ARCHAEOLOGICAL PROJECT SERVICES

GEOPHYSICAL SURVEY:

KNIGHT'S END ROAD
MARCH
CAMBRIDGESHIRE
(MKER19)

Prepared for
Persimmon Homes

by
Jonathon Smith, BA (hons) MA
Sean Parker, BSc (Hons)

Date: June 2020

APS Report No: 101/19

The Old School
Cameron Street
Heckington
Sleaford
Lincolnshire
NG34 9RW

Document Control

Project Name	**March Knight's End Road**
Author(s) and contact details	**Jonathon Smith, Sean Parker** **Tel: 01529 461499** **Email:info@apsarchaeology.co.uk**
Origination Date	**November 2019**
Reviser(s)	**Paul Cope-Faulkner, Mark Dymond**
Date of Last Revision	**027/05/2020**
Version	**2.0**

Site name	**March Knight's End Road** **-Geophysical Survey Report**
National Grid Reference	**TL 40802 95349**
OASIS Record No.	**archaeol1-383666**

CONTENTS

Appendices

List of Figures

1. SUMMARY

A detailed magnetic gradiometer survey was undertaken for Persimmon Homes on land at Knight's End Road, March, Cambridgeshire. The survey area totalled 50.7ha.

A previous evaluation has demonstrated that the site contains several Bronze Age pits, a Saxon hearth, a probable medieval moated manor and possible post-medieval garden features. The extent of the medieval features are known from cropmarks and are thought to lie within a single modern field. Several of the surrounding fields have already been the subject of a geophysical survey, which only revealed post-medieval agricultural features.

This survey focused on the remaining fields surrounding the one containing the medieval manor. The survey captured several linear anomalies which most likely represent post-medieval and modern agricultural features, comprising former field boundaries, land drains and plough marks. The remaining anomalies are likely to represent background geology and modern detritus, although an archaeological origin for some features cannot be ruled out.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation. Evaluation is defined as *'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate'* (CIfA 2014a).

2.2 Project Background

Archaeological Project Services (APS) was commissioned by Persimmon Homes to undertake a detailed magnetometer survey on a site totalling 50.7ha on land at Knight's End Road, March. A previous geophysical survey which partially overlapped with the current site (Failes 2012) has been included with the new set of data. The work was undertaken in accordance with a method statement prepared by Archaeological Project Services and approved by the Historic Environment Officer, Cambridgeshire County Council. The survey was carried out between the 18th November 2019 and 22nd May 2020.

2.3 Topography and Geology

March is located approximately 38km north of Cambridge and 23km east of Peterborough in the Fenland Administrative District of Cambridgeshire (Figure 1). The site is located to the southwest of the urban core of March and is centred on National Grid Reference TL 4081 9534 (Figure 2).

The site is bounded by March western bypass (A141) to the west andextends south to the rear of properties along Knight's End Road. The site encompasses some 50.7 hectares, split over seven fields, most of which are used for arable farming (Figure 3).

March occupies a former island within the fenland, lying on the northern tip of a large peninsula between two major southern embayments of the fen. The pre-Flandrian bedrock of the area is Kimmeridge Clay, overlain by interglacial gravels (Hoxnian Phase) known as 'March Gravels' (flinty gravels with shelly fauna).The site lies between 0m and 5m AOD and

is situated on the western edge of the low-lying island (BGS 1983).

Soils in the area are recorded as Ashley Association fine loamy over clayey stagnogleyic argillic brown earths over aeolian drift incorporated into the surface of chalky till (Hodge *et al.* 1984, 96).

2.4 Archaeological Setting

Geological and soil mapping of the area has suggested that during the prehistoric periods the site lay on the edge of March 'island', with a small embayment of the surrounding fen protruding into the site (Hall 1987). The embayment corresponds with the waterlogged area in Field 7.

A Mesolithic land surface was discovered roughly 900m to the north at Gaul Road. The excavation revealed a low valley with a stream and preserved land surfaces on either bank. Flint tools and debitage were recovered (Mellor 2011). Neolithic tools and pits were also discovered at the Gaul Road site. A second Neolithic site was located nearby (HER MCB19567), at which flints, pits and pottery were noted. These prehistoric sites are focused towards the fen edge in a similar situation to that which exists in Field 7.

The prehistoric land surfaces at Gaul Farm were covered over by peat in the early Bronze Age, indicating a rising water table at this time.

Two flints thought to be Bronze Age were found during trial trenching in Field 8. The first came from a linear feature with no other dating evidence and the possibility the flint was a residual artefact was raised by the excavators (Failes 2013, 24). The second came from a pit with additional undiagnostic burnt flint fragments and is likely to represent a genuine Bronze Age feature (*ibid.*). A scatter of Bronze Age flints were found immediately east of the site (HER MCB20311).

Iron Age settlement is known 460m east of the Site (HER MCB15352), with ditches and possible field systems extending to the north (HER MCB20107 and MCB19571) and east (HER MCB26737). About 525m east of the Site an Iceni coin hoard was discovered and subsequent excavations identified a cut feature, possibly a roundhouse gully (HER MCB16060). A second hoard of silver coins was found at least 170m north of the site, although its exact location is unknown (HER MCB7364).

The majority of Roman finds in the vicinity of the site have been discovered to the east and probably indicate Roman occupation towards the southern end of March. A Roman coin hoard was found on or extremely close to the eastern edge of the Site (HER MCB7197), although its exact position is unknown. A probable Roman field system is known from the field immediately east, and is thought to represent the western extremity of the system associated with a villa 460m east of the site (Wright 2014). Further ditches probably relating to the same field system (HER MCB18116) and Roman pottery (HER MCB14807) were also discovered 300m east.

Excavations in Field 8 revealed a hearth which contained a single sherd of early-mid Saxon pottery (Failes 2013, 24).

The place-name March is probably derived from the Old English *mearc*, meaning 'boundary' (Ekwall 1989, 314). March has been identified as one of the estates given to Ely Abbey *c.*1000 AD by Oswy and Leofleda when their son, Aelfwine, was admitted as a monk (Pugh 2002). March is first recorded in the Domesday Book of 1086, indicating the settlement was in existence in the late Saxon period.

Domesday records that March was held by the Abbey of Ely as a berewick of their manor of Doddington. Within this Ely holding were 12 villeins, each with 12 acres. The Abbot of St. Edmundsbury also held 16 acres in March. In this holding there was land for half a plough, meadow for 4 ploughs or oxen, and woodland for 4 pigs (Williams and Martin 2002, 525-6). On the basis of the Domesday entry it has been tentatively suggested that there were two centres of settlement and that there was a dispersed pattern of occupation in the Ely holding (Cambridgeshire County Council 2002, 19).

Hatchwood Farm, adjacent to the southeast corner of the site preserves a medieval place name. Hatchwood is first mentioned in 1251 when Stephen of the Marsh held 80 acres in the marsh below 'Hachwood'. Hatchwood manor, the first manor to be recorded at March, is first referred to in 1328 when it was held by Geoffrey de Coleville. A descendent, Geoffrey Colville, had licence of a private oratory in his house at Hachewood in 1407 (Pugh 2002).

The excavations in Field 8 revealed a roughly rectangular 120m x 80m enclosure which contained late Saxon or early medieval pottery. A late 12th century date was considered most likely for the feature. A possible beam slot, and mortar and tile were identified, indicating a structure was located near the northern edge of the enclosure. Recuts of the enclosure ditch indicate it was maintained throughout the medieval period. A midden deposit from within the enclosure similarly produced pottery indicating it accumulated throughout the medieval period. A preserved land surface was sampled and revealed the presence of charred seeds, mussel, cockle and fruit and nut shells, typical domestic foods from the medieval period. It was considered that the enclosure may have been a moat and represents the setting for a medieval farmstead or manor, perhaps the original Hatchwood manor. The small number of structural elements identified within the enclosure might suggest that the buildings were located along the road frontage and may have been lost to later housing construction (Failes 2013).

Also on the site are cropmarks indicating ridge and furrow cultivation. However, excavations adjacent to the medieval enclosure suggest a post-medieval date for these features in Field 8 (Failes 2013, 31).

Maps of the site are available dating from the 17th century, when it is shown divided into 11 different fields. However, the accuracy and completeness of the early maps is questionable. The first accurate map to fully depict the site was not produced until 1840. This was followed in 1887 by the first edition Ordnance Survey 6 inch to 1 mile map, which shows some boundaries had been removed. In Field 8 is a trapezoidal earthwork, labelled as 'Moat Intrenchments'. This feature contained a long pond. A single building is depicted within the Site boundary, towards its western edge.

Excavations on the site have shown that the 'Moat Intrenchments' consist of a 15m wide feature with stepped sides and built-up clay banks. The feature was 2m deep and 120m long. Carbon dating indicated the earliest fills were likely to be 18th century in date, although a 17th century date was also possible. There were no fish bones found within the samples, suggesting it was not a fishpond (Failes 2013). It is possible this feature is part of a post-medieval garden.

Excavation shows that the ridge and furrow in Field 8 has a post-medieval date, but respects the medieval enclosure, implying the enclosure was still visible in this period (perhaps primarily as a hedgerow rather than ditch) (*ibid.*). Probable post-medieval ridge and furrow earthworks are also adjacent to the south (No. 30), east (Nos. 21 and 31) and north of the site (No. 54).

Maps from the early 20th century show a short-lived building present on the site. A golf course, making use of 15ha of pasture, was established at Hatchwoods Farm in 1927. It

remained there until 1961, when the greens were dug up to be re-laid at its new location (MGC 2011).

The site has been the subject of several previous pieces of archaeological work:

- The site was fieldwalked as part of the Fenland Project (Hall 1987, 46)
- A desk-based assessment was carried out in 2011 (Drury and Taylor)
- A geophysical survey covered a portion of the site in 2012 (Failes)
- Several of the features identified in the desk-based assessment were examined by archaeological evaluation in 2013 (Failes)
- An updated desk-based assessment was compiled to support the current planning application (Smith 2020)

3. GEOPHYSICAL SURVEY

3.1 Methods

A magnetic gradiometry survey was carried out with a Bartington Grad 601-2 fluxgate magnetometer. The field was divided into 30m^2 grids using a survey grade GPS and each grid was walked systematically in a zigzag pattern, taking readings every 0.25m in traverses 1m apart.

The layout of the survey area is shown in Figure 3. The grids were aligned with the previous phase of geophysical survey to allow for easy compilation of results. The fields were in the following condition at the time of the survey:

- Field 1 - Emergent crop
- Field 2 - Surveyed 2011
- Field 3 - Emergent crop.
- Field 4 - Emergent crop
- Field 5 - Surveyed 2011
- Field 6 - Surveyed 2011
- Field 7 – Emergent crop. The north western corner of the field was waterlogged and unsuitable for surveying.
- Field 8 – Already subject to excavation, not surveyed

The survey was undertaken in accordance with Historic England (2008) and CIfA (2014b) guidelines and codes of conduct. Detailed methodology can be found in Appendix 1.

The survey data originally produced in 2011 (Fails 2012) has been reprocessed using the same methods as employed in the current survey in order to maintain consistency between the two pieces of fieldwork.

