ROYAL NORWICH GOLF CLUB, HELLESDON, NORWICH, NORFOLK

DETAILED MAGNETOMETER SURVEY

Report Number: 1101

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Royal Norwich Golf Club, Hellesdon
Norwich, Norfolk

Detailed Magnetometer Survey

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CONTENTS

Abstract

A non-continuous detailed fluxgate gradiometer survey was undertaken between March and May 2015 over c.20 hectares on the existing Royal Norwich Golf Club, Hellesdon, Norwich, Norfolk (TG 203 115), in advance of the proposed development of c.1000 new homes.

The survey areas were divided into separate golf holes, trees, bunkers and land terracing reduced the amount of survey area available. The background magnetic susceptibility signature varied across the site, the area on the eastern side of the A1067 had a relatively low magnetic background, compared with the average readings recorded to the west. A relatively wide range of anomalies, many of which have archaeological potential, were prospected with good clarity.

Discrete anomalies indicative of potential rubbish pits were recorded in the majority of the survey areas, a backfilled ditch from the WWII anti-tank defences (Holes 2, 3, 4, 7, 14, 15 and 16), one curvilinear anomaly (Hole 6) interpreted as a potential ring-ditch, negative and positive anomalies indicative of potential archaeological ditches (Holes 10 and 13) and one rectilinear anomaly indicative of a potential structure (Hole 15) were prospected during the survey.

The full range of anomaly types should be targeted to investigate the interpretations given within this report, with particular attention given to those with a possible archaeological derivation.

1.0 INTRODUCTION

A non-continuous detailed fluxgate gradiometer survey over *c*.20 hectares was undertaken by Britannia Archaeology Ltd starting on the 5th of March and finishing on the 29th May 2015 at the Royal Norwich Golf Club, Hellesdon, Norwich, Norfolk (TG 203 115). Britannia Archaeology Ltd were commissioned by John Craven of Suffolk Archaeology on behalf of Persimmon Homes Anglia, in response to a generic brief prepared by Norfolk County Council Historic Environment Team (NCC HET, Hamilton, K.) dated 13th June 2014. The survey was undertaken in advance of a proposed development of *c.*1000 new homes.

2.0 SITE DESCRIPTION

The survey was located on an 18 hole golf course set within mature wooded parkland with associated practice areas and a clubhouse. The site lies at a height of between 15 and 35m aOD.

The bedrock comprises Lewes Nodular Chalk, Seaford Chalk, Newhaven Chalk and Culver Chalk Formations, which were formed approximately 71 to 94 million years ago in the Cretaceous Period when the local environment was dominated by warm chalk seas (BGS, 2015).

The superficial deposits are described as Sheringham Cliffs Formation Sand and Gravel, which were formed up to 3 million years ago in the Quaternary Period when the local environment was dominated by ice age conditions. These rocks formed when Ice Age glaciers scoured the landscape, depositing moraines of till with outwash sand and gravel deposits from seasonal and post glacial meltwaters (BGS, 2015).

3.0 PLANNING POLICIES

The archaeological investigation is to be carried out on the recommendation of the local planning authority, following guidance laid down by the National Planning and Policy Framework (NPPF, DCLD 2012) which replaces Planning Policy Statement 5: Planning for the Historic Environment (PPS5, DCLG 2010). The relevant local planning policy is the *Broadland District Local Plan (adopted 2006)*.

4.0 ARCHAEOLOGICAL BACKGROUND

The following archaeological background is a summary of the 1km search from the boundary of the site that was undertaken as part of a desk-based assessment (Craven, J. 2014).

4.1 Early prehistoric – Palaeolithic / Mesolithic

Palaeolithic and Mesolithic findspots have been recorded within the search radius; those of the Palaeolithic are predominantly present in the river valley to the west and south with only one at a similar height to that of the survey area, overlooking the valley. This suggests that the site has a low potential for Palaeolithic deposits. In contrast Mesolithic findspots are more evenly distributed both within the river valley and also on higher ground around the site, therefore the Mesolithic period has a low to moderate potential.

4.2 Neolithic and Bronze Age

Neolithic worked flint findspots are common throughout the search radius particularly along the river valley to the west and across the plateau to the north. Bronze Age findspots are slightly less frequent but are also widely distributed. There are four sites of Neolithic and Bronze Age date in the Study Area, two lie on the eastern slopes of the river valley and a third on the plateau to the north-east. Together with the topographic position (the southwest portion occupies a prominent high spot overlooking the river valley) the evidence points to a moderate to high potential for containing archaeological deposits from these periods.

4.3 Iron Age

Iron Age activity is less well represented than the earlier phases of prehistoric activity and subsequent Roman periods suggesting a low potential for archaeological deposits of Iron Age date.

4.4 Roman

There is no direct evidence of any Roman occupation within the search radius, however a metal detector survey prior to the development of the adjacent industrial estates to the south in the 1980's recovered Roman coins, an urned cremation. In addition, rumours of a possible hoard were also reported during construction works. Roman material has been found immediately to the north and along the Wensum valley in which possible field systems are noted. This evidence with the topographic location overlooking the Wensum valley suggests there is a moderate to high potential for Roman archaeological deposits.

4.5 Anglo-Saxon

There is no direct evidence for Anglo-Saxon occupation, however a range of findspots are recorded both to the south and west of the site. These suggest occupation along the Wensum valley and a settlement focus preceding the later medieval village of Hellesdon and the site of Hellesdon Hall, rather than on the higher ground to the east. A series of cropmarks immediately to the south of the survey area are potentially Anglo-Saxon sunken featured buildings and a brooch has also been found in the same area. A moderate potential for Anglo-Saxon archaeology has been assigned.

4.6 Medieval

Documentary evidence only extends back to the 18th century, however it seems likely that the known post-medieval arable farmland landscape is a continuation of a similar pattern of land-use in the medieval period. It is therefore likely that the site consisted of farm or heathland at this time, located to the east of the settlement of Hellesdon and north of Hellesdon Hall. The medieval findspots give credence to this however there may be a bias in the data due to the early 20th century development of the eastern part of the site which has limited fieldwalking, metal-detecting and aerial photographic survey. A low to moderate potential for medieval deposits is thought likely.

4.7 Post-medieval

The site is known to have been used as arable farmland on the post-medieval period, with limited areas of quarrying. Therefore the survey area is thought to have low potential for post-medieval deposits, largely relating to agricultural land-use and management of the landscape rather than occupation.

4.8 Modern

The modern history of the site as a golf course is well established with the layout of the course, apparently largely unchanged since the 1920's, when the original clubhouse at Rabbits' Hill was demolished. There is a high potential for archaeological deposits relating to its use in World War II in the form of defences, however these defences were quickly removed post-war at ground level to return the course to its original state. The anti-tank ditch that encircled north Norwich passes through the centre of the site and is of local or perhaps regional importance with much of its wider route being lost to housing or other development. A pillbox on Rabbits' Hill is the last survivor of the city's perimeter defences, and the site of the rare anti-tank rails is also of local and possible regional importance. If structural remains of the Royal Observer Corps post survive these may be of local importance.

5.0 PROJECT AIMS

Field survey by geophysical prospection is required to determine the extent and significance of subsurface features.

6.0 METHODOLOGY

6.1 Instrument Type Justification

Britannia Archaeology Ltd employed a Bartington Dual Grad 601-2 fluxgate gradiometer to undertake the survey, due to its high sensitivity and rapid ground coverage within a confined and irregular golf course layout. As much of the survey areas were covered as was suitable for the instrument to be used with safety by the surveyors. Areas that have no data recorded within them were unsuitable for survey.

6.2 Instrument Calibration

One hour was allowed in the morning for the magnetometers sensors to acclimatise before the start of the first grid. The instrument was zeroed after every three to five grids to minimise the effect of diurnal drift. An area with a relatively low magnetic reading was chosen to calibrate the instrument for each golf hole; this same point was used to zero the sensors throughout each hole providing a common zero point. The survey was undertaken during sunny periods which caused a degree of sensor drift and the characteristic parallel traverse 'striping' that is present within the raw dataset (See Figures 2A – 9A).

6.3 Sampling Interval and Grid Size

The sampling interval was set at 0.25m along 1m traverse intervals, providing 4 readings a metre, the magnetometer survey was undertaken within 20 x 20m grids.

6.4 Survey Grid Location

The survey grid was set out to the Ordnance Survey OSGB36 datum to a minimum accuracy of ±0.1m, employing a Leica Viva Glonnass Smart Rover GS08 real time kinetic (RTK) survey system. Data were converted to the National Grid Transformation OSTN02 and the instrument was regularly tested using stations with known ETRS89 coordinates. The survey grids were positioned to allow the survey to progress with ease, alignments differ throughout the holes (see Figure 1).

6.5 Data Capture

Instrument readings were recorded on an internal data logger that were downloaded to a laptop at midday followed by a second download at the end of the survey. The grid order was recorded on a BA pro-forma sheet to aid in the creation of the data composites. Data were filed in job specific folders. These data composites were checked for quality on site by BA, allowing grids to be re-surveyed if necessary. The data were backed up onto an external storage device in the office and finally a remote server at the end of the day.

6.6 Data Presentation and Processing

Data are presented in both raw and processed data plots in greyscale format (Figures 2A – 9A and 2B – 9B), XY trace plots of the processed data have also been included (Figures 2C – 9C).

The raw data plots are presented with no processing, and were clipped to produce a uniform greyscale plot, processed data schedules are also displayed below.

Raw Data:
Data Clipping: -10 to +10nT;
Display Clipping: +/- 3 standard deviations.

Processed Data:
De-stripe: Median Sensors: All;
Data Clipping: -5 to +5nT;
Display Clipping: +/- 3 standard deviations.

An interpretation plan characterising the anomalies recorded can be found at Figures 2D – 9D, drawing together the evidence collated from both greyscale and XY trace plots.

6.7 Software

Raw data were downloaded using DW Consulting's Terrasurveyor v3.0.25.0 and will be stored in this format as raw data. The software used to process the data and produce the composites was also DW Consulting's Terrasurveyor v3.0.25.0. Datasets were exported into AutoCAD and placed onto the local survey grid. Interpretation plots were then produced using AutoCAD.

6.8 Grid Restoration

Britannia Archaeology Ltd did not position any reference stations as the site is an active golf course; virtual geo-referenced survey stations are presented in the table below and Figure 1 that will allow the survey grid and anomalies to be accurately targeted.

Station	Easting	Northing
STN1A	620303.8992	311496.4878
STN1B	620339.3797	311424.8409
STN2A	620504.4537	311416.5742
STN2B	620764.3857	311422.5239
STN3A	620602.5968	311498.8414
STN3B	620682.5758	311500.6722
STN4A	620628.9441	311611.9835
STN4B	620660.3101	311560.8349
STN5A	620675.1914	311740.8314
STN5B	620913.8848	311887.2058
STN6A	620751.1030	311693.5386
STN6B	620904.5574	311787.6417
STN7A	620403.4404	311520.6167
STN7B	620505.7376	311583.3486
STN8A	620365.4803	311544.2605
STN8B	620604.1737	311690.6349
STN9A	620749.2012	311570.6998
STN9B	620802.4610	311463.1665
STN10A	620525.8216	311357.0473
STN10B	620745.7640	311362.0819
STN11A	620189.2072	311135.9424
STN11B	620310.8291	311319.2675
STN12A	620007.4091	311148.7986
STN12B	620079.0992	311184.3051
STN13A	619927.5192	311310.0984
STN13B	619963.3651	311327.8517
STN14A	619963.6039	311417.2449
STN14B	620034.7146	311273.9161
STN15A	619999.7151	311479.7681
STN15B	620097.3580	311282.6239
STN16A	620044.6063	311524.3201
STN16B	620133.3714	311345.1006
STN17A	620098.7108	311640.3921
STN17B	620187.4771	311461.1700
STN18A	620179.1074	311613.2554
STN18B	620267.8736	311434.0333

7.0 RESULTS & DISCUSSION

The results and discussion have been split into individual golf holes, the most common geophysical anomalies have been grouped together immediately below to avoid repetition.

Isolated dipolar ('iron spike') responses (yellow hatched circles) were recorded throughout the survey areas and are likely to record the presence of ferrous material introduced into the topsoil throughout the 120 year existence of the golf course. It is possible that some of these responses could be caused by archaeological artefacts.

Areas of magnetic disturbance (yellow hatching) have been recorded across the majority of the site, caused by the presence of ferrous golf hole furniture, manhole covers, metal fence boundaries and backfilled golf course earthworks.

Dipolar linear trends (blue lines) were recorded within many of the holes on site, they delineate the route of modern ferrous service pipes.

7.1 Hole 1 (Figures 6A – 6D & 9A - 9D)

Hole 1 was located in the centre of the survey area, immediately west of the A1067 that bisects the site, similar to Hole 18 it had a higher than average magnetic background. Isolated dipolar responses, areas of magnetic disturbance and a dipolar linear trend were recorded in Hole 1. Both positive (red hatching) and negative (cyan hatching) linear trends were recorded where an extant bank and ditch surrounding the putting green of Hole 1 was noted by the surveyors.

7.2 Hole 2 (Figures 2A – 2D & 5A – 5D)

Hole 2 was located on the side of a dry valley in the centre of the eastern half of the golf course. The magnetic background was found to be slightly higher than those recorded in Holes 3 and 10. Five narrow negative (cyan lines) and one positive linear trend (red line) orientated north-east to south-west are likely to delineate the location of land drains or agricultural furrows (similar to those recorded in holes 3 and 10). Twenty-seven broad positive anomalies (magenta hatching) that vary in shape are likely to be caused by geological patterned ground, however an archaeological origin cannot be ruled out. One positive linear anomaly (red hatching) located to the east of Hole 2, and two 'L' shaped negative linear anomalies (cyan hatching) located to the west, record the location of backfilled golf course earthworks. A broad discontinuous linear area of magnetic disturbance (brown hatching) records the location of the World War II (WWII) anti-tank defensive ditch, orientated north-east to south-west. This anomaly is also present in Holes 3, 4 and 7 on the eastern side of the road. Eleven discrete positive anomalies (orange hatching) indicative of potential archaeological pits are predominantly clustered at the base of the dry valley to the east, however a geological origin cannot be dismissed.

