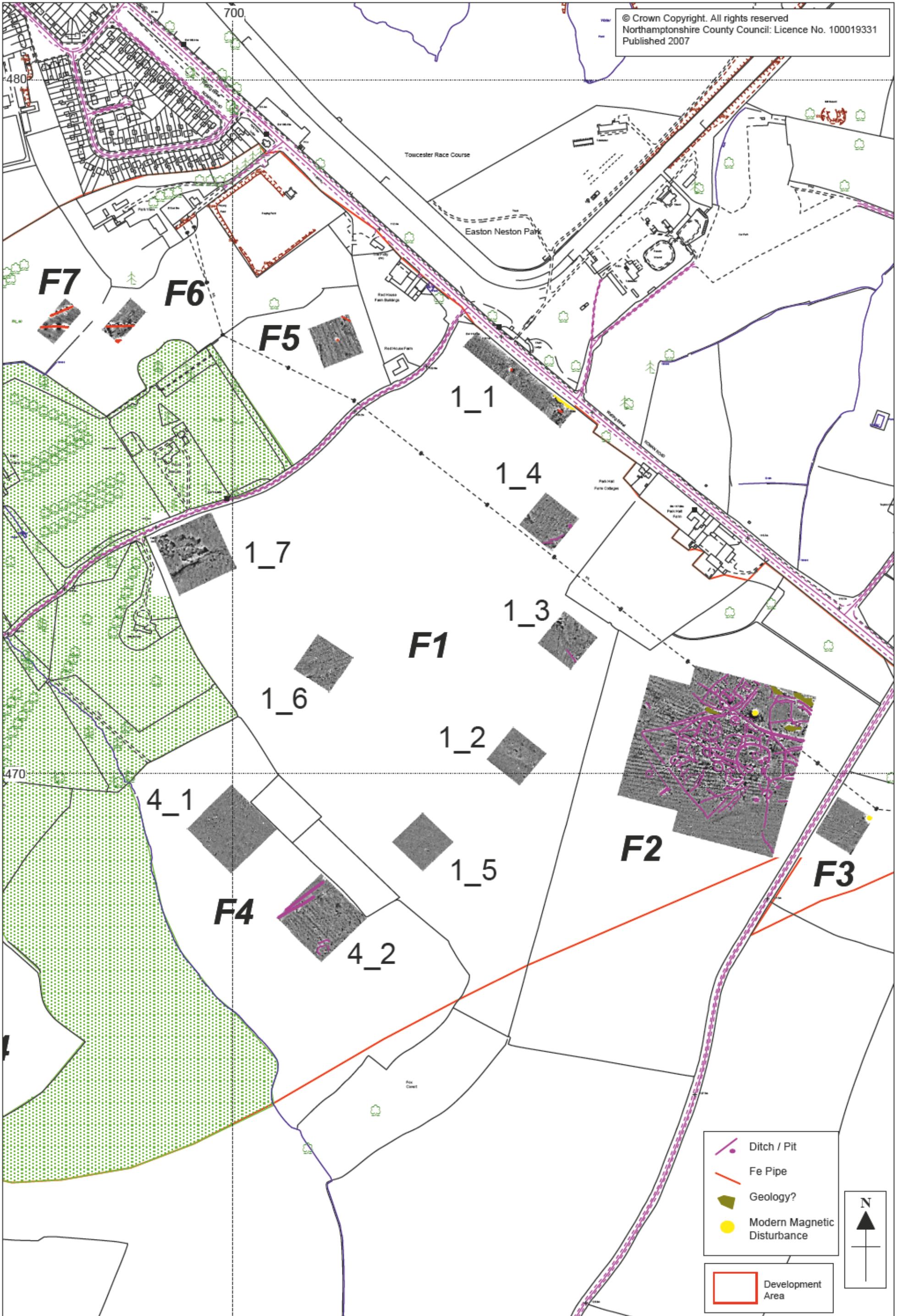


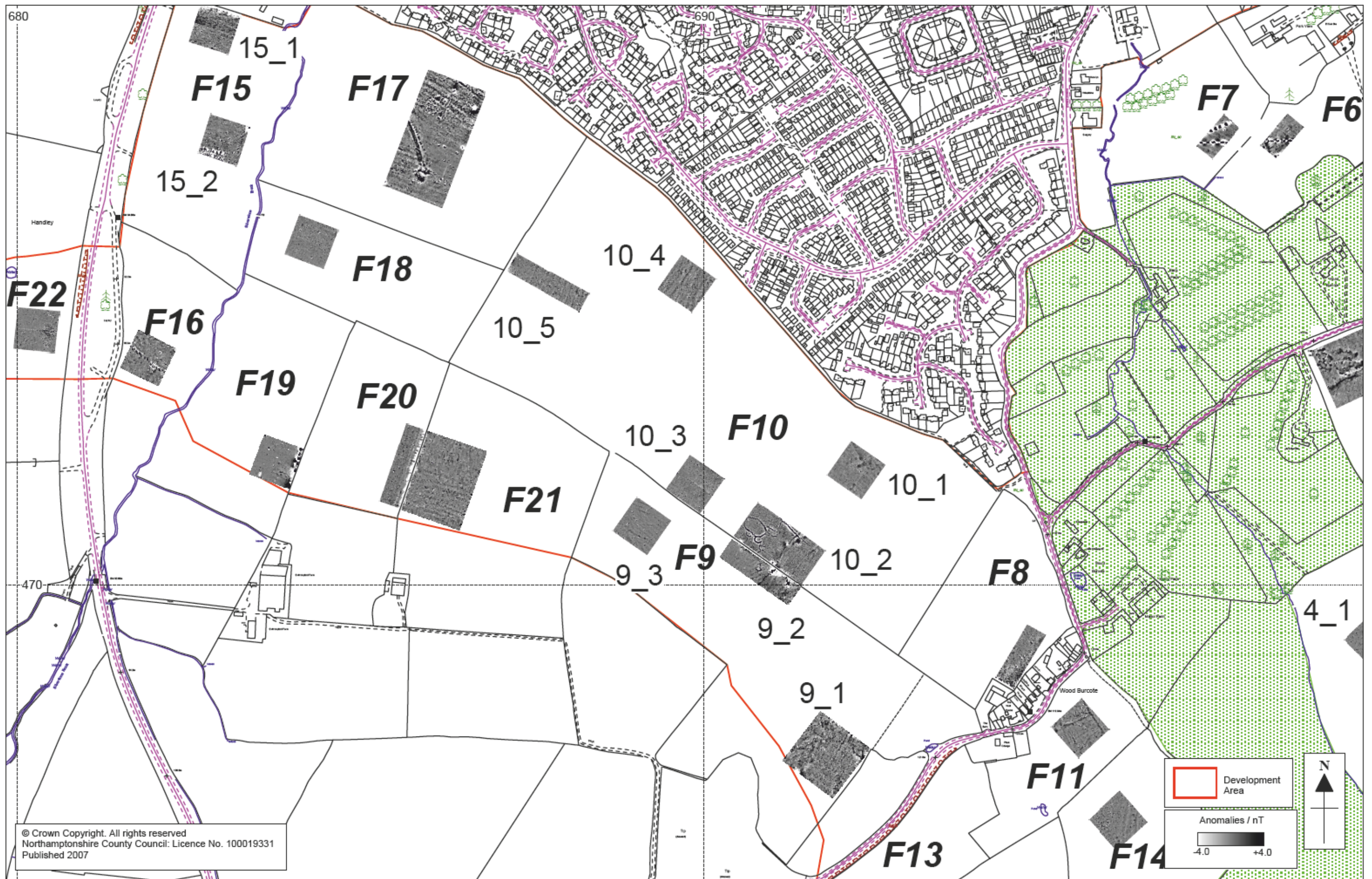


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