3.2 Results

The presentation of the data for the site involves a plot of the raw data as a greyscale image (Figs 4, 7, 10, 13, 16 and 19; clipped to +/-10nT for display but otherwise unprocessed), together with greyscale plots of the processed data (Figs 5, 8, 11, 14, 17 and 20). Magnetic anomalies have been identified and plotted onto interpretative drawings (Figs 6, 9, 12, 15, 18 and 21). An overall greyscale (Fig 22) and interpretative plot of the entire survey area incorporating the 2012 geophysical survey (Fig 23) is also provided.

In the following text, the letters in brackets indicates annotations on Figures 6, 9, 12, 15, 18 and 21.

Field 1 (Figs 4-9)

Positive linear features

within the survey multiple positive linear anomalies have been identified (marked with solid red line). Within this field, there is a significant linear in the south (**A**) this could be a former field boundary marked in 1886 historical maps. There is a smaller anomaly (**B**) that is present to the west of the area this does not appear to align to any agricultural regime.

A small positive linear **C** in the northwest of the field has likely been caused by the edge of ploughing.

Weak Positive Linear

The field contains many weaker positive anomalies (marked by dashed red lines). Anomaly **D** is likely to be related to the former field boundary, known from an 1886 map.

Many of the other weak positive anomalies that run north-south and east-west could relate to agricultural activity or field drains; however, anomaly **E** is also believed to be a former field boundary seen on 1925 maps.

To the southeast of the field, there is a small collection of linear anomalies running south of former field boundary **F**. These could relate to agricultural activity or represent small enclosures that extend to the south of the survey area.

There is a small annual anomaly (**G**) to the east of the field. It has a diameter of 10m, but does not form a full circle.

Bipolar Linear

The field has a bipolar linear anomaly running north-south in the centre (marked by blue dashed line). This is likely to be a service it may be related to the field drains. There is a larger bipolar linear to the northeast of the area. This is also likely to be a service but is more likely to relate to the housing estate located to the north.

Negative Linear

The negative liner (marked by the light blue line) is believed to be caused by agricultural activity, possibly related to tractor ruts.

Agricultural trend

Within the field are many very weak linear anomalies caused by the current and past agricultural regimes. The general orientations are shown by green arrows. In this field, there are two patterns running north-south and east-west.

Agricultural Linear

To the western side of the field, there are several strong agricultural positive anomalies (marked by green lines) these are related to agricultural activity at the edge of the field.

Field Drain

Within the field there are weak bipolar linear anomalies (marked by the green dashed lines). These are caused by field drains. These appear to run in an east-west pattern 20m apart.

Isolated Positive Response

There are multiple positive responses (marked by a red dot) these could be pits, but there is no correlation and no clear evidence of nearby archaeology so are more likely to relate to small accumulations of magnetically enhanced material.

Isolated Dipolar Response

There are a number of isolated dipolar responses (marked by a blue dot) within the field,

most of which are likely to be caused by small modern metallic debris (nails, bolts, fragments of farm machinery, etc.) The dipolar response at the ends of **A** and **D** may be related to a former post at the end of the former field boundaries.

Area of Bipolar Response
There is an area of bipolar response (marked by blue hatch) near the intersection of two former field boundaries. This may indicate they were backfilled with waste material including metallic items or brick fragments. Another area of bipolar response is located around the likely service to the northeast. This could mask any weaker anomalies located in this area.

Field 2 (Figs 7-9)
Positive Linear
The positive linear (marked with solid red line) to the north of the survey area is a ditch which is still visible as an earthwork.

Weak Positive Linear
There are several weak positive linear anomalies (marked by dashed red lines) that are present within the field. These are not likely to be caused by ditches and may instead represent fragments of agricultural features, although they do not exhibit a regular pattern.

Bipolar Linear
The bipolar linear (marked by a blue dashed line) to the north of the area is likely a modern service.

Agricultural Linear
The agricultural linear (marked by green lines) anomalies in this field are likely to relate to a former ridge and furrow agricultural regime.

Isolated Dipolar Response
There is a single dipolar response (marked by a blue dot), which is likely to be due to a piece of modern detritus.

Area of Bipolar Response
An area of bipolar disturbance (marked by blue hatch) is around the modern service. This could mask any weaker anomalies located in this area.

Field 3 (Figs 10-12)
Positive linear features
Positive anomalies have been highlighted with red lines. Towards the western side of the field is an intermittent linear anomaly with a north-south orientation (**H**). This is strongest to the north and fades towards the south, where a weaker response has been marked with a broken red line. This anomaly corresponds with a field boundary first indicated on a map of 1819 (Smith 2020, *Figure 5*). The boundary originally turned northeast towards the northern end (not indicated in the magnetic data), but by the publication of the 1887 Ordnance Survey 6" map (*ibid*), it had been straightened, and the additional north-south stretch corresponds with the portion with the stronger readings.

Close to the western edge of the field is a prominent north-south aligned linear feature (**I**) with a magnetic strength of *c.*13nT, much higher than the *c.*2.5nT of the other linear features in the field. It does not correspond with known historic field boundaries. The high readings may indicate this is a modern service trench, although it does not continue south into Field 7.

In the northeastern part of the survey there are seven parallel east-west aligned linear features, each 20m from its neighbour (**J**). These are on the same orientation as ridges mapped from cropmarks, but do not fit the same pattern (the ridges are spaced by 15-16m).

This suggests the features are post-medieval land drains. The anomalies define an area approximate to a roughly square field shown on a 17th century map of the area (*ibid*), but which was no longer shown in 1819 (*ibid*).

Several relatively weak linear features (indicated with dashed red lines) are parallel to the former land boundaries and are likely to be due to ploughing.

A small length of an east-west linear feature with the suggestion of a north turn has been captured at the northwestern edge of the survey (**K**).

Isolated positive anomalies
The most prominent isolated anomalies have been highlighted with red dots. These can be caused by human-made features such as pits, but also are frequently caused by natural concentrations of magnetically enhanced material. Along the line of the north-south aligned field boundary (**H**) are several regularly spaced positive features which have very likely been caused by a fence or tree line.

Bipolar anomalies
There are four areas of bipolar readings in the field, indicated with blue hatching. One of these is particularly strong (**L**), giving readings in the 90-100nT range at its core and is likely to be caused by human activity, such as a collection of metallic or burnt material. The remaining bipolar anomalies are somewhat weaker. Such anomalies can have a wide range of causes, including natural variations in geology, rubbish dumps and quarrying.

Isolated dipolar responses
Dipolar responses are due to small metallic items. The most prominent examples have been highlighted with a blue dot. Dipoles are usually the result of modern detritus in the topsoil which has arrived via manuring practices and are not typically given any archaeological significance.

However, along the line of the north-south orientated field boundary (**H**), there are several dipoles which are likely to represent former posts or pits with a metallic element (such as nails, stakes or wire fragments).

Agricultural Trends
There are three subtle trends in the data (indicated with green arrows) which are most likely due to agricultural practice. Roughly north-south orientated lines have been caused by the modern plough scheme. Some weak northwest-southeast aligned linear features are likely to represent land drains.

At the western edge of the area are many roughly east-west orientated linear features, corresponding to the low-lying, wet area of the field. These are slightly irregular and may represent deeper elements of the plough scheme, drainage, or perhaps features associated with the construction of the adjacent road.

Field 4 (Figs 13-15)
Positive Linear
Within this field, there is a single positive linear anomaly (marked with a solid red line). This corresponds with a former field boundary (**M**) seen in historical maps from 1886.

Weak Positive Linear
Several weaker positive linear anomalies (marked by dashed red lines) can be seen in the field. Some of these (**N**) located at are possibly related to field drains, but may also be related to the former boundary seen in historical mapping from 1886.

To the east of the field, there is a pattern of weaker positive anomalies (**O**). These are likely to be former ridge and furrow marks. However, the north-south anomaly running in the same area may indicate a field drain. The other weak positive anomalies to the north of the likely field boundary (**M**) are likely to be agricultural.

Bipolar Linear
There are two bipolar linear anomalies in the field (marked with a dashed blue line). The north-south orientated anomaly is likely to relate to a former field boundary. The bipolar linear to the southeast may be a continuation of the furrows identified as **O**.

Agricultural trend
Within the field are many very weak linear anomalies caused by the agricultural regime. A general orientation has been marked by green arrows. In this field, there are two patterns, orientated north-south and east-west.

Agricultural Linear
Several faint linear features have been marked by green lines. These anomalies are likely to relate to an agricultural regime, probably ridge and furrow.

Field Drain
Within the field there are weak bipolar linear anomalies these are likely caused by field drains (marked by the green dashed lines) these appear to run in a north-south pattern 30m apart. As these appear to stop at the former boundary **M** it is assumed they were present before the boundary was removed.

Area of Bipolar Response
The areas of bipolar disturbance (marked by blue hatch) could mask any weaker anomalies in the vicinity. The areas marked in this field are all located close former field boundaries and are likely caused by backfilling the field boundaries with waste material.

Field 5 (Figs 16-18)

Agricultural Linear Anomalies
Within the northern area of the field, there appear to be several stronger linear anomalies similarly to the former ridge and furrow regime seen in other areas of the site.

Field Drains
Within the field there are weak, parallel bipolar linear anomalies. These are likely caused by field drains (marked by the green dashed lines). To the south these are aligned north-south and to the north they are aligned east-west.

Area of Bipolar Response
The areas of bipolar disturbance (marked by blue hatch) could mask any weaker anomalies located in the areas. These areas are likely to relate to nearby modern features such as buildings and fences.

Field 6 (Figs 16-18)
Bipolar Linear
There are three bipolar linear anomalies in the field that appear to connect. These three are possibly related to services or drainage system as they appear to end in a hollow.

Area of Bipolar Response
Most of this field is heavily disturbed by bipolar response. This is related to the modern services. As this area is so heavily disturbed, it is possible that weak features have been masked.

Field 7 (Figs 19-21)

Positive linear anomalies

There are two distinct schemes of linear features. One is roughly north-south aligned and the other is roughly east-west. In both cases these are likely due to land drains. The north-south aligned anomalies fall equidistance from the ridges indicated by cropmarks, implying they have been laid in furrows.

Isolated positive anomalies

The most prominent isolated anomalies have been highlighted with a red dot. Pits may cause such anomalies, but geological variations are also frequently responsible. There are two concentrations of such anomalies towards the north of the survey area (**P** and **Q**).

Areas of positive response

There is one broad area of positive response, 6m by 3.5m, which is associated with the cluster of smaller positive anomalies (**P**).

Bipolar anomalies

There are three broad areas of bipolar anomalies in the field. The main concentration is along the western boundary. The strength of the features is very high at over 100nT, which suggests concentrations of metallic or burnt features/debris.

Isolated dipolar responses

Dipolar responses are due to small metallic items. The most prominent examples have been highlighted with a blue dot. Dipoles are usually the result of modern detritus in the topsoil which has arrived via manuring practices and are not typically given any archaeological significance.

Agricultural trends

Three subtle sets of parallel features are visible in the data. Towards the west of the field, a roughly north-south orientated set is due to the modern plough scheme. In the north of the field a series of east-west orientated linear features are also likely to represent an element of the past or present plough scheme. A northwest-southeast series of well-spaced linear anomalies cover the whole area and is likely to represent land drains.