7.3 Hole 3 (Figures 2A – 2D & 5A – 5D)

Hole 3 was separated by woodland to the south of Hole 9, the magnetic susceptibility of the soil here was found to be relatively low for the site. Three narrow negative linear trends (cyan lines) have been recorded in the dataset that are potentially land drains or agricultural furrows, orientated north-west to south-east. Four similarly aligned positive narrow linear anomalies (red lines) located in the same area may prove to be of the same origin. Nine broad positive anomalies (magenta hatching) of varying shape are most likely to be caused by natural geological variations, however an archaeological derivation cannot be discounted. Two positive anomalies (red hatching) were recorded where slight depressions (backfilled golf hole bunkers) were noted by the surveyors. The large broad discontinuous linear area of magnetic disturbance (brown hatching) recorded to the north-west of Hole 3, running east to west before turning north-east to south-west, records the location of the World War II anti-tank ditch defences that traverse the site. Eight positive discrete anomalies (orange hatching) indicative of archaeological pit type anomalies are located across the survey area, a geological origin however cannot be ruled out.

7.4 Hole 4 (Figures 4A – 4D & 5A – 5D)

A dry valley runs through the centre of Hole 4, which was located in the central portion of the eastern survey area. This hole was found to have a relatively high magnetic background compared with the golf holes. One narrow negative linear trend (cyan line) that is located trough the centre of the putting green has been interpreted as a land drain, or non-ferrous service trench run. Twenty-five broad positive anomalies (magenta hatching) that vary in shape and size are likely to relate to natural geological variations, although an archaeological derivation cannot be completely discounted. Two positive linear anomalies (red hatching) record the location of banks surrounding two opposing bunkers. The linear area of magnetic disturbance (brown hatching) interpreted as the location of the World War II anti-tank ditch is recorded along the southern extreme of the hole on an approximate east to west alignment that terminates before continuing 6m further to the west clipping Hole 7, it then turns towards Hole 2. Seven positive discrete anomalies (orange hatching) are present in the southern portion of Hole 4, interpreted as potential rubbish pits but equally could be of a geological origin.

7.5 Hole 5 (Figures 3A – 3D)

Hole 5 was located in the north-eastern corner of the site and was long and thin in form, running parallel with Hole 6 and had a relatively low magnetic background signature. Twenty six broad positive anomalies (magenta hatching) have been recorded and interpreted as natural geological variations within the subsoil, an archaeological origin however should not be ruled out. Eight positive discrete anomalies (orange hatching), recorded in the central and north-eastern section of the golf hole have been recorded; they are potentially archaeological rubbish pits but also could be caused by natural geological variations.

7.6 Hole 6 (Figures 3A – 3D)

Hole 6 runs parallel and south of Hole 5, the south-western section had a higher than average magnetic background signal, with the north-eastern section slightly lower. Ten broad positive anomalies (magenta hatching) indicative of natural magnetic changes have been recorded in the dataset, however an archaeological origin should not be ruled out. One positive (red hatching) and two negative linear anomalies (cyan hatching) have been recorded where golf hole earthworks are extant within the survey area. One discontinuous curvilinear anomaly (orange curvilinear hatching) has been recorded in the dataset that is potentially of archaeological derivation (ring ditch), a geological origin is also plausible.

7.7 Hole 7 (Figures 2A – 2D, 4A – 4D & 5A – 5D)

Hole 7 runs parallel and to the south of Hole 8 crossing Hole 4 where the soils magnetic susceptibility was found to be relatively low. One narrow negative (cyan line) and one narrow positive (red line) linear trend indicative of land drains or agricultural furrows were recorded in the western half of the hole, orientated north-west to south-east. Eleven broad positive anomalies (magenta hatching) indicative of geological patterned ground were prospected within this survey area, however an archaeological derivation cannot be dismissed. One discrete positive anomaly (orange hatching) indicative of an archaeological pit is recorded on the boundary of Holes 7 and 8.

7.8 Hole 8 (Figures 4A – 4D & 5A – 5D)

Hole 8 runs along the central northern boundary parallel to Hole 7, the magnetic susceptibility of this hole was found to be low. Seventeen broad positive anomalies (magenta hatching) of potential geological origin were recorded in the dataset. Six positive discrete anomalies (orange hatching) were recorded in the western end of the dataset that are indicative of potential archaeological pits, however a geological derivation is possible.

7.9 Hole 9 (Figures 2A –2B)

Hole 9 was the smallest surveyed and had a relatively low magnetic background. Dipolar ferrous responses (yellow hatched circles) and an area of magnetic disturbance (yellow hatching) were recorded where golf hole earthworks were extant. Part of the linear area of magnetic disturbance (brown hatching) interpreted as the World War II anti-tank ditch defences terminates on the southern boundary. An opening within this defensive ditch is visible to the east, before it once again continues eastward towards Hole 4.

7.10 Hole 10 (Figures 2A – 2D & 5A – 5D)

Hole 10 was located furthest south-east of the geophysical survey, it is crescent-shaped and lies directly south of Hole 2, a relatively low magnetic background signature was recorded. A large area of magnetic disturbance (yellow hatching) on the south-eastern corner of the dataset has been caused by the location of a very high ferrous fence. Narrow positive (red lines) and negative linear trends (cyan lines), predominantly

orientated north-west to south-east with one north-east to south-west are interpreted as land drains or agricultural furrows, these are similar to those recorded in Hole 2. Five broad positive anomalies (magenta hatching) of varying shape and size were prospected in Hole 10 that are indicative of natural variations within the geology. Recorded just to the west of the large area of magnetic disturbance are a group of three positive (red) and one negative linear anomalies (cyan) that are indicative of a ditch with associated banks that are of potential archaeological or agricultural origin. The negative anomaly may prove to be caused by low magnetically susceptible bank material, and the positive anomalies more indicative of backfilled ditch material. Six positive discrete anomalies (orange hatching) are indicative of backfilled archaeological rubbish pits, although a geological origin cannot be discounted.

7.11 Hole 11 (Figures 9A – 9D)

Hole 11 was located in the south-central part of the golf course, low magnetically susceptible soil was present in the south-western and north-eastern areas of the hole. One very large area of magnetic disturbance (yellow hatching) located across a wide proportion of the centre of Hole 11 may provide evidence of landscaping. Just to the north-west is a very large discrete area of magnetic disturbance (yellow hatching) that is located on the route of a curving dipolar linear anomaly (blue line), both of which are likely to relate to modern buried services. Nine broad positive anomalies (magenta hatching) are likely to be of a geological origin, however an archaeological derivation should not be ruled out.

7.12 Hole 12 (Figures 8A – 8D)

Hole 12 was located in the south-western corner of the survey area to the south of Hole 14, it had a relatively low magnetic background compared with the site's average. A curvilinear area of magnetic disturbance (yellow hatching) to the south of the site records an extant gravel track. Three broad positive anomalies (magenta hatching) were recorded, their character suggests a potential geological origin however an archaeological derivation cannot be ruled out. A dis-continuous line of four positive linear anomalies (red hatching) recorded running from the south-western corner of the dataset and orientated north-east to south-west is indicative of a ditch-type anomaly. One negative linear trend (cyan line) recorded to the north of the dataset, orientated approximately east to west, is indicative of a land drain or former agricultural furrow. Six broad positive anomalies (magenta hatching) recorded in Hole 12 are of potential geological origin. One positive anomaly (red hatching) is recorded within the area of the putting green, and is indicative of a backfilled hollow. A second positive anomaly (red hatching) partially surrounded by a crescent-shaped negative anomaly (cyan hatching) records the location of a backfilled golf bunker.

7.13 Hole 13 (Figures 7A – 7D, 8A – 8D)

Hole 13 was located to the north-west of Hole 12 and to the west of Hole 14, its magnetic background was slightly higher than average on site. Eleven broad positive anomalies (magenta hatching) have been recorded in the northern half of the dataset, all of which have been assigned a geological origin due to their broad nature. Positive (red

hatching) and negative linear anomalies (cyan hatching) were recorded where an extant bank surrounds the putting green of Hole 13. Two positive (red hatching) and one negative curving linear anomalies (cyan hatching) are indicative of a bank (cyan hatching) and associated ditch (red hatching) similar to those recorded in Hole 10. A positive curvilinear anomaly (red hatching) was further recorded just to the north-east that also has archaeological potential. Two positive discrete anomalies (orange hatching) indicative of archaeological rubbish pits were recorded to the south-east of the putting green.

7.14 Hole 14 (Figures 7A – 7D & 8A – 8D)

Hole 14 is located to the east of Hole 13 and had a similar magnetic background. Two negative linear trends (cyan lines) indicative of land drains or agricultural furrows and orientated approximately east to west were recorded in the southern section of the hole. Four broad positive anomalies (magenta hatching) indicative of geological variations have further been recorded in the southern half of the hole. A small portion of the World War II anti-tank ditch defences has been recorded (orientated north-east to south-west), that runs north-eastward into Hole 15.

7.15 Hole 15 (Figures 7A – 7D & 8A – 8B)

Hole 15 is located in between holes 14 and 16, the magnetic background was found to be relatively low here compared with the site's average. One narrow negative linear trend (cyan line) located towards the southern extent of Hole 15 is indicative of a land drain, agricultural furrow, or a non-ferrous service run, it appears to be the continuation of a negative linear anomaly recorded in Hole 16 before potentially joining a ferrous service run in Hole 14. Thirty-eight broad positive anomalies (magenta hatching) were recorded within the dataset of Hole 15, they are a variety of irregular shapes and sizes and are likely to be of geological derivation. One negative anomaly (cyan hatching) located on the south-western boundary records a potential backfilled bunker. Three sections of the discontinuous linear area of magnetic disturbance (brown hatching) were recorded near to the southern boundary of the survey area. These sections are part of the WWII anti-tank ditch defences that were also recorded within holes 16, 14, 7, 4, 3 and 2. One discrete positive anomaly (orange hatching) interpreted as an archaeological pit has been prospected near to the corner of a rectilinear anomaly (purple hatching) on the western boundary. The positive rectilinear anomaly (purple hatching) is indicative of the remains of a structure, and is possibly associated with the discrete positive anomaly.

7.16 Hole 16 (Figures 7A – 7D & 8A – 8D)

Hole 16 runs parallel to the east of Hole 15 and to the west of Hole 17, it had a similar magnetic background to Hole 15 and a lower magnetic background than Hole 17. One negative linear trend (cyan line) indicative of an agricultural furrow or land drain orientated north-north-east to south-south-west, was recorded towards the centre of the hole. A further four narrow negative linear trends (cyan hatching) orientated north-east to south-west in the southern half of the survey area are of a similar origin. The southern-most negative linear trend is discontinuous in nature and potentially joins up with the negative linear trend in Hole 15 and a ferrous service located in Hole 14.

Thirteen broad positive anomalies (magenta hatching) likely to be of geological origin were prospected during the geophysical survey, they are predominantly recorded in the northern third of the hole. Three sections of the discontinuous linear area of magnetic disturbance (brown hatching) was recorded in Hole 16, forming the defensive anti-tank ditches that turn through 90 degrees, before heading in a south-easterly direction.

7.17 Hole 17 (Figures 6A – 6D & 7A – 7D)

Hole 17 was located to the east of Hole 16 and to the west of Hole 18, its magnetic background signature was noisier in the northern two thirds compared with the levels to the south of the hole. Narrow positive (red lines) and negative linear trends (cyan lines) indicative of land drains or agricultural furrows have been recorded throughout Hole 17 on a north-west to south-east orientation. Seven broad positive anomalies (magenta hatching) recorded throughout the dataset are most likely to represent discrete positive magnetic changes in the geology. The three negative linear anomalies (cyan hatching) are believed to be the remains of backfilled golf bunkers. Two positive discrete anomalies (orange hatching) have been recorded in the central portion of the hole, they are indicative of rubbish pits of potential archaeological origin, however a geological or modern derivation cannot be dismissed.

7.17 Hole 18 (Figures 6A – 6D & 7A – 7D)

Hole 18 is located directly to the west of the A1067, the magnetic background in the northern two thirds of the hole was higher than the level prospected in the south. Narrow positive (red lines) and negative linear trends (cyan lines) were recorded on a north-west to south-east orientation that are indicative of land drains or agricultural furrows and similar to those recorded in Hole 17. Five broad positive anomalies (magenta hatching) indicative of geological anomalies are located to the north of the dataset. Three negative (cyan hatching) and four positive anomalies (red hatching) that are the remains of backfilled golf bunkers and earthworks were further recorded in Hole 18.

8.0 CONCLUSION

A wide range of anomalies were recorded throughout the survey areas, some of which have a potential archaeological origin. Anomalies characterised as having a good archaeological potential are the discrete positive anomalies indicative of potential archaeological pits, recorded across the majority of the survey areas. One rectilinear anomaly indicative of a potential structure, recorded in Hole 15. A positive curvilinear anomaly that may prove to be the remains of a ring ditch type feature, recorded in Hole 6, and negative and positive anomalies indicative of potential banks and ditches prospected in holes 10 and 13. Finally the remains of the World War II anti-tank ditch defences that were recorded in Holes 2, 3, 4, 7, 14, 15 and 16 may prove to be worthy of further archaeological investigation.

A wide variety of anomaly types should be further investigated to allow the interpretations given within this report to be tested, however particular importance should be given to these anomalies of particular archaeological potential.

9.0 PROJECT ARCHIVE AND DEPOSITION

A full archive will be prepared for all work undertaken in accordance with guidance from the *Selection, Retention and Dispersion of Archaeological Collections,* Archaeological Society for Museum Archaeologists, 1993. Arrangements will be made for the archive to be deposited with the relevant museum/HER Office.