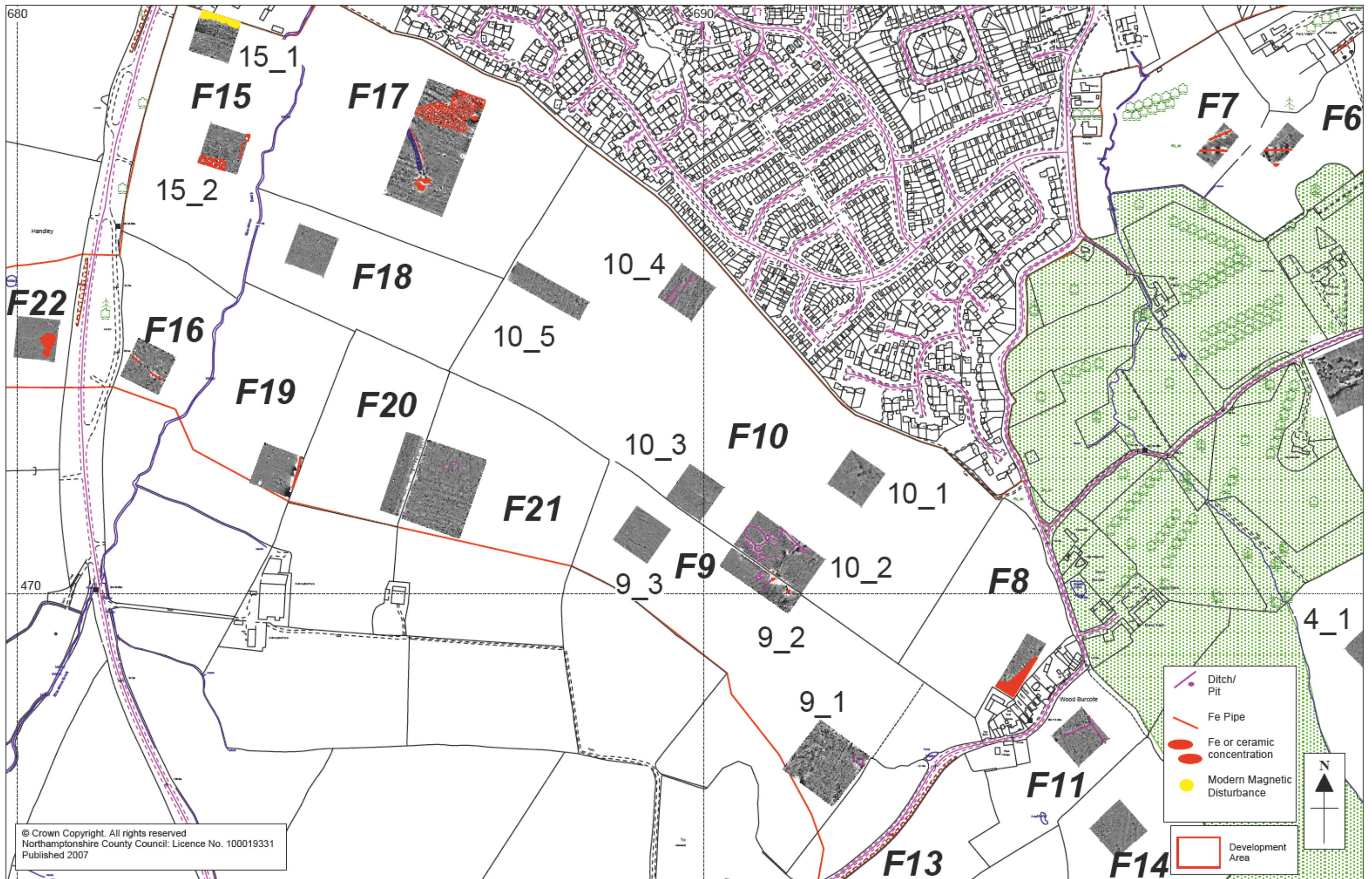
Towcester Vale Detailed Survey Results Fig 4







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Towcester Vale Detailed Survey Interpretation - West Fig 8