4. DISCUSSION

Magnetic survey on land north of Knight's End Road, March, Cambridgeshire has identified the remains of post-medieval field boundaries and drainage systems. A number of bipolar and discrete positive anomalies do not have obvious origins and may represent features such as human-made pits, but are also of a form typical for modern disturbance or geological variations. A series of semi-regular linear features along the western edge of Field 3 have an unknown origin, although could be caused by agricultural practice, drainage or road construction.

There is no indication that the medieval manor extended west into Field 7. Cropmark data had highlighted several parallel ridges in Field 3 and 7, which might have indicated ridge and furrow. This is not visible in the magnetic data, although the placement of the field drains in Field 7 indicates that they may have been laid when furrows were still visible.

Throughout the site, there are considerable numbers of suspected land drains and ridge and furrow field systems showing that this has probably been used primarily for farmland since the late medieval period. There is little evidence for structured enclosures or buildings over the site. Many of the former field boundaries have been removed but have still been detected

in the data.

The results of the geophysical survey are consistent with those from the previous survey, which indicated a landscape largely devoid of archaeological remains except for post-medieval land boundaries and occasional patches of ridge and furrow, with a small number of unidentifiable anomalies which may indicate isolated pit features or variations in the underlying geology.

One of the issues with using older data sets is apparent in Field 1. This is where continuous anomalies are apparently staggered (e.g. anomaly **E** on Fig. 6). Differences in surveying techniques between 2011 and 2020 are likely to have caused this. The 2011 report does not mention the surveying technique employed and it is possible no GPS was used to fix the grid layout.

5. ACKNOWLEDGEMENTS

Archaeological Project Services would like to acknowledge the assistance of Anne Dew for commissioning the work on behalf of Persimmon Homes. The work was coordinated by Paul Cope-Faulkner who edited this report along with Mark Dymond.

6. PERSONNEL

Project coordinator: Paul Cope-Faulkner
Geophysical Survey: Ryan Godbold, Jonathon Smith, Sean Parker, Anna Farrell.
Survey processing and reporting: Jonathon Smith, Sean Parker
Archiving: Denise Buckley

7. BIBLIOGRAPHY

BGS, 1983 *Soil Survey of England and Wales, Sheet 4: Soils of Eastern England*

Cambridgeshire County Council, 2002 *Cambridgeshire Extensive Urban Survey: March, Draft Report 10/05/2002*

CIfA, 2014a *Standard and Guidance for Field Evaluation.*

CIfA, 2014b *Standard and Guidance for Geophysical Survey.*

Drury, D, and Taylor G, 2011 *Archaeological Desk-Based Assessment on Land at Hatchwood Park, March, Cambridgeshire*. Archaeological Project Services Report No. **84**/**11**.

Ekwall, E, 1989 *The Concise Dictionary of English Place Names* (4th edition), Oxford

Failes, A, 2012 *Land at Hatchwood Park, March, Cambridgeshire: Geophysical Survey*. Archaeological Project Services Report No. **38**/**12**.

Failes, A, 2013 *Archaeological Evaluation at March, Hatchwoods, Cambridgeshire*. Archaeological Project Services Report No. **55**/**13**.

Hall, D, 1987 *The Fenland Survey Number 2: Cambridgeshire Survey, Peterborough to March,* East Anglian Archaeology **35**

Historic England, 2008 *Geophysical Survey in Archaeological Field Evaluation.*

Hodge, CAH, Burton, RGO, Corbett, WM, Evans, R, and Seale, RS, 1984 *Soils and their use in Eastern England*, Soil Survey of England and Wales **13**

MGC 2011, *Club History*, formerly available at www.marchgolfclub.co.uk, currently available at https://web.archive.org/web/20110908033317/http://marchgolfclub.co.uk/club-history.html (accessed 06.12.2019)

Mellor, V, 2011 *Archaeological Excavations at Gaul Road, March, Cambridgeshire*. Archaeological Project Services Report **06/11**

Pugh, RB, 2002 *The Victoria History of the County of Cambridgeshire and the Isle of Ely* 4

Smith, J, 2020 *Archaeological Desk Based Assessment of Land at Knight's End Road, March, Cambridgeshire*. Archaeological Project Services Report **111/19**

Williams, A and Martin, GH, 2002 *Domesday Book A Complete Translation,* Alecto Historical Editions Penguin, London

Wright, A, 2014 *Knight's End, March, Cambridgeshire: An archaeological evaluation*. Cambridgeshire Archaeological Unit Report No. **1207**.

8. ABBREVIATIONS

AOD	Ordnance Datum
APS	Archaeological Project Services
BGS	British Geological Survey
CIfA	Chartered Institute for Archaeologists
HER	Cambridgshire Historic Environment Record
MGC	March Golf Club