10.0 ACKNOWLEDGEMENTS

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Bibliography

Ayala. G. *et al*. 2004. *Geoarchaeology; Using Earth Sciences to Understand the Archaeological Record*. English Heritage.

Clark. A. J. 1996. *Seeing Beneath the Soil, Prospecting Methods in Archaeology*. BT Batsford Ltd, London.

Craven, J. 2014. *Royal Norwich Golf Club, Drayton High Road, Hellesdon, Norwich; Archaeological Desk-Based Assessment.* SCCAS Report No. 2014/069.

David. A. 1995. *Geophysical Survey in Archaeological Field Evaluation: Research and Professional Services Guidelines*. No.1. English Heritage.

David. A. *et al*. 2008. *Geophysical Survey in Archaeological Field Evaluation,* Second Edition. English Heritage.

Department for Communities and Local Government, 2012. *National Planning Policy Framework (NPPF)*

Gaffney. C, Gater. J. and Ovenden. S. 2002. *The Use of Geophysical Techniques in Archaeological Evaluations*. IFA Technical Paper No. 6.

Gaffney. C. and Gater. J. 2003. *Revealing the Buried Past, Geophysics for Archaeologists*. Tempus Publishing Ltd.

Gurney, D. 2003. *Standards for Archaeology in the East of England*, East Anglian Archaeology Occasional Paper 14.

Institute for Archaeologists. 2011. *Standard and Guidance for Archaeological Geophysical Survey*.

Linford. N. 2006. Notes from an English Heritage Seminar.

Schmidt. A. 2001. *Geophysical Data in Archaeology: A Guide to Good Practice*. Archaeology Data Service. Oxbow Books.

Whitten. D.G.A. 1978. *The Penguin Dictionary of Geology*. Penguin Books Ltd. London.

Witten. A.J. 2006. *Handbook of Geophysics and Archaeology*. Equinox Publishing Ltd. London.

Websites

The British Geological Survey, 2015, (Natural Environment Research Council) – Geology of Britain Viewer - www.bgs.ac.uk/opengeoscience/home.html?Accordion2=1#maps

APPENDIX 1 METADATA SHEETS

Raw Data; Golf Holes 1, 17 and 18

Filename	RNGC 1 17 18 R.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1440 x 240
Survey Size (meters)	360 m x 240 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	2.74
Mean	-1.03
Median	-1.04
Composite Area	8.64 ha
Surveyed Area	3.8701 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Holes 1, 17 and 18

Filename	RNGC 1 17 18 P.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1440 x 240
Survey Size (meters)	360 m x 240 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.89
Mean	0.05
Median	0.00
Composite Area	8.64 ha
Surveyed Area	3.8701 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 126
1 Col:0 Row:4 grids\187.xgd
2 Col:0 Row:5 grids\188.xgd
3 Col:0 Row:6 grids\189.xgd
4 Col:0 Row:7 grids\190.xgd

5	Col:1	Row:4	grids\182.xgd
6	Col:1	Row:5	grids\183.xgd
7	Col:1	Row:6	grids\184.xgd
8	Col:1	Row:7	grids\185.xgd
9	Col:1	Row:8	grids\186.xgd
10	Col:2	Row:4	grids\177.xgd
11	Col:2	Row:5	grids\178.xgd
12	Col:2	Row:6	grids\179.xgd
13	Col:2	Row:7	grids\180.xgd
14	Col:2	Row:8	grids\181.xgd
15	Col:3	Row:3	grids\171.xgd
16	Col:3	Row:4	grids\172.xgd
17	Col:3	Row:5	grids\173.xgd
18	Col:3	Row:6	grids\174.xgd
19	Col:3	Row:7	grids\175.xgd
20	Col:3	Row:8	grids\176.xgd
21	Col:4	Row:2	grids\167.xgd
22	Col:4	Row:3	grids\168.xgd
23	Col:4	Row:4	grids\169.xgd
24	Col:4	Row:5	grids\170.xgd
25	Col:4	Row:6	grids\191.xgd
26	Col:4	Row:7	grids\192.xgd
27	Col:4	Row:8	grids\193.xgd
28	Col:5	Row:2	grids\163.xgd
29	Col:5	Row:3	grids\164.xgd
30	Col:5	Row:4	grids\165.xgd
31	Col:5	Row:5	grids\166.xgd
32	Col:5	Row:6	grids\194.xgd
33	Col:5	Row:7	grids\195.xgd
34	Col:5	Row:8	grids\196.xgd
35	Col:6	Row:2	grids\159.xgd
36	Col:6	Row:3	grids\160.xgd
37	Col:6	Row:4	grids\161.xgd
38	Col:6	Row:5	grids\162.xgd
39	Col:6	Row:6	grids\197.xgd
40	Col:6	Row:7	grids\198.xgd
41	Col:6	Row:8	grids\199.xgd
42	Col:7	Row:2	grids\155.xgd
43	Col:7	Row:3	grids\156.xgd
44	Col:7	Row:4	grids\157.xgd
45	Col:7	Row:5	grids\158.xgd
46	Col:7	Row:6	grids\200.xgd
47	Col:7	Row:7	grids\201.xgd
48	Col:7	Row:8	grids\202.xgd
49	Col:8	Row:2	grids\152.xgd
50	Col:8	Row:3	grids\153.xgd
51	Col:8	Row:4	grids\154.xgd
52	Col:8	Row:6	grids\203.xgd
53	Col:8	Row:7	grids\204.xgd
54	Col:8	Row:8	grids\205.xgd
55	Col:9	Row:2	grids\149.xgd
56	Col:9	Row:3	grids\150.xgd
57	Col:9	Row:4	grids\151.xgd
58	Col:9	Row:6	grids\206.xgd
59	Col:9	Row:7	grids\207.xgd
60	Col:9	Row:8	grids\208.xgd
61	Col:10	Row:2	grids\146.xgd
62	Col:10	Row:3	grids\147.xgd
63	Col:10	Row:4	grids\148.xgd
64	Col:10	Row:6	grids\209.xgd
65	Col:10	Row:7	grids\210.xgd
66	Col:10	Row:8	grids\211.xgd
67	Col:10	Row:9	grids\212.xgd
68	Col:11	Row:2	grids\143.xgd
69	Col:11	Row:3	grids\144.xgd
70	Col:11	Row:4	grids\145.xgd

71	Col:11	Row:6	grids\213.xgd
72	Col:11	Row:7	grids\214.xgd
73	Col:11	Row:8	grids\215.xgd
74	Col:11	Row:9	grids\216.xgd
75	Col:12	Row:0	grids\138.xgd
76	Col:12	Row:1	grids\139.xgd
77	Col:12	Row:2	grids\140.xgd
78	Col:12	Row:3	grids\141.xgd
79	Col:12	Row:4	grids\142.xgd
80	Col:12	Row:6	grids\217.xgd
81	Col:12	Row:7	grids\218.xgd
82	Col:12	Row:8	grids\219.xgd
83	Col:12	Row:9	grids\220.xgd
84	Col:12	Row:10	grids\221.xgd
85	Col:13	Row:0	grids\133.xgd
86	Col:13	Row:1	grids\134.xgd
87	Col:13	Row:2	grids\135.xgd
88	Col:13	Row:3	grids\136.xgd
89	Col:13	Row:4	grids\137.xgd
90	Col:13	Row:7	grids\222.xgd
91	Col:13	Row:8	grids\223.xgd
92	Col:13	Row:9	grids\224.xgd
93	Col:13	Row:10	grids\225.xgd
94	Col:14	Row:0	grids\128.xgd
95	Col:14	Row:1	grids\129.xgd
96	Col:14	Row:2	grids\130.xgd
97	Col:14	Row:3	grids\131.xgd
98	Col:14	Row:4	grids\132.xgd
99	Col:14	Row:7	grids\226.xgd
100	Col:14	Row:8	grids\227.xgd
101	Col:14	Row:9	grids\228.xgd
102	Col:14	Row:10	grids\229.xgd
103	Col:15	Row:1	grids\123.xgd
104	Col:15	Row:2	grids\124.xgd
105	Col:15	Row:3	grids\125.xgd
106	Col:15	Row:4	grids\126.xgd
107	Col:15	Row:5	grids\127.xgd
108	Col:15	Row:8	grids\230.xgd
109	Col:15	Row:9	grids\231.xgd
110	Col:15	Row:10	grids\232.xgd
111	Col:15	Row:11	grids\233.xgd
112	Col:16	Row:1	grids\118.xgd
113	Col:16	Row:2	grids\119.xgd
114	Col:16	Row:3	grids\120.xgd
115	Col:16	Row:4	grids\121.xgd
116	Col:16	Row:5	grids\122.xgd
117	Col:16	Row:8	grids\234.xgd
118	Col:16	Row:9	grids\235.xgd
119	Col:16	Row:10	grids\236.xgd
120	Col:16	Row:11	grids\237.xgd
121	Col:17	Row:2	grids\114.xgd
122	Col:17	Row:3	grids\115.xgd
123	Col:17	Row:4	grids\116.xgd
124	Col:17	Row:5	grids\117.xgd
125	Col:17	Row:10	grids\238.xgd
126	Col:17	Row:11	grids\239.xgd

Raw Data; Golf Hole 11

Filename	RNGC 11R.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	400 x 280
Survey Size (meters)	100 m x 280 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	3.43
Mean	0.10
Median	0.27
Composite Area	2.8 ha
Surveyed Area	1.5138 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Hole 11

Filename	RNGC 11P.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	480 x 280
Survey Size (meters)	120 m x 280 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	2.07
Mean	-0.01
Median	0.00
Composite Area	3.36 ha
Surveyed Area	1.5138 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 48
1 Col:0 Row:2 grids\367.xgd
2 Col:0 Row:3 grids\368.xgd
3 Col:0 Row:4 grids\369.xgd
4 Col:0 Row:5 grids\370.xgd
5 Col:0 Row:6 grids\371.xgd
6 Col:0 Row:7 grids\372.xgd
7 Col:0 Row:8 grids\349.xgd

8	Col:0	Row:9	grids\350.xgd
9	Col:0	Row:10	grids\351.xgd
10	Col:0	Row:11	grids\352.xgd
11	Col:0	Row:12	grids\353.xgd
12	Col:0	Row:13	grids\354.xgd
13	Col:1	Row:1	grids\393.xgd
14	Col:1	Row:2	grids\373.xgd
15	Col:1	Row:3	grids\374.xgd
16	Col:1	Row:4	grids\375.xgd
17	Col:1	Row:5	grids\376.xgd
18	Col:1	Row:6	grids\377.xgd
19	Col:1	Row:7	grids\378.xgd
20	Col:1	Row:8	grids\355.xgd
21	Col:1	Row:9	grids\356.xgd
22	Col:1	Row:10	grids\357.xgd
23	Col:1	Row:11	grids\358.xgd
24	Col:1	Row:12	grids\359.xgd
25	Col:1	Row:13	grids\360.xgd
26	Col:2	Row:0	grids\394.xgd
27	Col:2	Row:1	grids\391.xgd
28	Col:2	Row:2	grids\392.xgd
29	Col:2	Row:3	grids\379.xgd
30	Col:2	Row:4	grids\380.xgd
31	Col:2	Row:5	grids\381.xgd
32	Col:2	Row:6	grids\382.xgd
33	Col:2	Row:7	grids\383.xgd
34	Col:2	Row:8	grids\361.xgd
35	Col:2	Row:9	grids\362.xgd
36	Col:2	Row:10	grids\363.xgd
37	Col:2	Row:11	grids\364.xgd
38	Col:2	Row:12	grids\365.xgd
39	Col:2	Row:13	grids\366.xgd
40	Col:3	Row:0	grids\395.xgd
41	Col:3	Row:1	grids\389.xgd
42	Col:3	Row:2	grids\390.xgd
43	Col:3	Row:3	grids\384.xgd
44	Col:3	Row:4	grids\385.xgd
45	Col:4	Row:0	grids\396.xgd
46	Col:4	Row:1	grids\386.xgd
47	Col:4	Row:2	grids\387.xgd
48	Col:4	Row:3	grids\388.xgd

Raw Data; Golf Holes 12, 13 and 14

Filename	RNGC 12 13 14 R.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	1360 x 140
Survey Size (meters)	340 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	3.03
Mean	0.09
Median	0.28
Composite Area	4.76 ha
Surveyed Area	2.1493 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Holes 12, 13 and 14

Filename	RNGC 12 13 14 P.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	1360 x 140
Survey Size (meters)	340 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.95
Mean	-0.06
Median	0.00
Composite Area	4.76 ha
Surveyed Area	2.1493 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 72
1 Col:0 Row:1 grids\697.xgd
2 Col:0 Row:2 grids\698.xgd
3 Col:0 Row:3 grids\699.xgd
4 Col:1 Row:1 grids\693.xgd
5 Col:1 Row:2 grids\694.xgd
6 Col:1 Row:3 grids\695.xgd
7 Col:1 Row:4 grids\696.xgd