Figure 1 - General location map

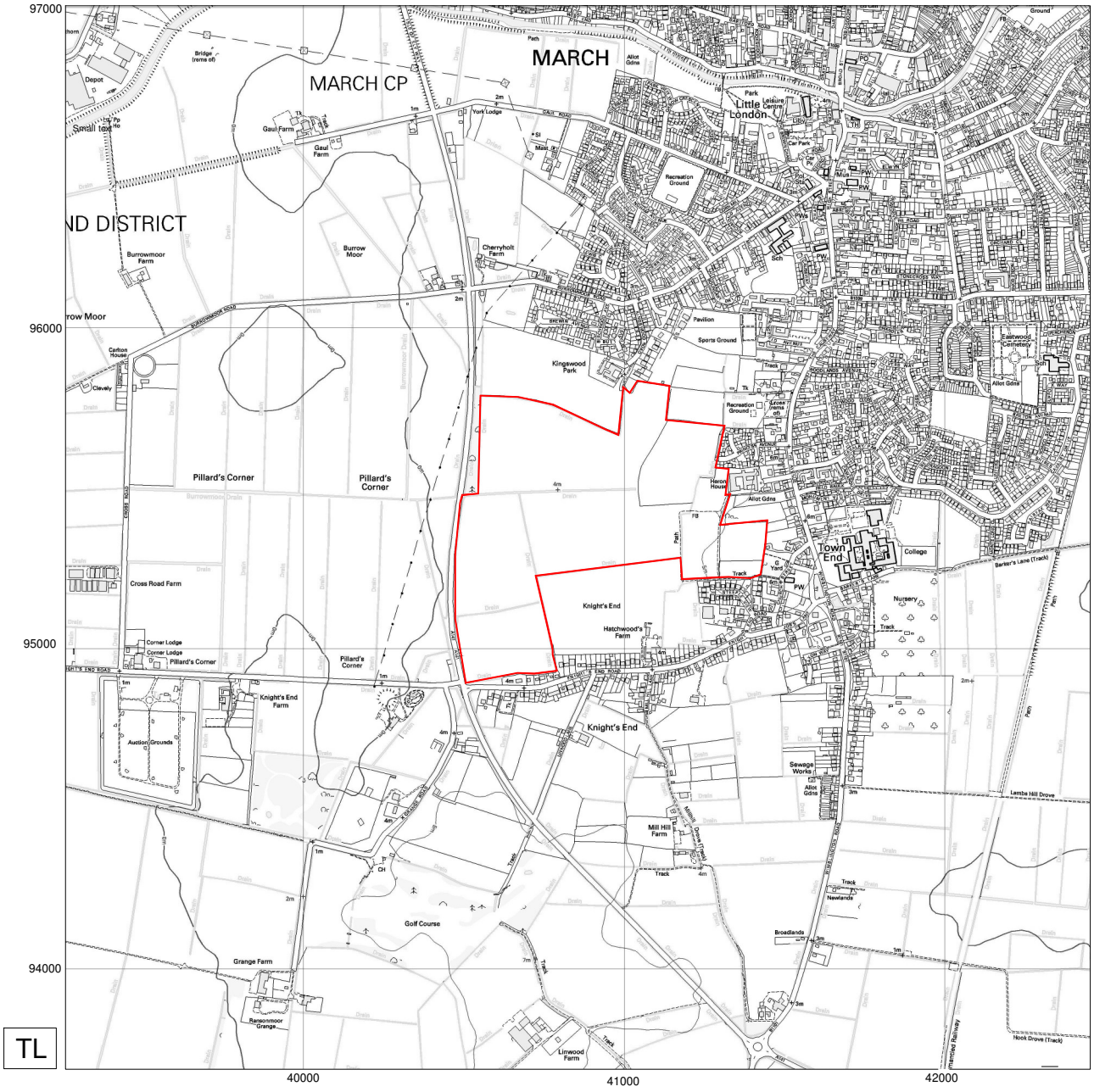


Figure 2 - Site location

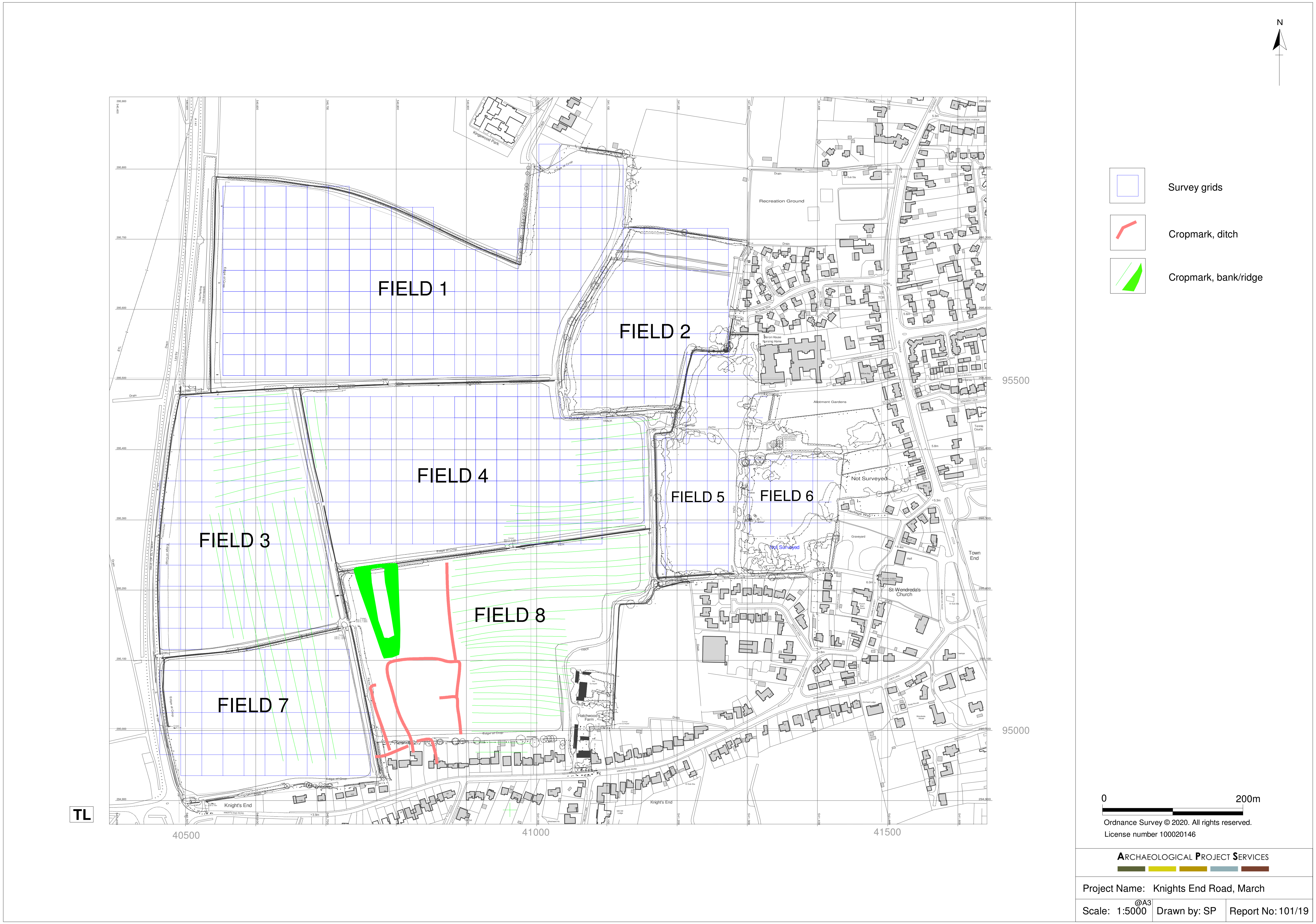


Figure 3 - Survey Grid Layout

KNIGHTS END ROAD

MARCH

10 nT
8
6
4
2
0
-2
-4
-6
-8
-10 nT

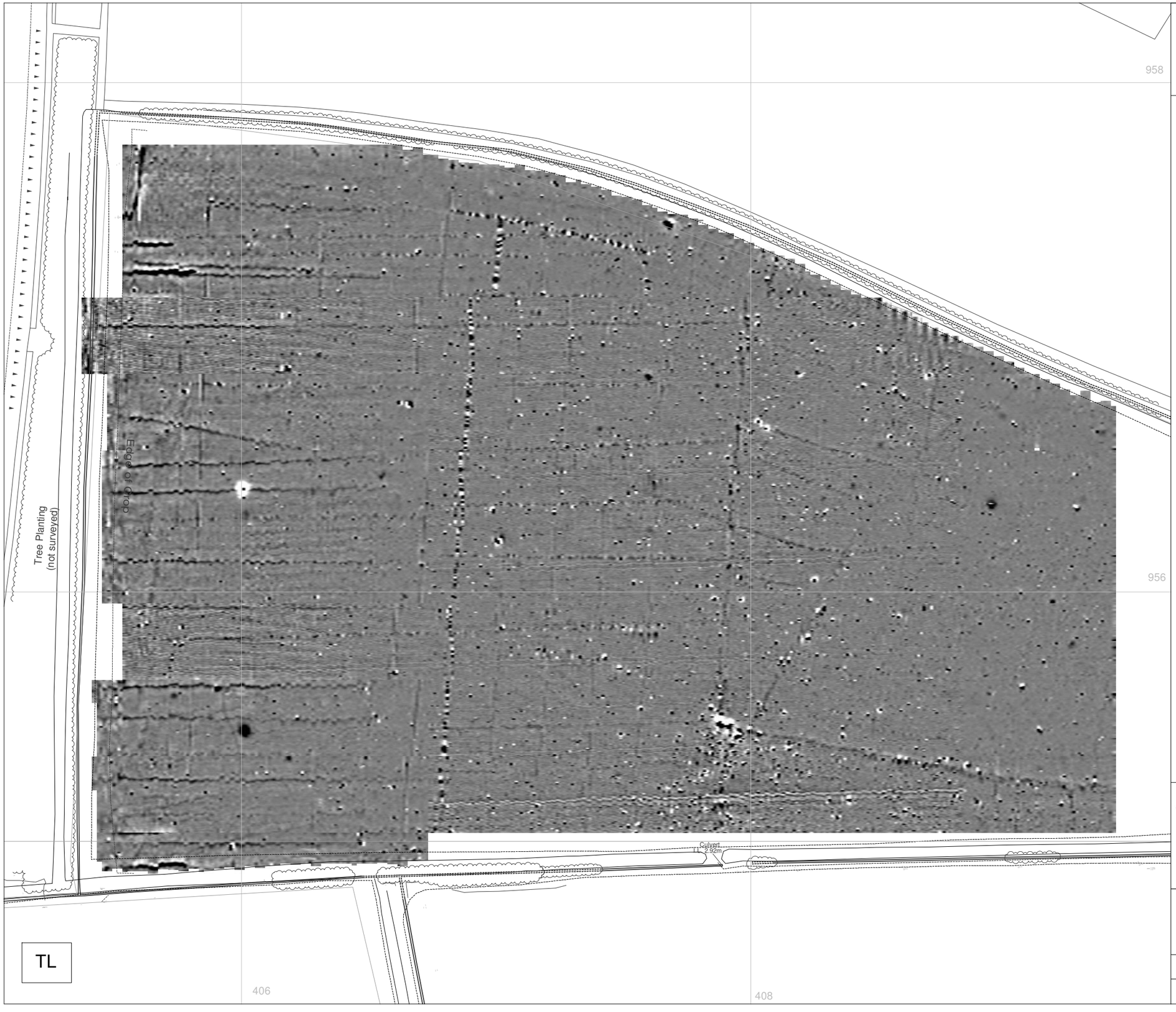
0 75m N

ARCHAEOLOGICAL PROJECT SERVICES

Project Name: Knights End Road, March

Scale 1:1500	Drawn by: SP	Report No: 101/19

Figure 4: Field 1 West Raw Data



KNIGHTS END ROAD

MARCH

5 nT
4
3
2
1
0
-1
-2
-3
-4
-5 nT

0 75m N

ARCHAEOLOGICAL PROJECT SERVICES

Project Name: Knights End Road, March		
Scale 1:1500	Drawn by: SP	Report No: 101/19

Figure 5: Field 1 West Processed Data

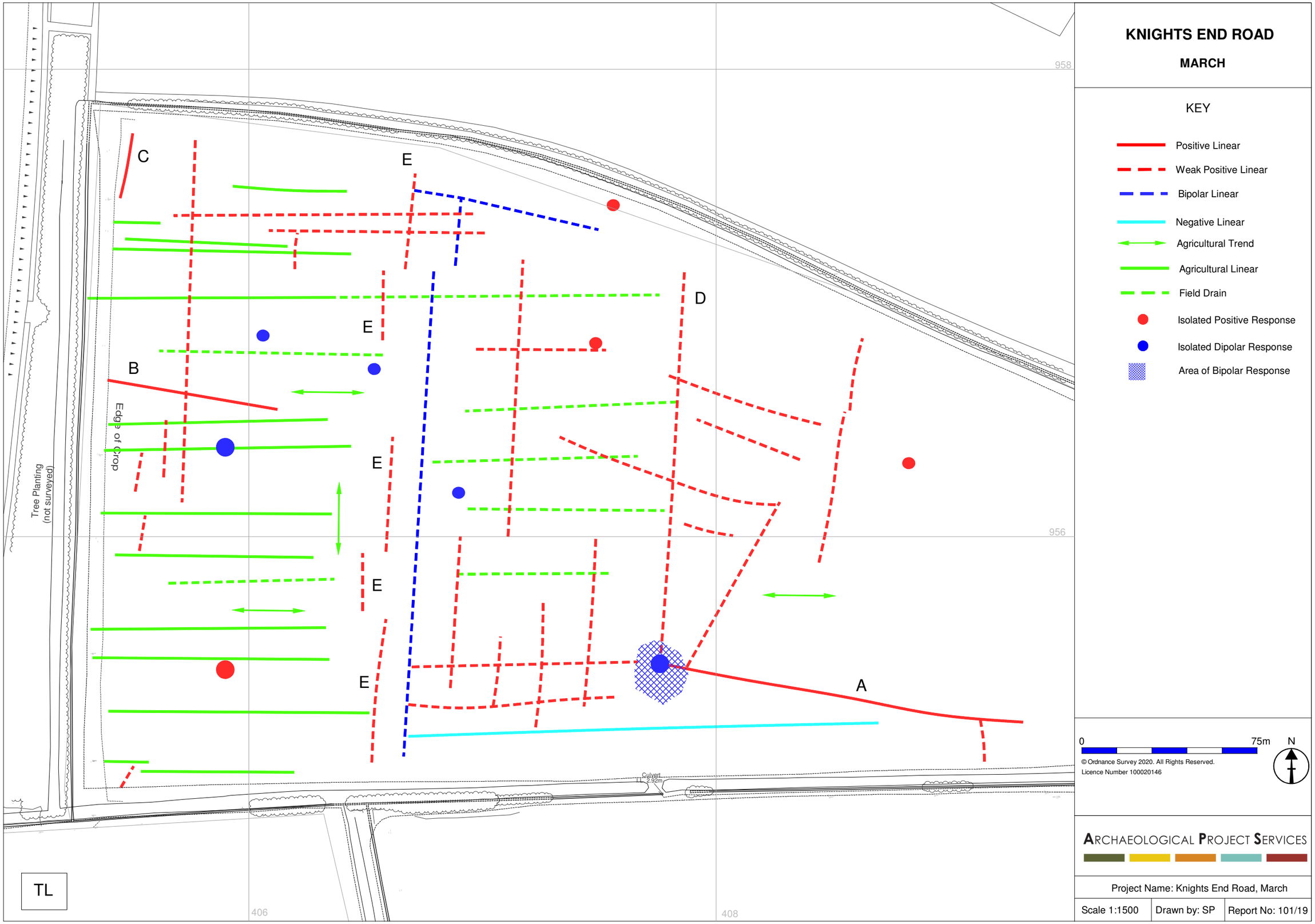


Figure 6: Field 1 West Interpretation Data

Figure 7: Field 1 East and Field 2 Raw Data

Figure 8: Field 1 East and Field 2 Processed Data

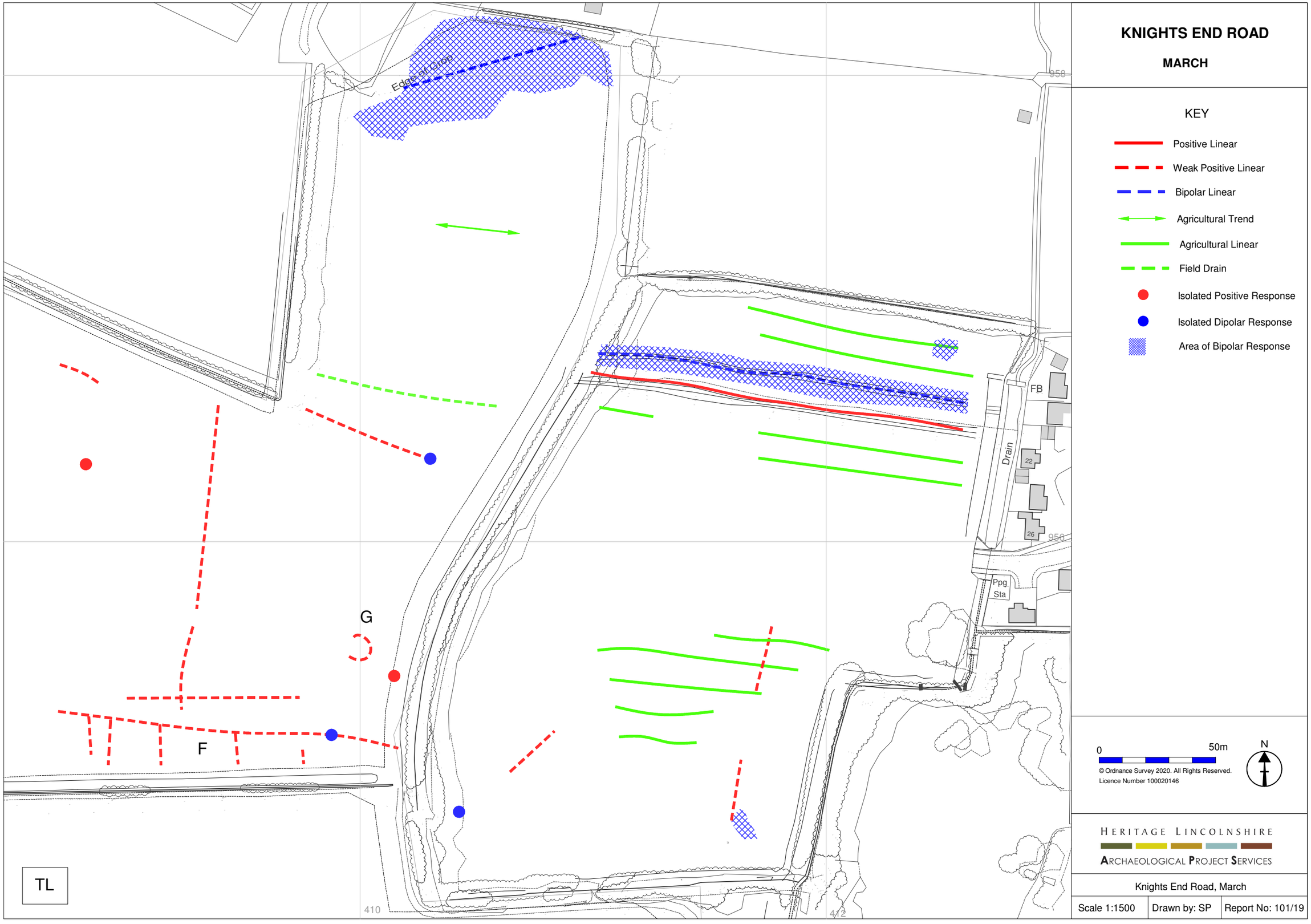


Figure 9: Field 1 East and Field 2 Interpreted Data

Figure 10 Field 2 Raw Data

Figure 11 - Field 3 Processed Data

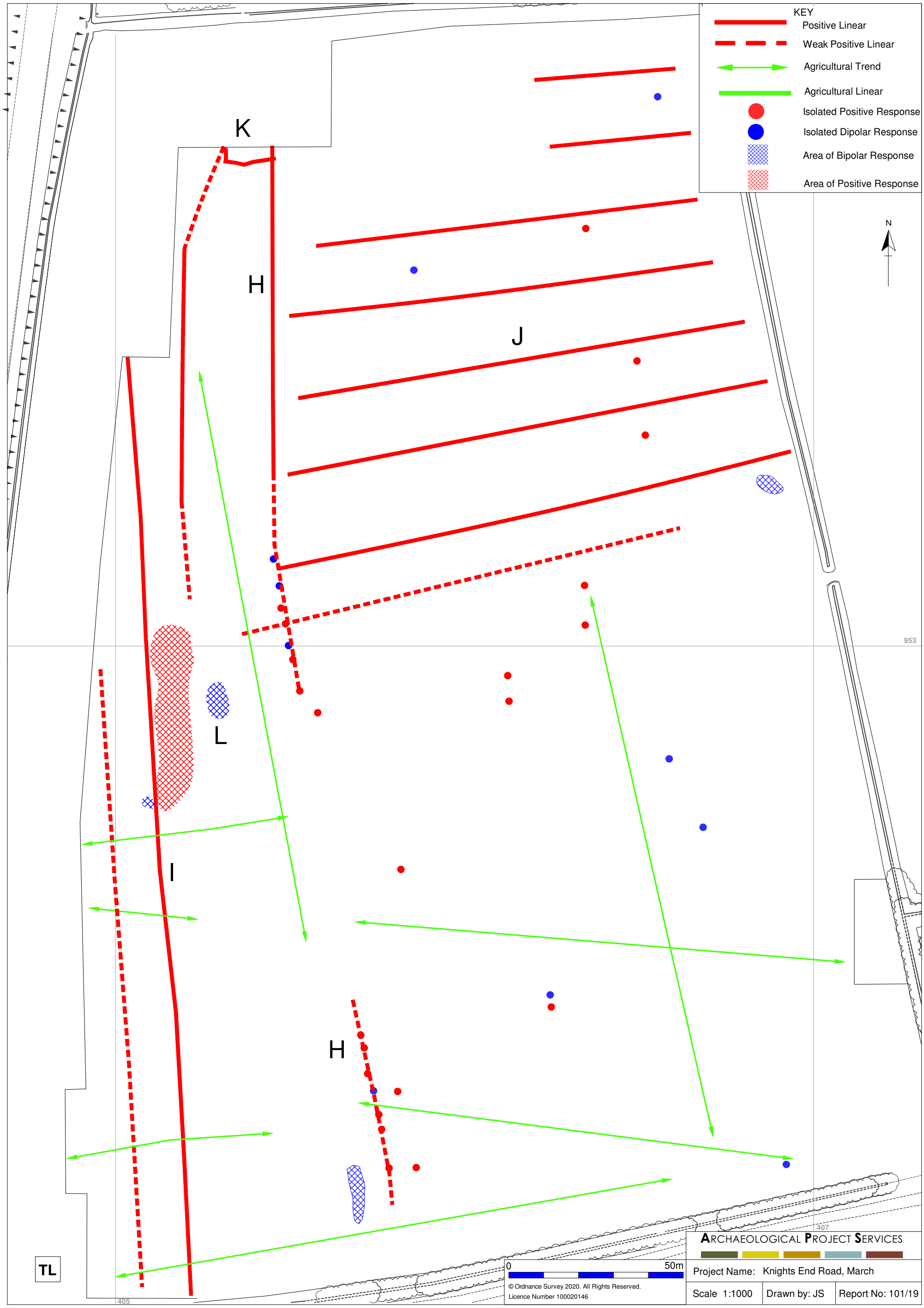


Figure 12 - Field 3 Interpretated Data

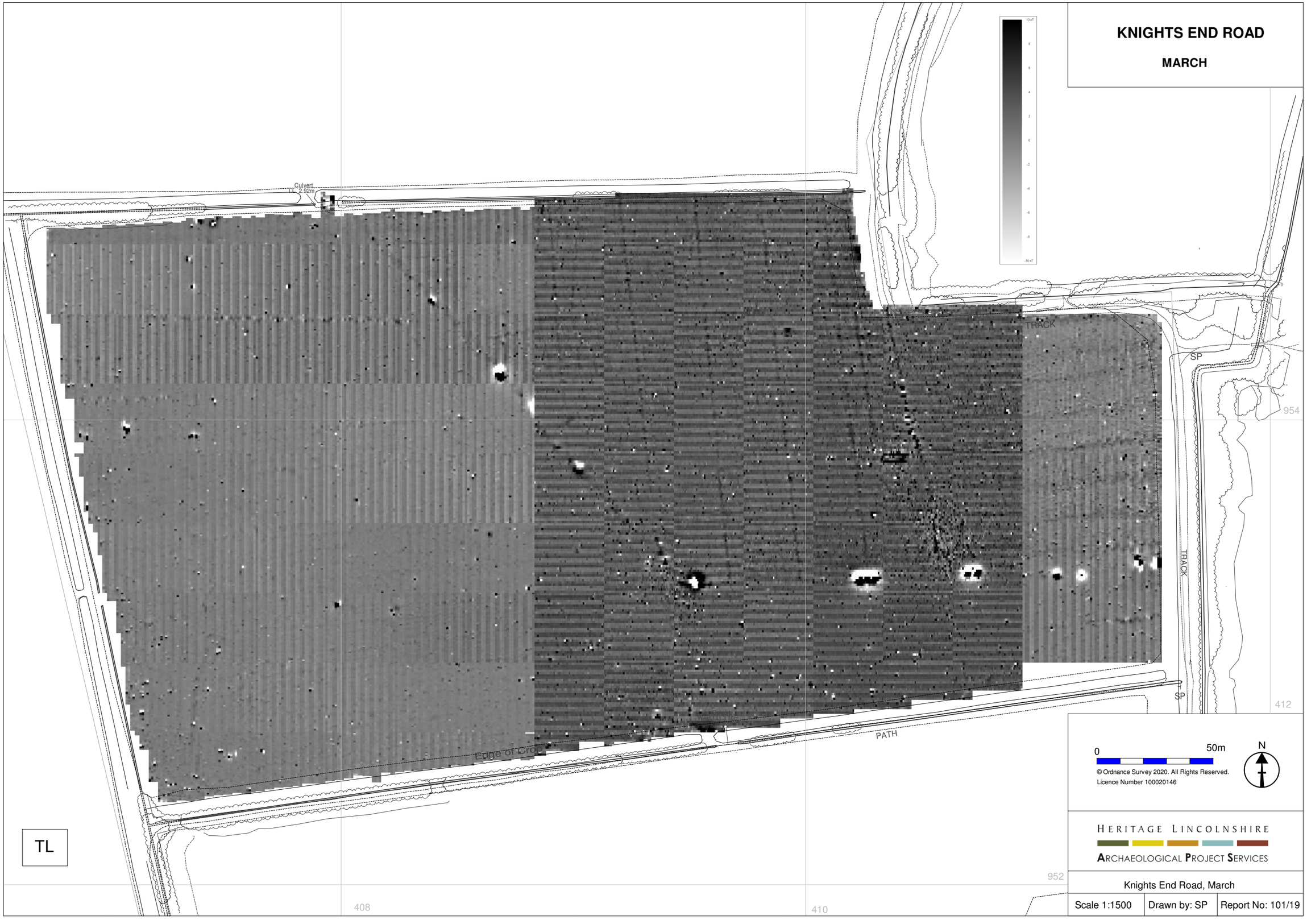


Figure 13: Field 4 Raw Data

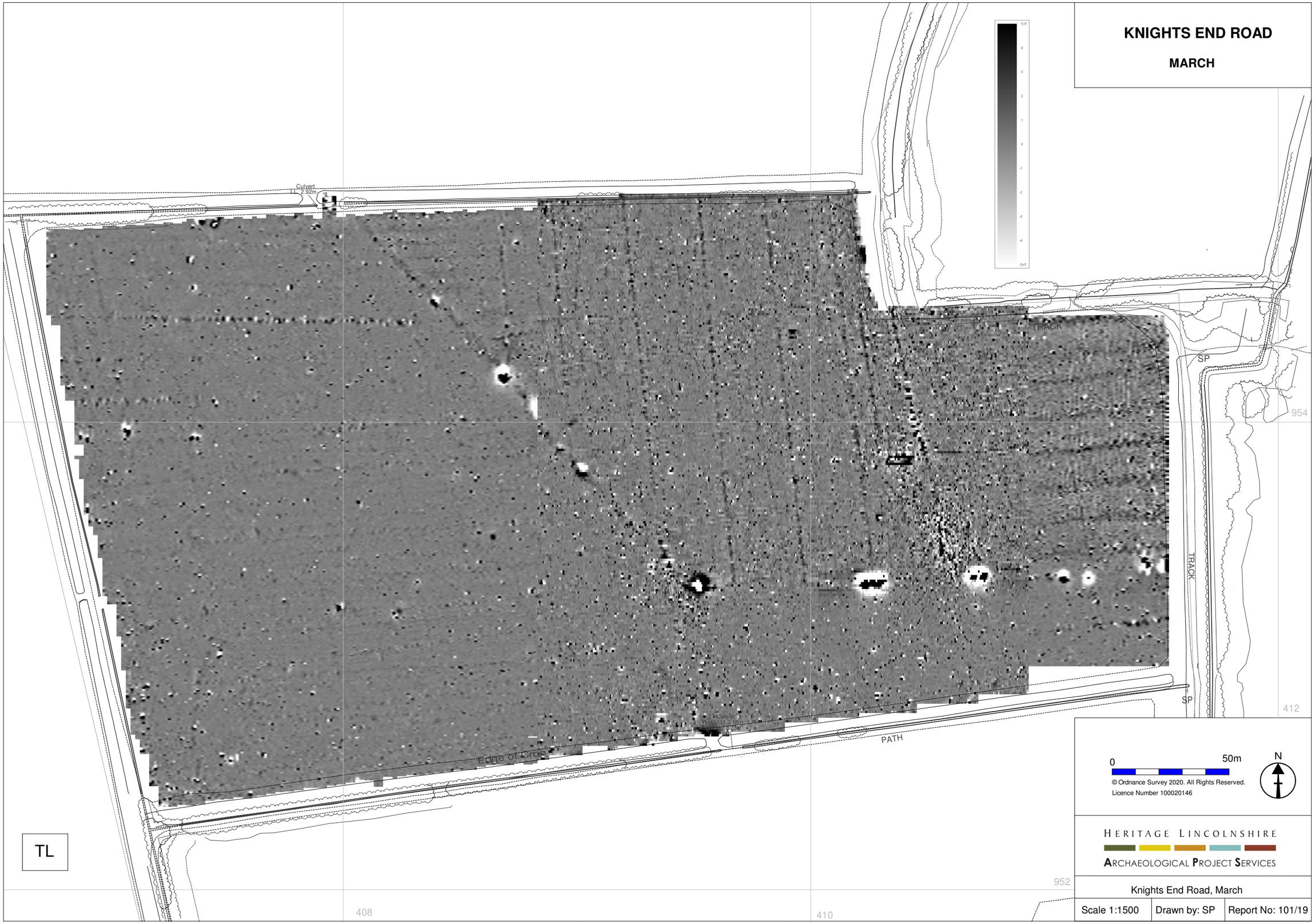


Figure 14: Field 4 Processed Data

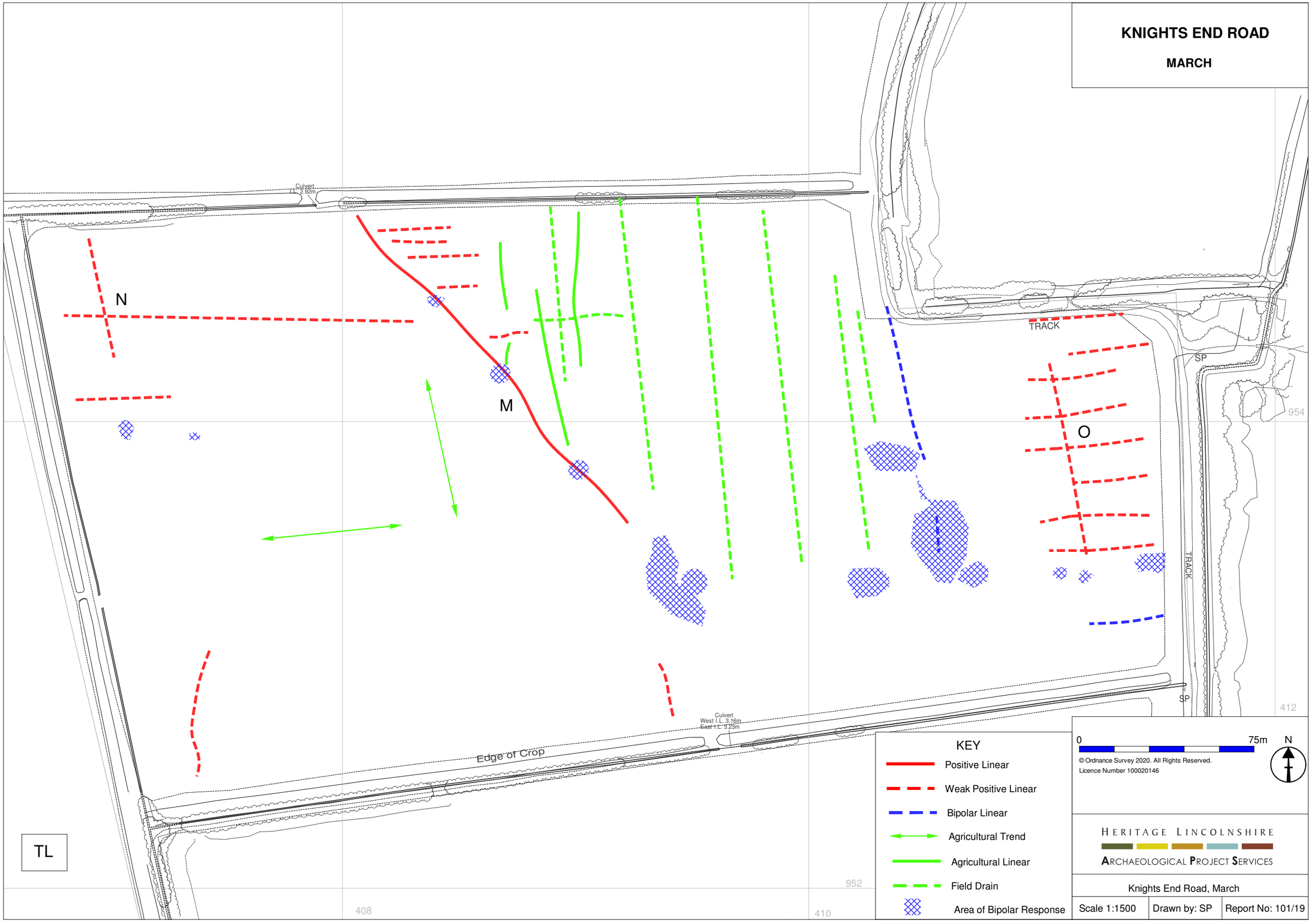


Figure 15: Field 4 Interpretation Data

Figure 16: Fields 5 and 6 Raw Data