8	Col:2	Row:1	grids\688.xgd
9	Col:2	Row:2	grids\689.xgd
10	Col:2	Row:3	grids\690.xgd
11	Col:2	Row:4	grids\691.xgd
12	Col:2	Row:5	grids\692.xgd
13	Col:3	Row:1	grids\683.xgd
14	Col:3	Row:2	grids\684.xgd
15	Col:3	Row:3	grids\685.xgd
16	Col:3	Row:4	grids\686.xgd
17	Col:3	Row:5	grids\687.xgd
18	Col:4	Row:1	grids\677.xgd
19	Col:4	Row:2	grids\678.xgd
20	Col:4	Row:3	grids\679.xgd
21	Col:4	Row:4	grids\680.xgd
22	Col:4	Row:5	grids\681.xgd
23	Col:4	Row:6	grids\682.xgd
24	Col:5	Row:1	grids\667.xgd
25	Col:5	Row:2	grids\668.xgd
26	Col:5	Row:3	grids\669.xgd
27	Col:5	Row:4	grids\670.xgd
28	Col:5	Row:5	grids\671.xgd
29	Col:5	Row:6	grids\672.xgd
30	Col:6	Row:1	grids\665.xgd
31	Col:6	Row:2	grids\666.xgd
32	Col:6	Row:5	grids\673.xgd
33	Col:6	Row:6	grids\674.xgd
34	Col:7	Row:1	grids\663.xgd
35	Col:7	Row:2	grids\664.xgd
36	Col:7	Row:5	grids\675.xgd
37	Col:7	Row:6	grids\676.xgd
38	Col:8	Row:1	grids\661.xgd
39	Col:8	Row:2	grids\662.xgd
40	Col:9	Row:1	grids\659.xgd
41	Col:9	Row:2	grids\660.xgd
42	Col:10	Row:2	grids\658.xgd
43	Col:11	Row:0	grids\655.xgd
44	Col:11	Row:1	grids\656.xgd
45	Col:11	Row:2	grids\657.xgd
46	Col:12	Row:0	grids\648.xgd
47	Col:12	Row:1	grids\649.xgd
48	Col:12	Row:2	grids\650.xgd
49	Col:12	Row:4	grids\652.xgd
50	Col:12	Row:5	grids\653.xgd
51	Col:12	Row:6	grids\654.xgd
52	Col:13	Row:0	grids\641.xgd
53	Col:13	Row:1	grids\642.xgd
54	Col:13	Row:2	grids\643.xgd
55	Col:13	Row:3	grids\644.xgd
56	Col:13	Row:4	grids\645.xgd
57	Col:13	Row:5	grids\646.xgd
58	Col:13	Row:6	grids\647.xgd
59	Col:14	Row:0	grids\634.xgd
60	Col:14	Row:1	grids\635.xgd
61	Col:14	Row:2	grids\636.xgd
62	Col:14	Row:3	grids\637.xgd
63	Col:14	Row:4	grids\638.xgd
64	Col:14	Row:5	grids\639.xgd
65	Col:14	Row:6	grids\640.xgd
66	Col:15	Row:0	grids\629.xgd
67	Col:15	Row:1	grids\630.xgd
68	Col:15	Row:2	grids\631.xgd
69	Col:15	Row:3	grids\632.xgd
70	Col:15	Row:4	grids\633.xgd
71	Col:16	Row:2	grids\627.xgd
72	Col:16	Row:3	grids\628.xgd

Raw Data; Golf Holes 15 and 16

Filename	RNGC 15 & 16 R.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	45 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1280 x 140
Survey Size (meters)	320 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	2.61
Mean	-0.15
Median	-0.08
Composite Area	4.48 ha
Surveyed Area	2.4699 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Holes 15 and 16

Filename	RNGC 15 & 16 P.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	45 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1280 x 140
Survey Size (meters)	320 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.76
Mean	0.05
Median	0.00
Composite Area	4.48 ha
Surveyed Area	2.4699 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 88
1 Col:0 Row:1 grids\532.xgd
2 Col:0 Row:2 grids\533.xgd
3 Col:0 Row:3 grids\534.xgd
4 Col:0 Row:4 grids\535.xgd
5 Col:1 Row:1 grids\527.xgd
6 Col:1 Row:2 grids\528.xgd
7 Col:1 Row:3 grids\529.xgd

8	Col:1	Row:4	grids\530.xgd
9	Col:1	Row:5	grids\531.xgd
10	Col:2	Row:0	grids\525.xgd
11	Col:2	Row:1	grids\526.xgd
12	Col:2	Row:3	grids\536.xgd
13	Col:2	Row:4	grids\537.xgd
14	Col:2	Row:5	grids\538.xgd
15	Col:3	Row:0	grids\523.xgd
16	Col:3	Row:1	grids\524.xgd
17	Col:3	Row:3	grids\539.xgd
18	Col:3	Row:4	grids\540.xgd
19	Col:3	Row:5	grids\541.xgd
20	Col:3	Row:6	grids\542.xgd
21	Col:4	Row:0	grids\520.xgd
22	Col:4	Row:1	grids\521.xgd
23	Col:4	Row:2	grids\522.xgd
24	Col:4	Row:3	grids\543.xgd
25	Col:4	Row:4	grids\544.xgd
26	Col:4	Row:5	grids\545.xgd
27	Col:4	Row:6	grids\546.xgd
28	Col:5	Row:0	grids\517.xgd
29	Col:5	Row:1	grids\518.xgd
30	Col:5	Row:2	grids\519.xgd
31	Col:5	Row:3	grids\547.xgd
32	Col:5	Row:4	grids\548.xgd
33	Col:5	Row:5	grids\549.xgd
34	Col:5	Row:6	grids\550.xgd
35	Col:6	Row:0	grids\513.xgd
36	Col:6	Row:1	grids\514.xgd
37	Col:6	Row:2	grids\515.xgd
38	Col:6	Row:3	grids\516.xgd
39	Col:6	Row:4	grids\551.xgd
40	Col:6	Row:5	grids\552.xgd
41	Col:6	Row:6	grids\553.xgd
42	Col:7	Row:0	grids\509.xgd
43	Col:7	Row:1	grids\510.xgd
44	Col:7	Row:2	grids\511.xgd
45	Col:7	Row:3	grids\512.xgd
46	Col:7	Row:4	grids\554.xgd
47	Col:7	Row:5	grids\555.xgd
48	Col:7	Row:6	grids\556.xgd
49	Col:8	Row:0	grids\505.xgd
50	Col:8	Row:1	grids\506.xgd
51	Col:8	Row:2	grids\507.xgd
52	Col:8	Row:3	grids\508.xgd
53	Col:8	Row:4	grids\557.xgd
54	Col:8	Row:5	grids\558.xgd
55	Col:8	Row:6	grids\559.xgd
56	Col:9	Row:1	grids\502.xgd
57	Col:9	Row:2	grids\503.xgd
58	Col:9	Row:3	grids\504.xgd
59	Col:9	Row:4	grids\560.xgd
60	Col:9	Row:5	grids\561.xgd
61	Col:9	Row:6	grids\562.xgd
62	Col:10	Row:1	grids\499.xgd
63	Col:10	Row:2	grids\500.xgd
64	Col:10	Row:3	grids\501.xgd
65	Col:10	Row:4	grids\563.xgd
66	Col:10	Row:5	grids\564.xgd
67	Col:10	Row:6	grids\565.xgd
68	Col:11	Row:2	grids\497.xgd
69	Col:11	Row:3	grids\498.xgd
70	Col:11	Row:4	grids\566.xgd
71	Col:11	Row:5	grids\567.xgd
72	Col:11	Row:6	grids\568.xgd
73	Col:12	Row:2	grids\495.xgd

74	Col:12	Row:3	grids\496.xgd
75	Col:12	Row:4	grids\569.xgd
76	Col:12	Row:5	grids\570.xgd
77	Col:12	Row:6	grids\571.xgd
78	Col:13	Row:2	grids\493.xgd
79	Col:13	Row:3	grids\494.xgd
80	Col:13	Row:4	grids\572.xgd
81	Col:13	Row:5	grids\573.xgd
82	Col:13	Row:6	grids\574.xgd
83	Col:14	Row:1	grids\490.xgd
84	Col:14	Row:2	grids\491.xgd
85	Col:14	Row:3	grids\492.xgd
86	Col:15	Row:1	grids\487.xgd
87	Col:15	Row:2	grids\488.xgd
88	Col:15	Row:3	grids\489.xgd

Raw Data; Golf Holes 2 and 10

Filename	RNGC 2 & 10 R.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1520 x 180
Survey Size (meters)	380 m x 180 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	3.17
Mean	-0.14
Median	-0.19
Composite Area	6.84 ha
Surveyed Area	3.5183 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Holes 2 and 10

Filename	RNGC 2 & 10 P.xcp
Description	
Instrument Type	Grad 601-2 (Magnetometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1520 x 180
Survey Size (meters)	380 m x 180 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.90
Mean	0.05
Median	0.00
Composite Area	6.84 ha
Surveyed Area	3.5183 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 112
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:1 Row:0 grids\03.xgd
4 Col:1 Row:1 grids\04.xgd
5 Col:1 Row:2 grids\05.xgd
6 Col:1 Row:3 grids\06.xgd
7 Col:1 Row:4 grids\07.xgd

8	Col:1	Row:5	grids\08.xgd
9	Col:2	Row:0	grids\09.xgd
10	Col:2	Row:1	grids\10.xgd
11	Col:2	Row:2	grids\11.xgd
12	Col:2	Row:3	grids\12.xgd
13	Col:2	Row:4	grids\13.xgd
14	Col:2	Row:5	grids\109.xgd
15	Col:2	Row:6	grids\110.xgd
16	Col:3	Row:0	grids\14.xgd
17	Col:3	Row:1	grids\15.xgd
18	Col:3	Row:2	grids\16.xgd
19	Col:3	Row:3	grids\17.xgd
20	Col:3	Row:4	grids\18.xgd
21	Col:3	Row:5	grids\106.xgd
22	Col:3	Row:6	grids\107.xgd
23	Col:3	Row:7	grids\108.xgd
24	Col:4	Row:0	grids\19.xgd
25	Col:4	Row:1	grids\20.xgd
26	Col:4	Row:2	grids\21.xgd
27	Col:4	Row:3	grids\22.xgd
28	Col:4	Row:4	grids\23.xgd
29	Col:4	Row:5	grids\103.xgd
30	Col:4	Row:6	grids\104.xgd
31	Col:4	Row:7	grids\105.xgd
32	Col:5	Row:0	grids\24.xgd
33	Col:5	Row:1	grids\25.xgd
34	Col:5	Row:2	grids\26.xgd
35	Col:5	Row:3	grids\27.xgd
36	Col:5	Row:4	grids\28.xgd
37	Col:5	Row:5	grids\29.xgd
38	Col:5	Row:6	grids\111.xgd
39	Col:5	Row:7	grids\112.xgd
40	Col:6	Row:0	grids\30.xgd
41	Col:6	Row:1	grids\31.xgd
42	Col:6	Row:2	grids\32.xgd
43	Col:6	Row:3	grids\33.xgd
44	Col:6	Row:4	grids\34.xgd
45	Col:6	Row:5	grids\35.xgd
46	Col:6	Row:6	grids\101.xgd
47	Col:6	Row:7	grids\102.xgd
48	Col:7	Row:2	grids\36.xgd
49	Col:7	Row:3	grids\37.xgd
50	Col:7	Row:4	grids\38.xgd
51	Col:7	Row:5	grids\39.xgd
52	Col:7	Row:6	grids\98.xgd
53	Col:7	Row:7	grids\99.xgd
54	Col:7	Row:8	grids\100.xgd
55	Col:8	Row:3	grids\40.xgd
56	Col:8	Row:4	grids\41.xgd
57	Col:8	Row:5	grids\42.xgd
58	Col:8	Row:6	grids\95.xgd
59	Col:8	Row:7	grids\96.xgd
60	Col:8	Row:8	grids\97.xgd
61	Col:9	Row:3	grids\43.xgd
62	Col:9	Row:4	grids\44.xgd
63	Col:9	Row:5	grids\45.xgd
64	Col:9	Row:6	grids\92.xgd
65	Col:9	Row:7	grids\93.xgd
66	Col:9	Row:8	grids\94.xgd
67	Col:10	Row:3	grids\46.xgd
68	Col:10	Row:4	grids\47.xgd
69	Col:10	Row:5	grids\48.xgd
70	Col:10	Row:6	grids\89.xgd
71	Col:10	Row:7	grids\90.xgd
72	Col:10	Row:8	grids\91.xgd
73	Col:11	Row:3	grids\49.xgd

74	Col:11	Row:4	grids\50.xgd
75	Col:11	Row:5	grids\51.xgd
76	Col:11	Row:6	grids\86.xgd
77	Col:11	Row:7	grids\87.xgd
78	Col:11	Row:8	grids\88.xgd
79	Col:12	Row:3	grids\52.xgd
80	Col:12	Row:4	grids\53.xgd
81	Col:12	Row:5	grids\54.xgd
82	Col:12	Row:6	grids\83.xgd
83	Col:12	Row:7	grids\84.xgd
84	Col:12	Row:8	grids\85.xgd
85	Col:13	Row:3	grids\55.xgd
86	Col:13	Row:4	grids\56.xgd
87	Col:13	Row:5	grids\57.xgd
88	Col:13	Row:6	grids\80.xgd
89	Col:13	Row:7	grids\81.xgd
90	Col:13	Row:8	grids\82.xgd
91	Col:14	Row:3	grids\58.xgd
92	Col:14	Row:4	grids\59.xgd
93	Col:14	Row:5	grids\60.xgd
94	Col:14	Row:6	grids\77.xgd
95	Col:14	Row:7	grids\78.xgd
96	Col:14	Row:8	grids\79.xgd
97	Col:15	Row:3	grids\61.xgd
98	Col:15	Row:4	grids\62.xgd
99	Col:15	Row:5	grids\63.xgd
100	Col:15	Row:6	grids\64.xgd
101	Col:15	Row:7	grids\65.xgd
102	Col:16	Row:3	grids\66.xgd
103	Col:16	Row:4	grids\67.xgd
104	Col:16	Row:5	grids\68.xgd
105	Col:16	Row:6	grids\69.xgd
106	Col:16	Row:7	grids\70.xgd
107	Col:17	Row:3	grids\71.xgd
108	Col:17	Row:4	grids\72.xgd
109	Col:17	Row:5	grids\73.xgd
110	Col:17	Row:6	grids\74.xgd
111	Col:18	Row:4	grids\75.xgd
112	Col:18	Row:5	grids\76.xgd

Raw Data; Golf Hole 3

Filename	RNGC 3 R.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1120 x 100
Survey Size (meters)	280 m x 100 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	4.43
Mean	-0.94
Median	-0.21
Composite Area	2.8 ha
Surveyed Area	1.2471 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Hole 3