Figure 17: Fields 5 and 6 Processed Data

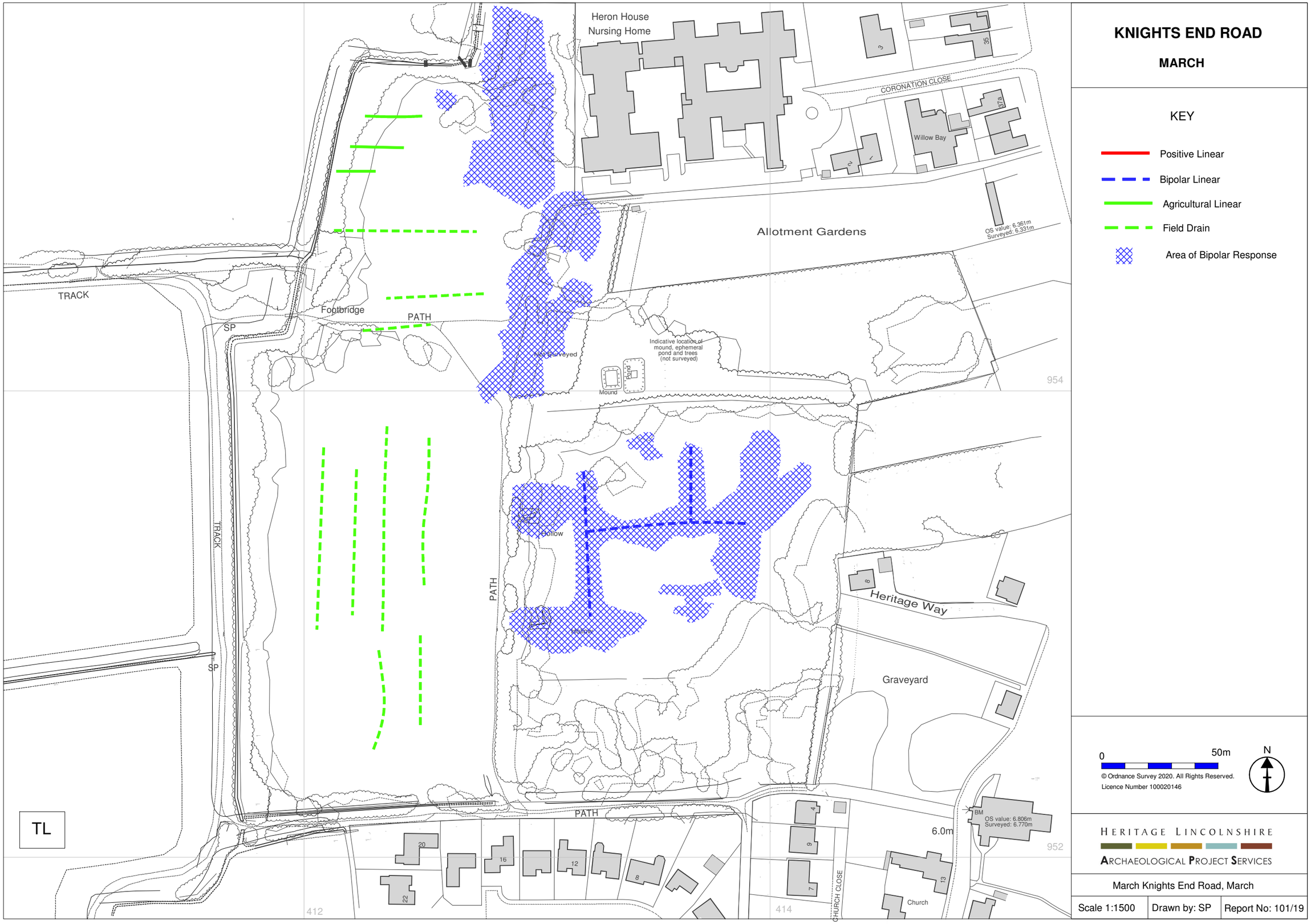


Figure 18: Fields 5 and 6 Interpreted Data

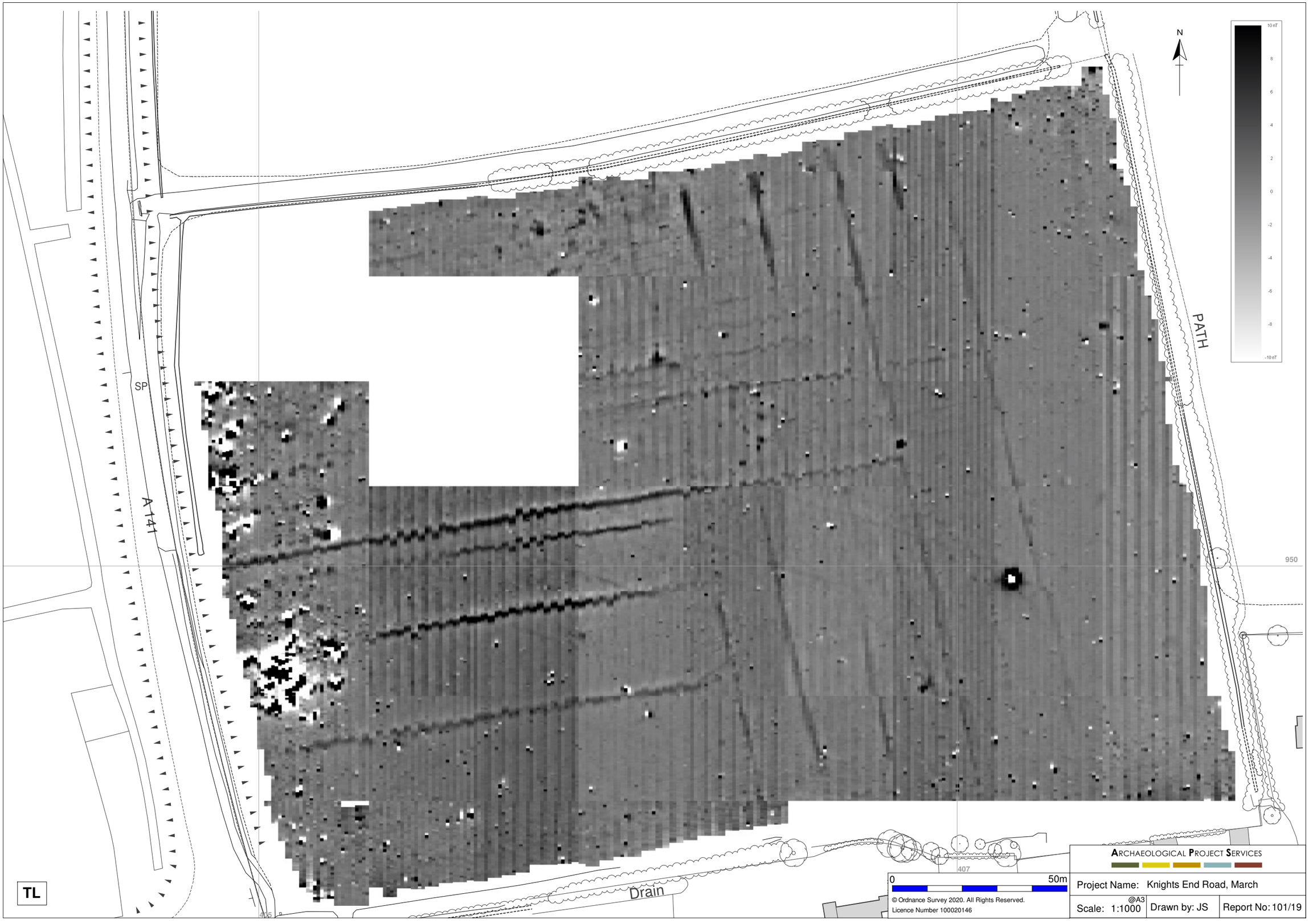


Figure 19 - Raw greyscale data, Field 7

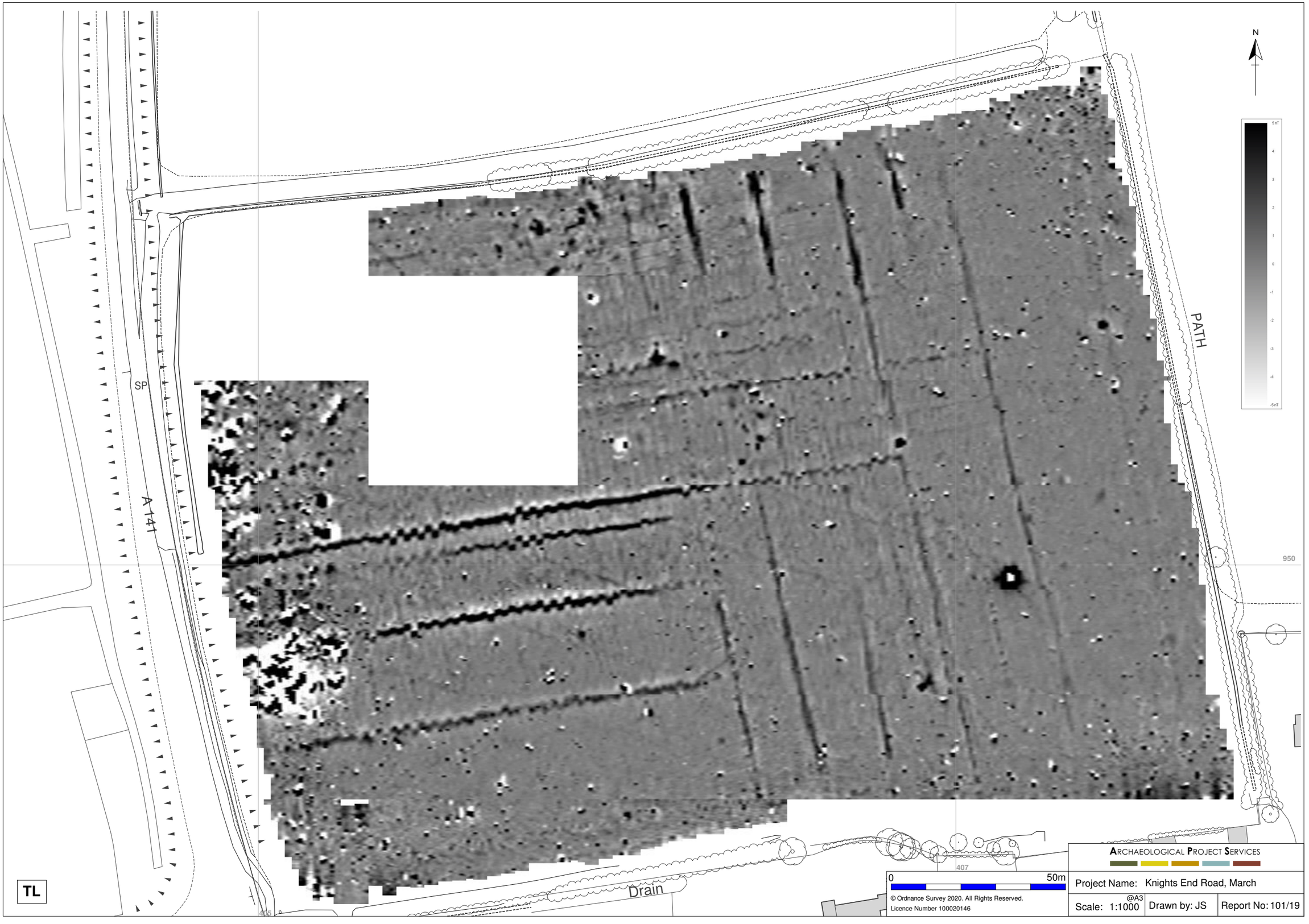


Figure 20 - Processed greyscale data, Field 7

KEY

Positive Linear

Weak Positive Linear

Agricultural Trend

Agricultural Linear

Isolated Positive Response

Isolated Dipolar Response

Area of Bipolar Response

Area of Bipolar Response

N

P

Q

PATH

SP

A141

Drain

950

407

405

TL

0 50m

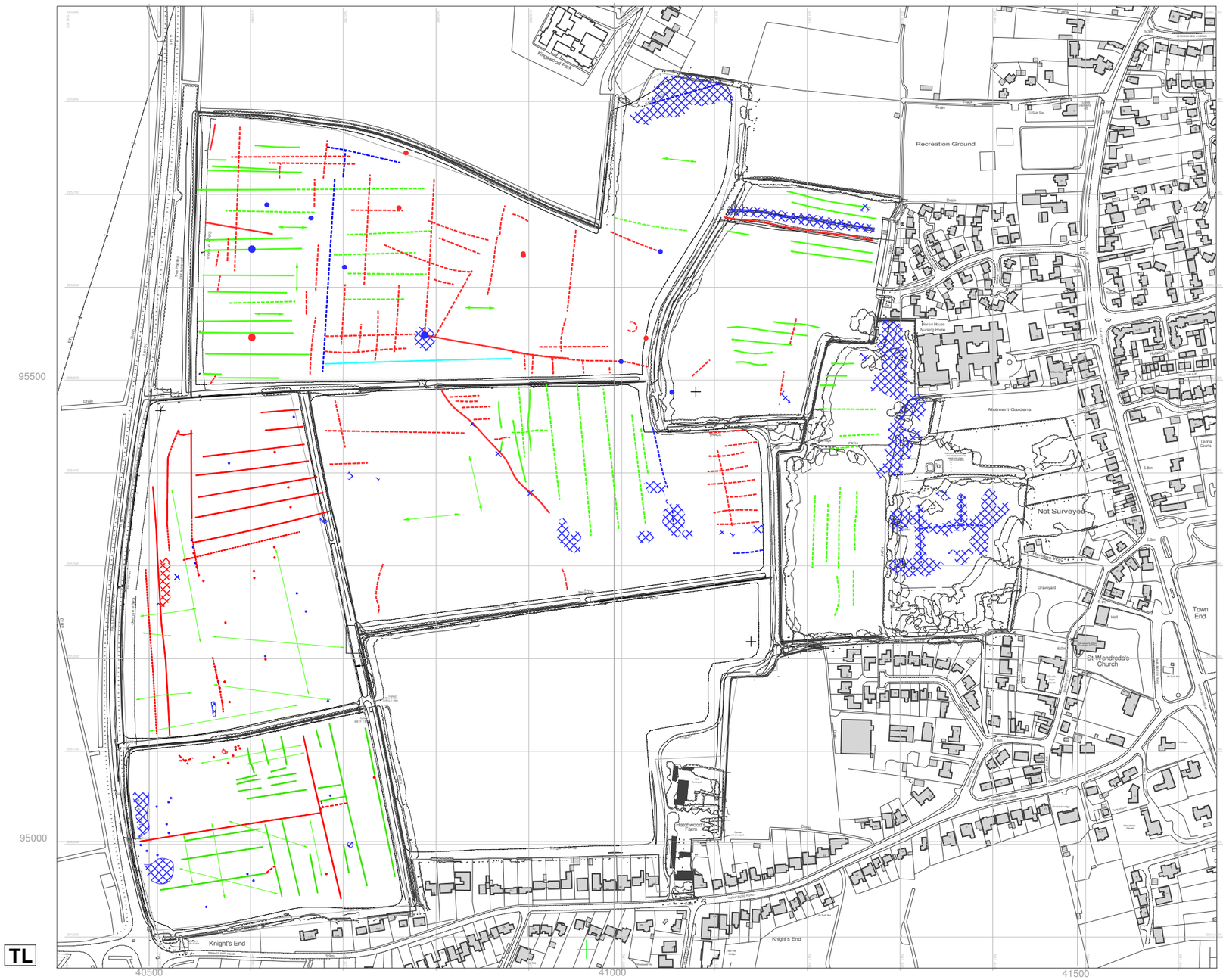
ARCHAEOLOGICAL PROJECT SERVICES

Project Name: Knights End Road, March

Scale: 1:1000 @A3 | Drawn by: JS | Report No: 101/19

Figure 21 - Field 7 Interpreted Data

Figure 22 - Full Area Greyscale Data



N

KEY

- Positive Linear
- Weak Positive Linear
- Bipolar Linear
- Negative Linear
- Agricultural Trend
- Agricultural Linear
- Field Drain
- Isolated Positive Response
- Isolated Dipolar Response
- Area of Bipolar Response
- Area of Positive Response

0 200m

ARCHAEOLOGICAL PROJECT SERVICES

Project Name: Knights End Road, March

Scale: 1:5000 @A3 | Drawn by: SP | Report No: 101/19

Figure 23 - Full Area Interpretation

Appendix 1

TECHNICAL INFORMATION

Principles of magnetometry
Magnetic prospecting is designed to identify concentrations of magnetised iron oxides in the soil. Iron oxides can exist in states of weak or a strong magnetisation (Gaffney and Gater 2003).