Filename	RNGC 3 P.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1120 x 100
Survey Size (meters)	280 m x 100 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	2.55
Mean	-0.46
Median	-0.11
Composite Area	2.8 ha
Surveyed Area	1.2471 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 46
1 Col:0 Row:0 grids\624.xgd
2 Col:0 Row:1 grids\625.xgd
3 Col:0 Row:2 grids\626.xgd
4 Col:1 Row:0 grids\621.xgd
5 Col:1 Row:1 grids\622.xgd
6 Col:1 Row:2 grids\623.xgd
7 Col:2 Row:0 grids\618.xgd

8	Col:2	Row:1	grids\619.xgd
9	Col:2	Row:2	grids\620.xgd
10	Col:3	Row:0	grids\615.xgd
11	Col:3	Row:1	grids\616.xgd
12	Col:3	Row:2	grids\617.xgd
13	Col:4	Row:0	grids\612.xgd
14	Col:4	Row:1	grids\613.xgd
15	Col:4	Row:2	grids\614.xgd
16	Col:5	Row:0	grids\609.xgd
17	Col:5	Row:1	grids\610.xgd
18	Col:5	Row:2	grids\611.xgd
19	Col:6	Row:0	grids\605.xgd
20	Col:6	Row:1	grids\606.xgd
21	Col:6	Row:2	grids\607.xgd
22	Col:6	Row:3	grids\608.xgd
23	Col:7	Row:0	grids\601.xgd
24	Col:7	Row:1	grids\602.xgd
25	Col:7	Row:2	grids\603.xgd
26	Col:7	Row:3	grids\604.xgd
27	Col:8	Row:0	grids\596.xgd
28	Col:8	Row:1	grids\597.xgd
29	Col:8	Row:2	grids\598.xgd
30	Col:8	Row:3	grids\599.xgd
31	Col:8	Row:4	grids\600.xgd
32	Col:9	Row:0	grids\591.xgd
33	Col:9	Row:1	grids\592.xgd
34	Col:9	Row:2	grids\593.xgd
35	Col:9	Row:3	grids\594.xgd
36	Col:9	Row:4	grids\595.xgd
37	Col:10	Row:1	grids\587.xgd
38	Col:10	Row:2	grids\588.xgd
39	Col:10	Row:3	grids\589.xgd
40	Col:10	Row:4	grids\590.xgd
41	Col:11	Row:2	grids\584.xgd
42	Col:11	Row:3	grids\585.xgd
43	Col:11	Row:4	grids\586.xgd
44	Col:12	Row:3	grids\582.xgd
45	Col:12	Row:4	grids\583.xgd
46	Col:13	Row:4	grids\581.xgd

Raw Data; Golf Holes 4, 7 and 8

Filename	RNGC 4 7 8 R.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1680 x 180
Survey Size (meters)	420 m x 180 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	2.84
Mean	-0.15
Median	-0.03
Composite Area	7.56 ha
Surveyed Area	3.5632 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Holes 4, 7 and 8

Filename	RNGC 4 7 8 P.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	1680 x 180
Survey Size (meters)	420 m x 180 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.78
Mean	-0.03
Median	-0.02
Composite Area	7.56 ha
Surveyed Area	3.5632 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 109
1 Col:0 Row:0 grids\240.xgd
2 Col:0 Row:1 grids\241.xgd
3 Col:1 Row:0 grids\242.xgd
4 Col:1 Row:1 grids\243.xgd
5 Col:1 Row:2 grids\244.xgd
6 Col:1 Row:3 grids\245.xgd
7 Col:2 Row:0 grids\246.xgd

8	Col:2	Row:1	grids\247.xgd
9	Col:2	Row:2	grids\248.xgd
10	Col:2	Row:3	grids\249.xgd
11	Col:3	Row:0	grids\250.xgd
12	Col:3	Row:1	grids\251.xgd
13	Col:3	Row:2	grids\252.xgd
14	Col:3	Row:3	grids\253.xgd
15	Col:4	Row:0	grids\254.xgd
16	Col:4	Row:1	grids\255.xgd
17	Col:4	Row:2	grids\256.xgd
18	Col:4	Row:3	grids\257.xgd
19	Col:4	Row:4	grids\258.xgd
20	Col:5	Row:0	grids\259.xgd
21	Col:5	Row:1	grids\260.xgd
22	Col:5	Row:2	grids\261.xgd
23	Col:5	Row:3	grids\262.xgd
24	Col:5	Row:4	grids\263.xgd
25	Col:6	Row:0	grids\264.xgd
26	Col:6	Row:1	grids\265.xgd
27	Col:6	Row:2	grids\266.xgd
28	Col:6	Row:3	grids\267.xgd
29	Col:6	Row:4	grids\268.xgd
30	Col:7	Row:0	grids\269.xgd
31	Col:7	Row:1	grids\270.xgd
32	Col:7	Row:2	grids\271.xgd
33	Col:7	Row:3	grids\272.xgd
34	Col:7	Row:4	grids\273.xgd
35	Col:7	Row:5	grids\312.xgd
36	Col:8	Row:0	grids\274.xgd
37	Col:8	Row:1	grids\275.xgd
38	Col:8	Row:2	grids\313.xgd
39	Col:8	Row:3	grids\314.xgd
40	Col:8	Row:4	grids\315.xgd
41	Col:8	Row:5	grids\316.xgd
42	Col:8	Row:6	grids\317.xgd
43	Col:9	Row:0	grids\276.xgd
44	Col:9	Row:1	grids\277.xgd
45	Col:9	Row:4	grids\318.xgd
46	Col:9	Row:5	grids\319.xgd
47	Col:9	Row:6	grids\320.xgd
48	Col:9	Row:7	grids\321.xgd
49	Col:10	Row:0	grids\278.xgd
50	Col:10	Row:1	grids\279.xgd
51	Col:10	Row:2	grids\280.xgd
52	Col:10	Row:4	grids\322.xgd
53	Col:10	Row:5	grids\323.xgd
54	Col:10	Row:6	grids\324.xgd
55	Col:10	Row:7	grids\325.xgd
56	Col:11	Row:0	grids\281.xgd
57	Col:11	Row:1	grids\282.xgd
58	Col:11	Row:2	grids\283.xgd
59	Col:11	Row:4	grids\326.xgd
60	Col:11	Row:5	grids\327.xgd
61	Col:11	Row:6	grids\328.xgd
62	Col:11	Row:7	grids\329.xgd
63	Col:12	Row:0	grids\284.xgd
64	Col:12	Row:1	grids\285.xgd
65	Col:12	Row:2	grids\286.xgd
66	Col:12	Row:4	grids\330.xgd
67	Col:12	Row:5	grids\331.xgd
68	Col:12	Row:6	grids\332.xgd
69	Col:12	Row:7	grids\333.xgd
70	Col:12	Row:8	grids\334.xgd
71	Col:13	Row:0	grids\287.xgd
72	Col:13	Row:1	grids\288.xgd
73	Col:13	Row:2	grids\289.xgd

74	Col:13	Row:3	grids\335.xgd
75	Col:13	Row:4	grids\336.xgd
76	Col:13	Row:5	grids\337.xgd
77	Col:13	Row:6	grids\338.xgd
78	Col:13	Row:7	grids\339.xgd
79	Col:13	Row:8	grids\340.xgd
80	Col:14	Row:0	grids\290.xgd
81	Col:14	Row:1	grids\291.xgd
82	Col:14	Row:2	grids\292.xgd
83	Col:14	Row:3	grids\293.xgd
84	Col:14	Row:4	grids\294.xgd
85	Col:14	Row:5	grids\341.xgd
86	Col:14	Row:6	grids\342.xgd
87	Col:14	Row:7	grids\343.xgd
88	Col:14	Row:8	grids\344.xgd
89	Col:15	Row:0	grids\295.xgd
90	Col:15	Row:1	grids\296.xgd
91	Col:15	Row:2	grids\297.xgd
92	Col:15	Row:3	grids\298.xgd
93	Col:15	Row:4	grids\299.xgd
94	Col:15	Row:5	grids\345.xgd
95	Col:15	Row:6	grids\346.xgd
96	Col:15	Row:7	grids\347.xgd
97	Col:16	Row:1	grids\300.xgd
98	Col:16	Row:2	grids\301.xgd
99	Col:16	Row:3	grids\302.xgd
100	Col:16	Row:4	grids\303.xgd
101	Col:16	Row:5	grids\348.xgd
102	Col:17	Row:2	grids\304.xgd
103	Col:17	Row:3	grids\305.xgd
104	Col:17	Row:4	grids\306.xgd
105	Col:18	Row:2	grids\307.xgd
106	Col:18	Row:3	grids\308.xgd
107	Col:19	Row:2	grids\309.xgd
108	Col:19	Row:3	grids\310.xgd
109	Col:20	Row:2	grids\311.xgd

Raw Data; Golf Holes 5 and 6

Filename	RNGC 5 & 6 R.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	45 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	1440 x 140
Survey Size (meters)	360 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	2.64
Mean	0.50
Median	0.63
Composite Area	5.04 ha
Surveyed Area	2.536 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Holes 5 and 6

Filename	RNGC 5 & 6 P.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	45 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	1440 x 140
Survey Size (meters)	360 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.66
Mean	-0.01
Median	0.00
Composite Area	5.04 ha
Surveyed Area	2.536 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 90
1 Col:0 Row:0 grids\397.xgd
2 Col:0 Row:1 grids\398.xgd
3 Col:1 Row:0 grids\399.xgd
4 Col:1 Row:1 grids\400.xgd
5 Col:1 Row:5 grids\485.xgd
6 Col:1 Row:6 grids\486.xgd
7 Col:2 Row:0 grids\401.xgd

8	Col:2	Row:1	grids\402.xgd
9	Col:2	Row:5	grids\483.xgd
10	Col:2	Row:6	grids\484.xgd
11	Col:3	Row:0	grids\403.xgd
12	Col:3	Row:1	grids\404.xgd
13	Col:3	Row:4	grids\480.xgd
14	Col:3	Row:5	grids\481.xgd
15	Col:3	Row:6	grids\482.xgd
16	Col:4	Row:0	grids\405.xgd
17	Col:4	Row:1	grids\406.xgd
18	Col:4	Row:3	grids\476.xgd
19	Col:4	Row:4	grids\477.xgd
20	Col:4	Row:5	grids\478.xgd
21	Col:4	Row:6	grids\479.xgd
22	Col:5	Row:0	grids\407.xgd
23	Col:5	Row:1	grids\408.xgd
24	Col:5	Row:3	grids\472.xgd
25	Col:5	Row:4	grids\473.xgd
26	Col:5	Row:5	grids\474.xgd
27	Col:5	Row:6	grids\475.xgd
28	Col:6	Row:0	grids\409.xgd
29	Col:6	Row:1	grids\410.xgd
30	Col:6	Row:3	grids\468.xgd
31	Col:6	Row:4	grids\469.xgd
32	Col:6	Row:5	grids\470.xgd
33	Col:6	Row:6	grids\471.xgd
34	Col:7	Row:0	grids\411.xgd
35	Col:7	Row:1	grids\412.xgd
36	Col:7	Row:3	grids\465.xgd
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39	Col:8	Row:0	grids\413.xgd
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42	Col:8	Row:3	grids\462.xgd
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46	Col:9	Row:1	grids\416.xgd
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48	Col:9	Row:3	grids\458.xgd
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88	Col:17	Row:1	grids\442.xgd
89	Col:17	Row:2	grids\443.xgd
90	Col:17	Row:3	grids\444.xgd

Raw Data; Golf Hole 9

Filename	RNGC 9 R.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	80 x 120
Survey Size (meters)	20 m x 120 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	10.00
Min	-10.00
Std Dev	2.28
Mean	0.63
Median	0.80
Composite Area	0.24 ha
Surveyed Area	0.17115 ha
PROGRAM	
Name	TerraSurveyor
Version	3.0.25.0

Processed Data; Golf Hole 9

Filename	RNGC 9 P.xcp
Description	
Instrument Type	Grad 601-2 (Gradiometer)
Units	nT
Direction of 1st Traverse	135 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	32702
Dimensions	
Composite Size (readings)	80 x 120
Survey Size (meters)	20 m x 120 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	5.00
Min	-5.00
Std Dev	1.54
Mean	-0.04
Median	0.00
Composite Area	0.24 ha
Surveyed Area	0.17115 ha
Program	
Name	TerraSurveyor
Version	3.0.25.0

Source Grids: 6
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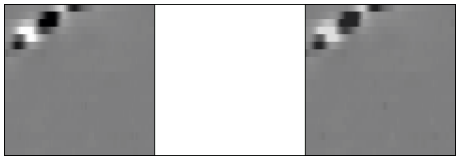
2 Col:0 Row:1 grids\576.xgd
3 Col:0 Row:2 grids\577.xgd
4 Col:0 Row:3 grids\578.xgd
5 Col:0 Row:4 grids\579.xgd
6 Col:0 Row:5 grids\580.xgd

APPENDIX 2 CONTROL GRIDS

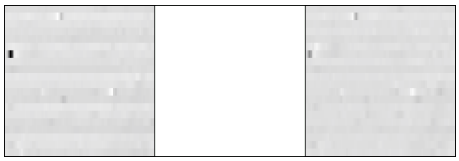
All control grids were recorded at different times during the day, both grids were imported together into Terrasurveyor, no processing was undertaken, the images were then exported as a .png file and are presented below.