Human activities tend to enhance the magnetic properties of iron oxide particles. Where these particles accumulate, such as in cut features like ditches and pits, a weak positive magnetic anomaly is apparent. In cases where very strong heat has been applied, such as furnace and kiln bases, a bipolar magnetic anomaly will be apparent, with one area having a strong positive signature and one area having a strongly negative signature. Where banks have been built up from natural geological material which excludes magnetically enriched sediments, or walls have been made of stone, this may result in a negative anomaly. Modern metallic items and fired bricks cause sharp bipolar spikes. Modern services have a tendency to alternate between positive and negative readings along their length.

It should be noted that not all features will be detectable magnetically and an absence of anomalies does not necessarily indicate absence of archaeological features (Clark 1996).

Bartington Grad 601-2
A gradiometer uses two sensors separated by a fixed distance in order to measure the difference in strength between the earth's magnetic field and the soil. The Bartington Grad 601 uses two fluxgate sensors separated vertically by 1m to take these readings. This reduces natural variations associated with the Earth's magnetic field and deep geology. Changes as small as 0.2 nanoTesla (nT) in an overall field strength of c. 49,000nT can be accurately detected using this instrumentation, although in practice instrument interference and soil noise can limit sensitivity. The instrument has typical penetration of 0.5m-1m, although stronger anomalies can be detected at greater depths. The 601-2 model uses two sets of sensor pairs to take parallel readings 1m apart horizontally.

Methodology
The survey area is divided into grid squares of 30x30m^2. The grids are set out using a survey grade GPS, accurate to 0.03m. The grids are systematically walked in a zigzag pattern with the gradiometer taking readings every 0.25m along a traverse, and each traverse being separated by 1m. This equates to 3600 sampling points in a full 30m x 30m grid. Readings are automatically recorded on a datalogger which is downloaded at the end of each day. The gradiometer is 'zeroed' at the start of each day and at intervals throughout to ensure consistent results are achieved throughout the survey.

Data Processing
The data is downloaded and processed using TerraSurveyor software (version 3.0.36.0). The raw data is then adjusted to emphasise possible features. At each stage the data is examined as a greyscale image and as a trace plot.

Minimally Processed data
The data is clipped so that the mid-range of readings is most visible. This involves excluding all readings outside of the -10nT to 10nT range.

Processed Data
The following processes are applied to produce the processed greyscale image:

- Destripe: Each traverse is flattened with regard to surrounding traverses by setting the median value of the traverse to 0nT. This produces cleaner images, but may cause bleeding where particularly strong signals are present at one end of a traverse.
- Data Clip: The data is clipped to provide the most suitable contrast for seeing archaeological features. This excludes readings outside of the -5nT to 5nT
- range.

Data is exported as a PNG image and georeferenced for use in scale plans of the site. Anomalies are then checked against historical maps, and where available, lidar contour data.

References

Clark, A., 1996 *Seeing Beneath the Soil*, London, 2nd edn.

Gaffney C. and Gater, J., 2006 *Revealing the Buried Past: Geophysics for Archaeologists,* The History Press

Appendix 2

GLOSSARY

Alluvium	Deposits laid down by water. Marine alluvium is deposited by the sea, and fresh water alluvium is laid down by rivers and in lakes.
Berewick	An outlying estate (to a larger manor).
Bronze Age	A period characterised by the introduction of bronze into the country for tools, between 2400 and 700 BC.
Chest Tomb	A memorial shaped like a stone box or cist, the whole of which is above ground. The body of its subject was usually buried beneath the memorial, not in the chest itself.
Cropmark	A mark that is produced by the effect of underlying archaeological or geological features influencing the growth of a particular crop.
Domesday Survey	A survey of property ownership in England compiled on the instruction of William I for taxation purposes in 1086 AD.
Drift	Material that has been eroded, transported or deposited by glaciers (or their melt water). The term 'drift' is commonly used to describe any deposits of Quaternary age.
Eastern Association	A Parliamentarian organisation during the English Civil War. It provided and administered an army which eventually became a mainstay of the Parliamentarian military effort towards the end of 1644.
Fill	Once a feature has been dug it begins to silt up (either slowly or rapidly) or it can be back-filled manually. The soil(s) that become contained by the 'cut' are referred to as its fill(s).
Geophysical Survey	Essentially non-invasive methods of examining below the ground surface by measuring deviations in the physical properties and characteristics of the earth. Techniques include magnetometry and resistivity survey.
Iceni	A British tribe inhabiting Norfolk and parts of Cambridgeshire and Suffolk at the time of Claudius's Roman invasion of AD 43. They supported the initial invasion but rebelled in AD 47 and again under Boudicca in AD 60-61.
Iron Age	A period characterised by the introduction of Iron into the country for tools, between 700 BC and AD 43.
Lidar	An aircraft-based method of survey using analysis of pulses of laser light reflected from the surfaces of the ground and buildings. It is cable of identifying subtle differences in topography.
Manuring Scatter	A distribution of artefacts, usually pottery, created by the spreading of manure and domestic refuse from settlements onto arable fields. Such scatters can provide an indication of the extent and period of arable agriculture in the landscape.
Medieval	The Middle Ages, dating from approximately AD 1066-1500.
Mesolithic	The 'Middle Stone Age' period, part of the prehistoric era, dating from approximately 11000 - 4500 BC.
Messuages	Plots of land used as the site for a house.

Modern	The current period, dating from around AD 1900 to the present time.
Neolithic	The 'New Stone Age' period, part of the prehistoric era, dating from approximately 4500 - 2400 BC.
Post-medieval	The period following the Middle Ages, dating from approximately AD 1500-1900.
Prehistoric	The period of human history prior to the introduction of writing. In Britain the prehistoric period lasts from the first evidence of human occupation about 500,000 BC, until the Roman invasion in the middle of the 1st century AD.
Residual	Artefacts that are noticeably earlier than others in an assemblage are often described as residual. Residual artefacts may be ones that were used for a very long time, or items that were maintained as heirlooms/antiques. If the dates of artefacts within a group do not exhibit major differences it can be difficult to determine if an artefact is residual or redeposited (*q.v.*)
Ridge and Furrow	The remains of arable cultivation consisting of raised rounded strips separated by furrows. It is characteristic of open field agriculture.
Roman	Pertaining to the period dating from AD 43-410 when the Romans occupied Britain.
Saxon	Pertaining to the period dating from AD 410-1066 when England was largely settled by tribes from northern Germany, Denmark and adjacent areas.
Soilmarks	A mark that is produced by the effect of underlying archaeological or geological features seen in the colour of soil.
Villein	Unfree but land holding countryman of early Feudal times.

Appendix 3

THE ARCHIVE

The archive consists of:

9 Daily record sheets
1 Report text and illustrations
1 Digital data

File names	MKER19.csv
Explanation of codes used in file names	.csv files allow whole composite to be generated and stored easily.
Description of file formats	All files are in csv format where Z= nT reading
List of codes used in files	
Hardware, software and operating systems	TerraSurveyor 3.0.36.0 running under Windows 10
Date of last modification	28/05/220
Indications of known areas of weakness in data	
Survey Technique	Zigzag
Origin	Starts at A1. X axis progresses east. Y axis progresses south
Grid size	30mx30m
Interval	X=1, Y=0.25m
Dummy Value	2047.5
XYZ Separation	Comma

All primary records are currently kept at:

Heritage Lincolnshire/Archaeological Project Services
The Old School
Cameron Street
Heckington
Sleaford
Lincolnshire
NG34 9RW

Final destination of the archive is:

Cambridgeshire County Council Archaeological Archive Facility

The digital archive will be deposited with a publically accessible CoreSealTrust repository (Archaeology Data Service) in accordance with best practice guidelines.

OASIS code: archaeol1-383666

APS Site Code MKER19

Appendix 4

OASIS FORM

OASIS ID: archaeol1-383666

Project details	
Project name	GEOPHYSICAL SURVEY: KNIGHTS END ROAD MARCH CAMBRIDGESHIRE (MKER 19)
Short description of the project	A detailed magnetic gradiometer survey was undertaken on land at Knights End Road, March, Cambridgeshire. The survey area totalled 13.2ha. A previous evaluation has demonstrated that the site contains several Bronze Age pits, a Saxon hearth, a likely medieval moated manor house and possible post-medieval garden features. The extent of the medieval features are known from cropmarks and are thought to lie within a single field. Several of the fields surrounding this one have already been the subject of a geophysical survey, which only revealed agricultural features. This survey focused on the remaining fields surrounding the one containing the medieval moat feature. The survey captured several linear anomalies which most likely represent post-medieval and modern agricultural features, including former field boundaries, land drains and plough marks. The remaining anomalies are likely to be caused by background geology and modern detritus, although an archaeological origin for some features cannot be ruled out.
Project dates	Start: 18-11-2019 End: 27-11-2019
Previous/future work	Yes / Yes
Any associated project reference codes	MKER19 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	DITCH Post Medieval
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Housing estate
Prompt	Voluntary/self-interest
Position in the planning process	Pre-application
Solid geology	KIMMERIDGE CLAY
Drift geology	ALLUVIUM
Techniques	Magnetometry

Project location	
Country	England
Site location	CAMBRIDGESHIRE FENLAND MARCH Knights End Road
Postcode	PE159QD
Study area	13.2 Hectares

Site coordinates	TL 40802 95349 52.537388224097 0.076265179698 52 32 14 N 000 04 34 E Point

Project creators

Name of Organisation	Archaeological Project Services
Project brief originator	Self (i.e. landowner, developer, etc.)
Project design originator	Archaeological Project Services
Project director/manager	Paul Cope-Faulkner
Project supervisor	Sean Parker and Jonathon Smith
Type of sponsor/funding body	Developer

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Archaeological Data Service
Digital Contents	"Survey"
Digital Media available	"Geophysics","Images raster / digital photography","Images vector","Survey","Text"
Paper Archive recipient	Cambridgeshire County Arcaeheology Office
Paper Contents	"Survey"
Paper Media available	"Diary","Photograph","Report","Survey "

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	GEOPHYSICAL SURVEY: KNIGHTS END ROAD MARCH CAMBRIDGESHIRE (MKER19)
Author(s)/Editor(s)	Smith, J.
Other bibliographic details	APS Report 101/19
Date	2020
Issuer or publisher	Archaeological Project Services
Place of issue or publication	Heckington
Description	An A4 comb-bound booklet with A3 foldouts