Hole 2; Grid 58

Hole 3; Grid 606

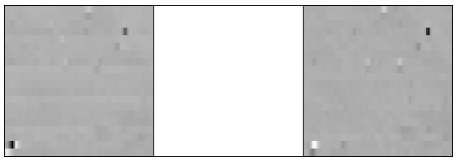


Hole 6; Grid 425



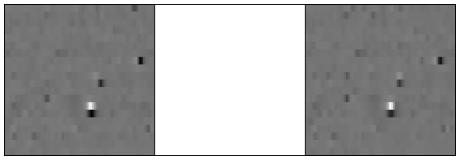
Hole 8; Grid 273

Hole 10; Grid 104

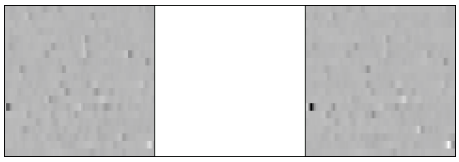


Hole 11; Grid 371

Hole 13; Grid 690



Hole 15; Grid 567



Hole 18; Grid 164

APPENDIX 3 TECHNICAL DETAILS

MAGNETOMETER

The magnetometer differs from the 'active' magnetic susceptibility meter by being a 'passive' instrument. Rather than injecting a signal into the ground it detects slight variations in the Earth's magnetic field caused by cultural and natural disturbance (Clark).

Thermoremanent magnetism is produced when a material containing iron oxides is strongly heated. Clay for example has a high iron oxide content that in a natural state is weakly magnetic, when heated these weakly magnetic compounds become highly magnetic oxides that a magnetometer can detect.

The demagnetisation of iron oxides occurs above a temperature known as the Curie point; for example haematite has a Curie point of 675 Celsius and magnetite 565C. At the time of cooling the iron oxides become permanently re-magnetised with their magnetic properties re-aligned in the direction of the Earth's magnetic field (Gaffney and Gater). The direction of the Earth's magnetic field shifts over time and these subtle alignment differences can be recorded. Kilns, hearths, baked clay and ovens can reach Curie point temperatures, and are the strongest responses apart from large iron objects that can be detected. Other cultural anomalies that can be prospected include occupation areas, pits, ditches, furnaces, sunken feature buildings, ridge and furrow field systems and ritual activity (David, 2011). Commonly recorded anomalies include modern ferrous service pipes, field drainage pipes, removed field boundaries, perimeter fences and field boundaries.

Fluxgate Gradiometers

Fluxgate gradiometers are sensitive instruments that utilise two sensors placed in a vertical plane, spaced 1 metre apart. The sensor above reads the Earth's magnetic (background) response while the sensor below records the local magnetic field. Both sensors are carefully adjusted to read zero before survey commences at a 'zeroing' point, selected for its relatively 'quiet' magnetic background reading. When differences in the magnetic field strength occur between the two sensors a positive or negative reading is logged. Positive anomalies have a positive magnetic value and conversely negative anomalies have a negative magnetic value relative to the site's magnetic background. Examples of positive magnetic anomalies include hearths, kilns, baked clay, areas of burning, ferrous material, ditches, sunken feature buildings, furrows, ferrous service pipes, perimeter fences and field boundaries. Negative magnetic anomalies include earthwork embankments, plastic water pipes and geological features.

The instruments are usually held approximately 0.30m to 0.50m above the ground surface and can detect to a depth of between 1-2metres. Best practice dictates that the optimal direction of traverse in Britain is east to west.

Magnetic Anomalies

Linear trends

Linear trends can be both positive and negative magnetic responses. If they are broad, relatively weak or negative in nature they may be of agricultural or geological origin, for example periglacial channels, land drains or ploughing furrows. If the responses are strong positive trends they are more likely to be of archaeological origin. Archaeological settlement ditches tend to be rich in highly magnetic iron oxides that accumulate in them via anthropogenic activity and humic backfills. Conversely surviving banks will be negative in nature, the material is derived from subsoil deposits that is less likely to be positively magnetic. Curvilinear trends can also be recorded and are indicative of archaeological structures such as drip-gullies.

Discrete anomalies

Discrete anomalies appear as increased positive responses present within a localised area. They are caused by a general increase in the amount of magnetic iron oxides present within the humic back-fill of for example a rubbish pit.

'Iron spike' anomalies

These strong isolated dipolar responses are usually caused by ferrous material present in the topsoil horizon. They can have an archaeological origin but are usually introduced into the topsoil during manuring.

Areas of magnetic disturbance

An area of magnetic disturbance is usually associated with material that has been fired. For example areas of burning, demolition (brick) rubble or slag waste spreads. They can also be caused by ferrous material, e.g. close proximity to barbwire or metal fences and field boundaries, buried services, pylons and modern rubbish deposits.

APPENDIX 4 OASIS FORM

OASIS FORM - Print view

OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

Printable version

OASIS ID: britanni1-204996

Project details

Project name	Royal Norwich Golf Course, Hellesdon, Norwich, Norfolk; Detailed Magnetometer Survey
Short description of the project	A non-continuous detailed fluxgate gradiometer survey was undertaken between March and May 2015 over c.20 hectares on the existing Royal Norwich Golf Course, Hellesdon, Norwich, Norfolk (TG 203 115), in advance of the proposed development of c.1000 new homes. The survey areas were divided into separate golf holes, trees, bunkers and land terracing reduced the amount of survey area available. The background magnetic susceptibility signature varied across the site, the area on the eastern side of the A1067 had a relatively low magnetic background, compared with the average readings recorded to the west. A relatively wide range of anomalies, many of which have archaeological potential, were prospected with good clarity. Discrete anomalies indicative of potential rubbish pits were recorded in the majority of the survey areas, a backfilled ditch from the WWII anti-tank defences (Holes 2, 3, 4, 7, 14, 15 and 16), one curvilinear anomaly (Hole 6) interpreted as a potential ring-ditch, negative and positive anomalies indicative of potential archaeological ditches (Holes 10 and 13) and one rectilinear anomaly indicative of a potential structure (Hole 15) were prospected during the survey. The full range of anomaly types should be targeted to investigate the interpretations given within this report, with particular attention given to those with a possible archaeological derivation.
Project dates	Start: 05-03-2015 End: 29-05-2015
Previous/future work	Yes / Yes
Any associated project reference codes	P1097 - Contracting Unit No.
Any associated project reference codes	ENF136426 - Sitecode
Any associated project reference codes	R1101 - Contracting Unit No.
Type of project	Field evaluation
Site status	None
Current Land use	Other 14 - Recreational usage
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"'Geophysical Survey'"

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OASIS FORM - Print view

Development type	Housing estate
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	GLACIAL SAND AND GRAVEL
Techniques	Magnetometry

Project location

Country	England
Site location	NORFOLK BROADLAND HELLESDON Royal Norwich Golf Club, Hellesdon, Norwich, Norfolk
Study area	20 Hectares
Site coordinates	TG 203 115 52.655908685484 1.257608351503 52 39 21 N 001 15 27 E Point
Height OD / Depth	Min: 15m Max: 35m

Project creators

Name of Organisation	Britannia Archaeology Ltd
Project brief originator	Local Planning Authority (with/without advice from County/District Archaeologist)
Project design originator	Timothy Schofield
Project director/manager	Timothy Schofield
Project supervisor	Timothy Schofield
Type of sponsor/funding body	Archaeological Contractor
Name of sponsor/funding body	Suffolk Archaeology CIC

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Norfolk HER
Digital Contents	"Survey"
Digital Media available	"Geophysics","Survey","Text"
Paper Archive recipient	Norfolk HER
Paper Contents	"Survey"
Paper Media	"Survey ","Unpublished Text"

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OASIS FORM - Print view

available

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Royal Norwich Golf Course, Hellesdon, Norwich, Norfolk; Detailed Magnetometer Survey
Author(s)/Editor(s)	Schofield, T. P.
Other bibliographic details	R1101
Date	2015
Issuer or publisher	Britannia Archaeology Ltd
Place of issue or publication	Stowmarket
Description	A4 Report with A3 Fold-out Figures
URL	www.britannia-archaeology.com
Entered by	Matt Adams (matt@britannia-archaeology.com)
Entered on	27 October 2015

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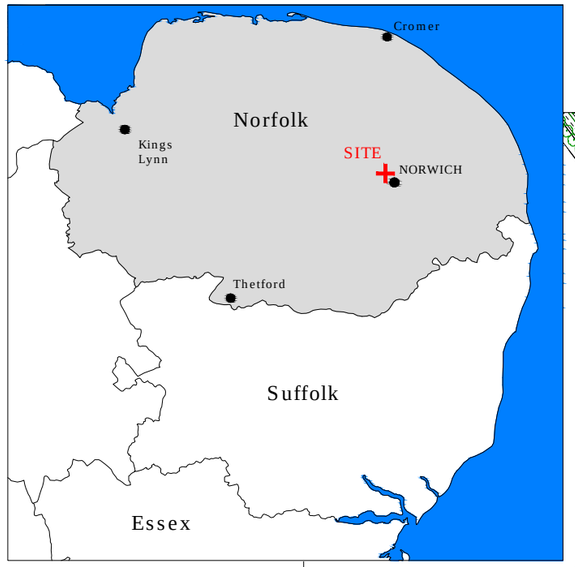
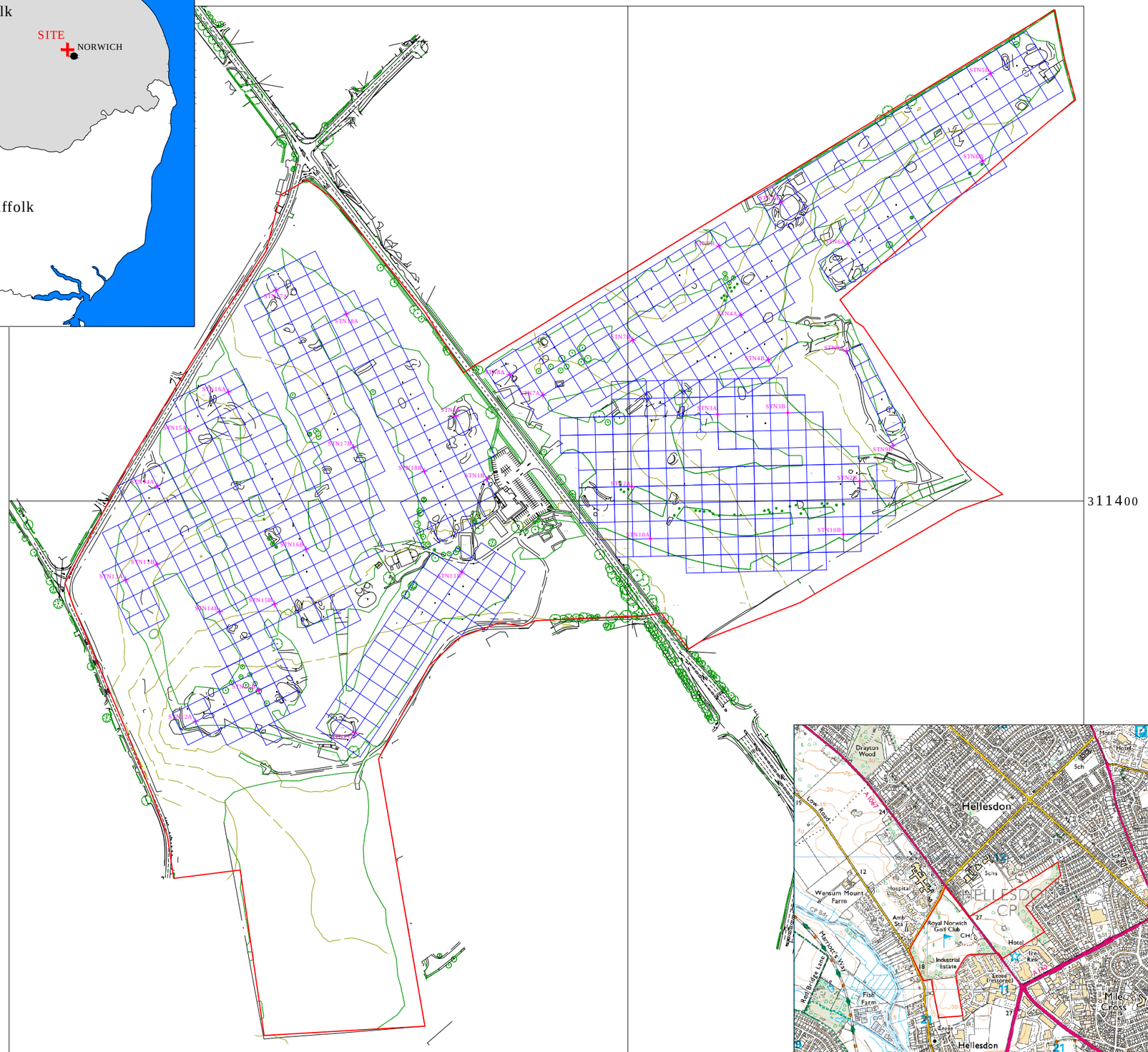




STN1A	Survey Station Location
	Survey Grid Location
	Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

SITE, SURVEY GRID & SURVEY STATION LOCATION PLAN

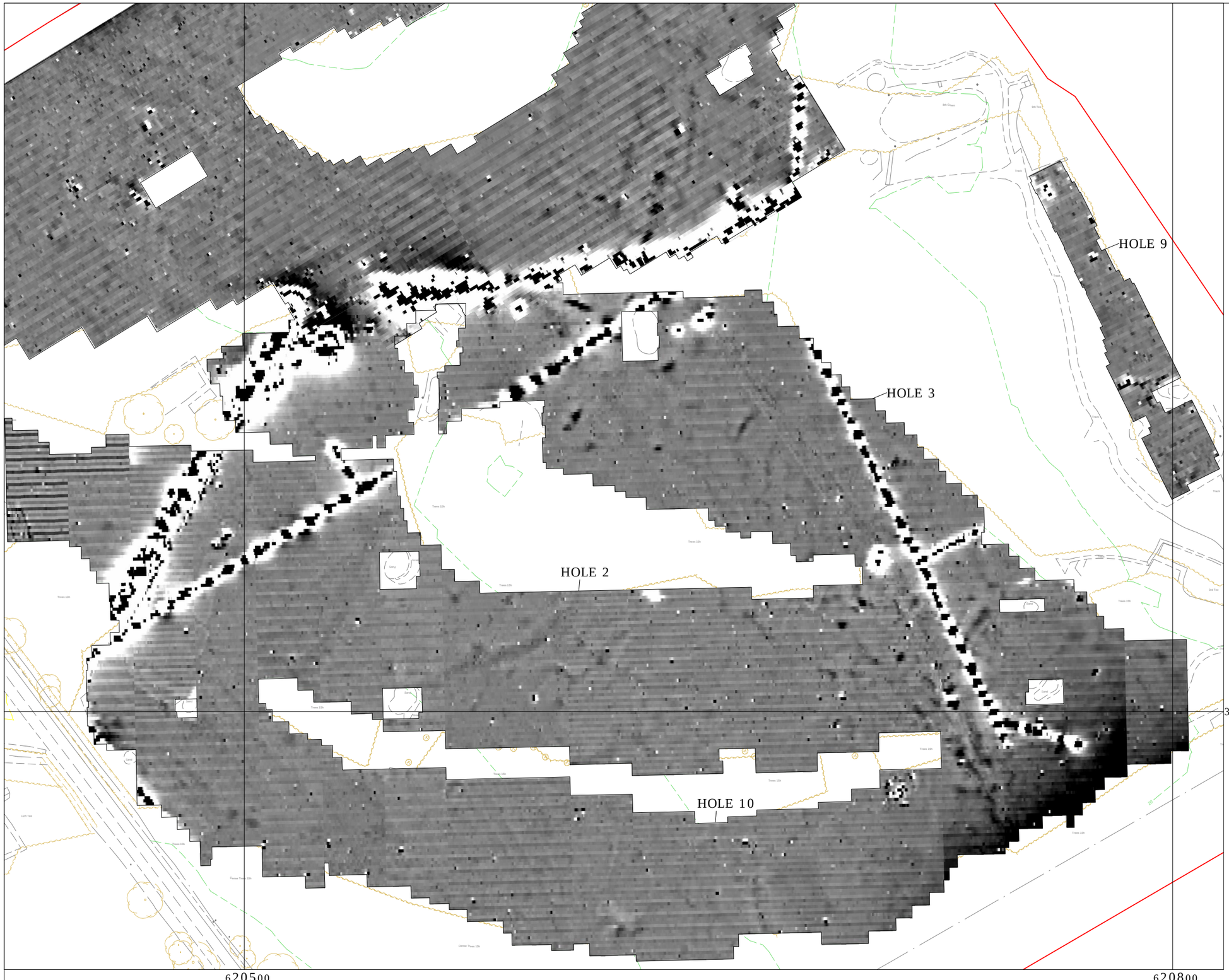
BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:5000 — 0 — 200m

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	01



N

+10nT

-10nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

RAW MAGNETOMETER GREYSCALE PLOT, HOLES 2, 3, 9 & 10

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	2A

HOLE 9

HOLE 3

HOLE 2

HOLE 10

311400

620500

620800

N

+5nT

-5nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

PROCESSED MAGNETOMETER
GREYSCALE PLOT, HOLES 2, 3, 9 & 10

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
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DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	2B

N

20nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT, HOLES 2, 3, 9 & 10

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
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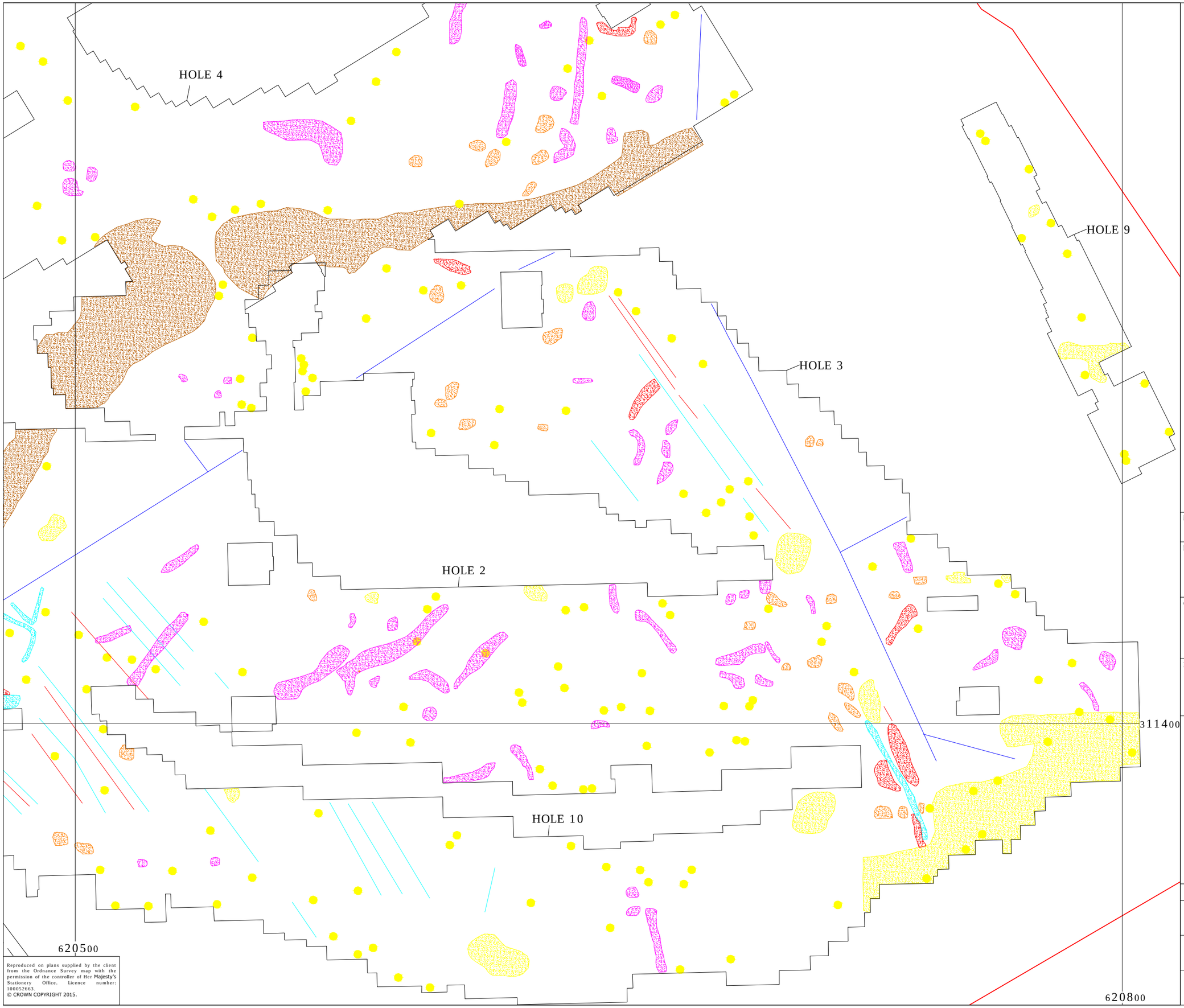
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	2C



N

	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, SOUTH-EAST SURVEY AREA

BRITANNIA ARCHAEOLOGY LTD

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W: www.britannia-archaeology.com

SCALE: 1:1000 (0 – 50m)

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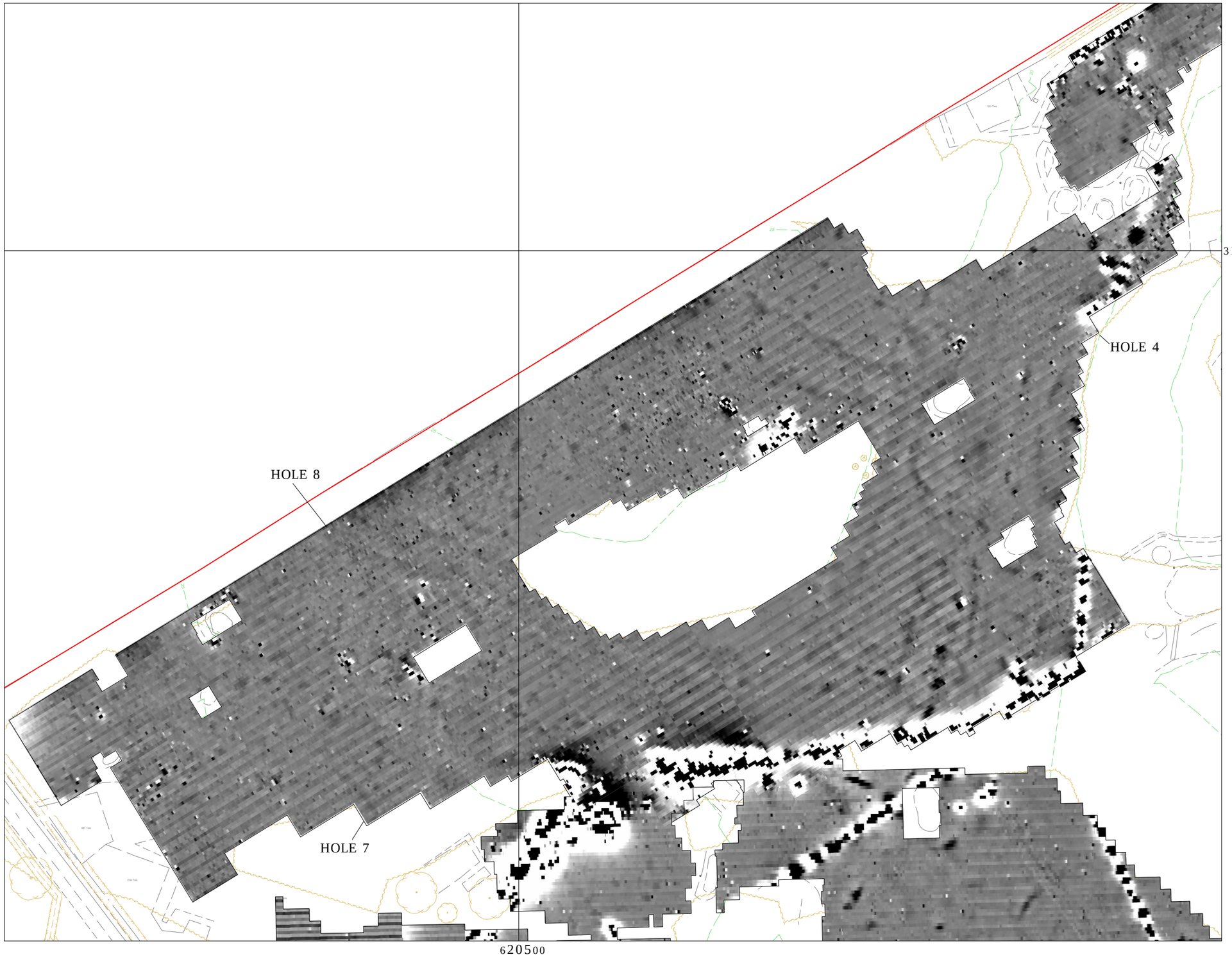
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 2D



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+10nT

-10nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
RAW MAGNETOMTER GREYSCALE PLOT, HOLES 4, 7 & 8

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W: www.britannia-archaeology.com

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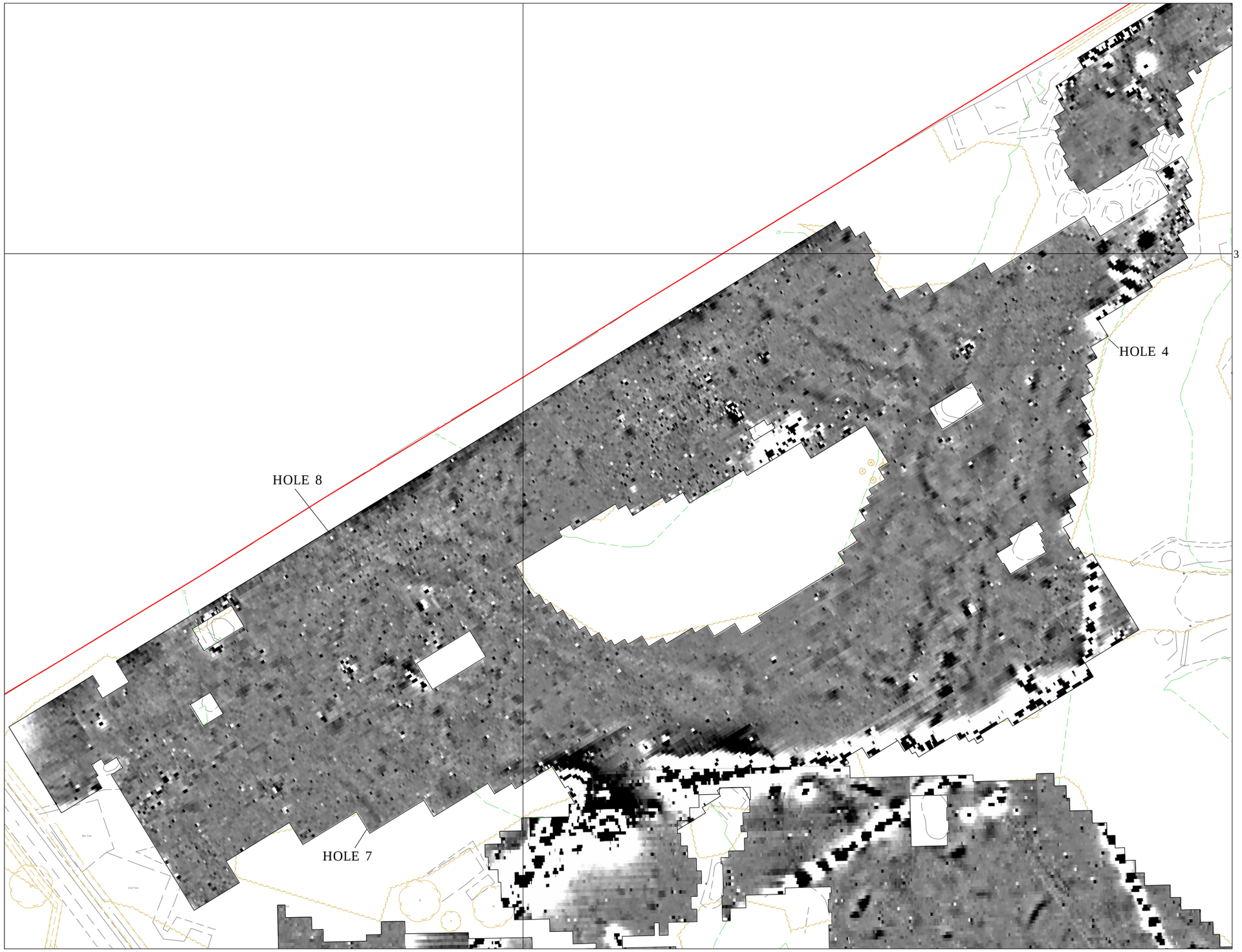
APPROVED: MCA

VERSION: 01

DATE: JUN 2015

AUTHOR: TPS

FIGURE: 3A



N

+5nT

-5nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER
GREYSCALE PLOT, HOLES 4, 7 & 8

BRITANNIA ARCHAEOLOGY LTD

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IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT: A3 | APPROVED: MCA | VERSION: 01

DATE: JUN 2015 | AUTHOR: TPS | FIGURE: 3B

N

20nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT, HOLES 4, 7 & 8

BRITANNIA ARCHAEOLOGY LTD

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IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
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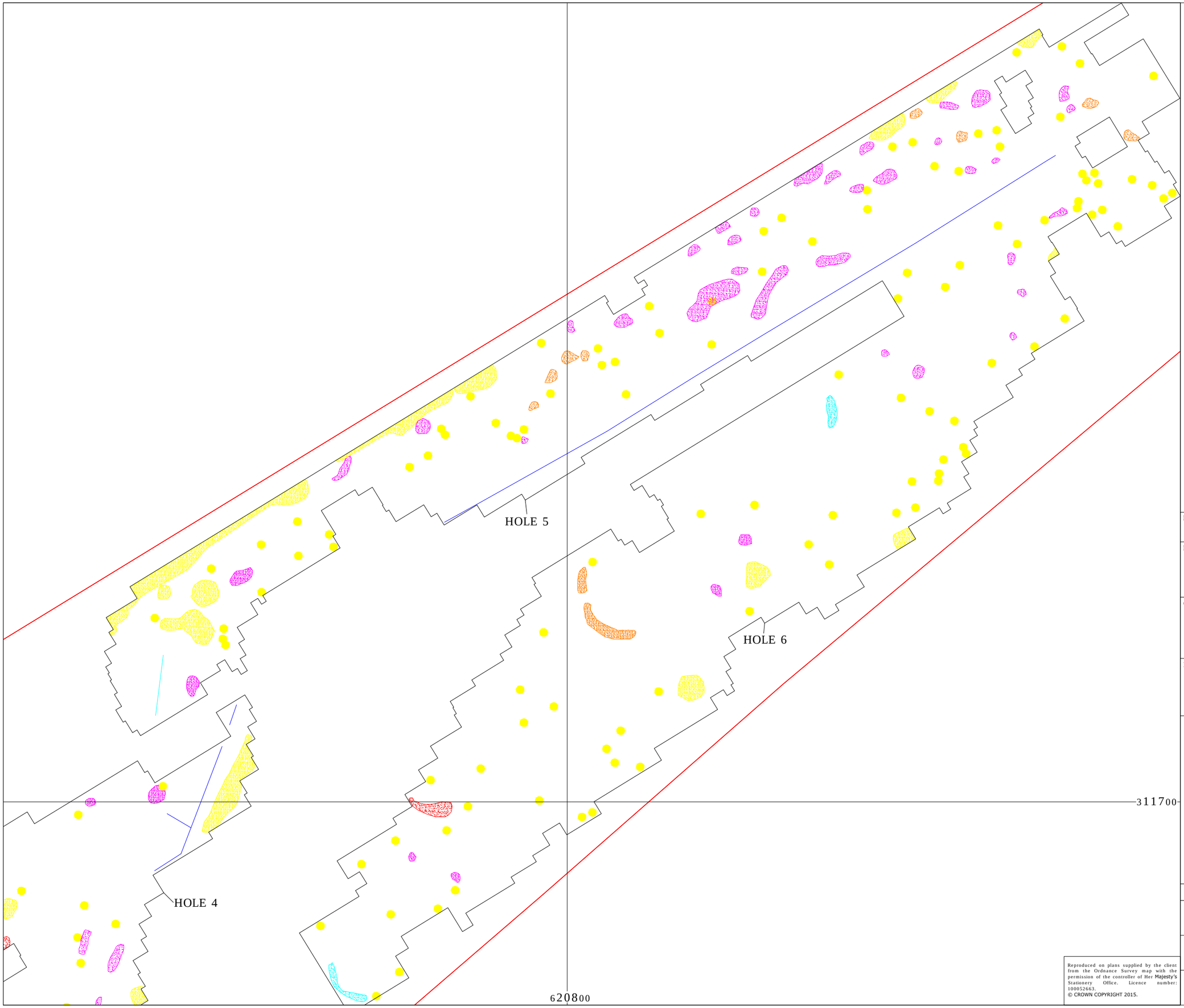
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 3C



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	Curvilinear Anomaly, Archaeology?
	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, NORTH-EAST SURVEY AREA

BRITANNIA ARCHAEOLOGY LTD
115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1000 (0 – 50m)

PLOT:	APPROVED:	VERSION:
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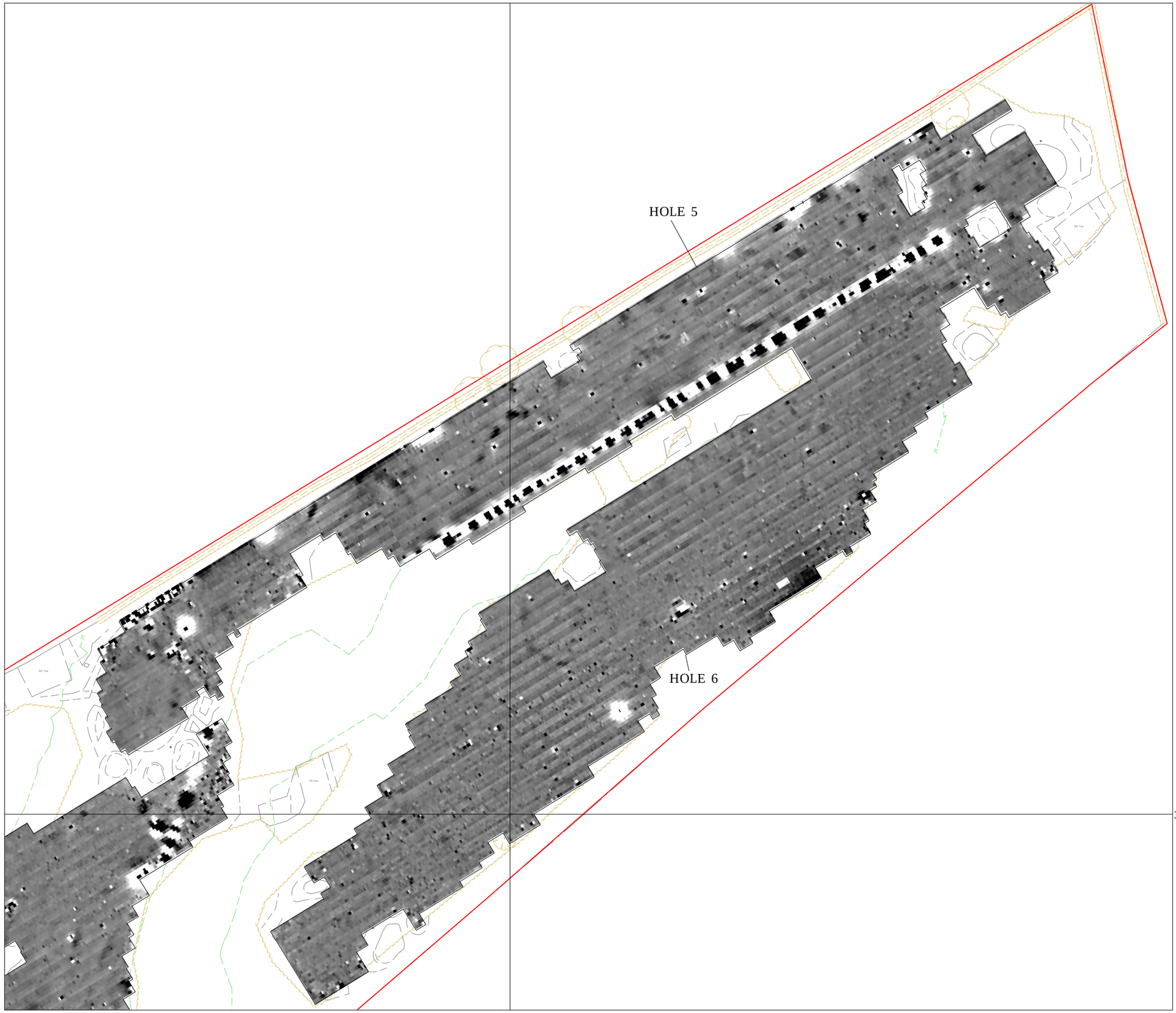
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 3D



N

+10nT

-10nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
RAW MAGNETOMETER GREYSCALE PLOT, HOLES 5 & 6

BRITANNIA ARCHAEOLOGY LTD
115 OSPREY DRIVE, STOWMARKET, SUFFOLK
IP14 5UX

T: 01449 763034
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W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	4A

N

+5nT

-5nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER GREYSCALE PLOT, HOLES 5 & 6

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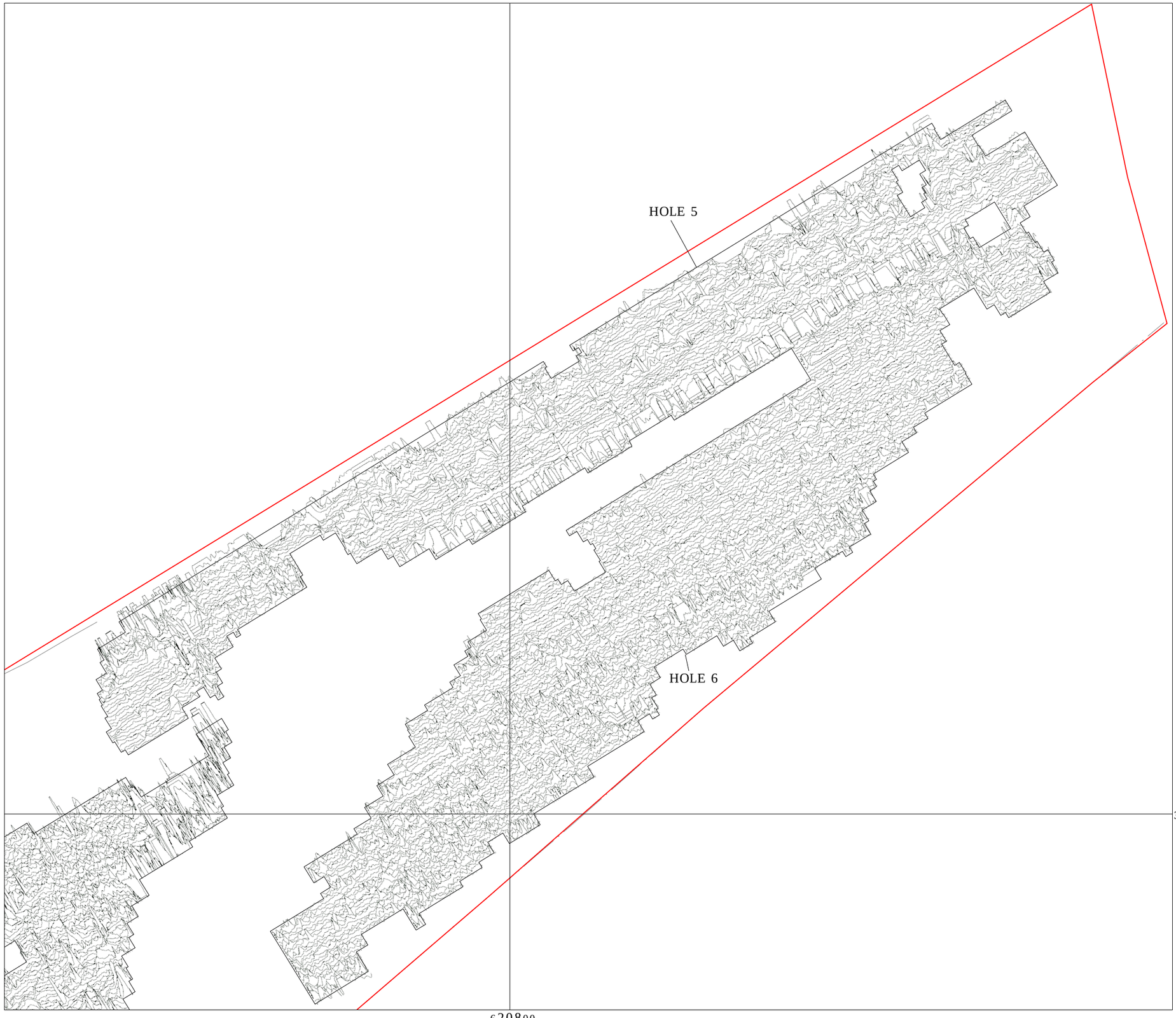
SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	4B



N

20nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT, HOLES 5 & 6

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SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	4C

620500

311700

HOLE 5

HOLE 6

HOLE 8

HOLE 4

HOLE 7

HOLE 3

HOLE 2

N

	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, NORTHERN SURVEY AREA

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SCALE: 1:1000 (0 – 50m)

PLOT: A3

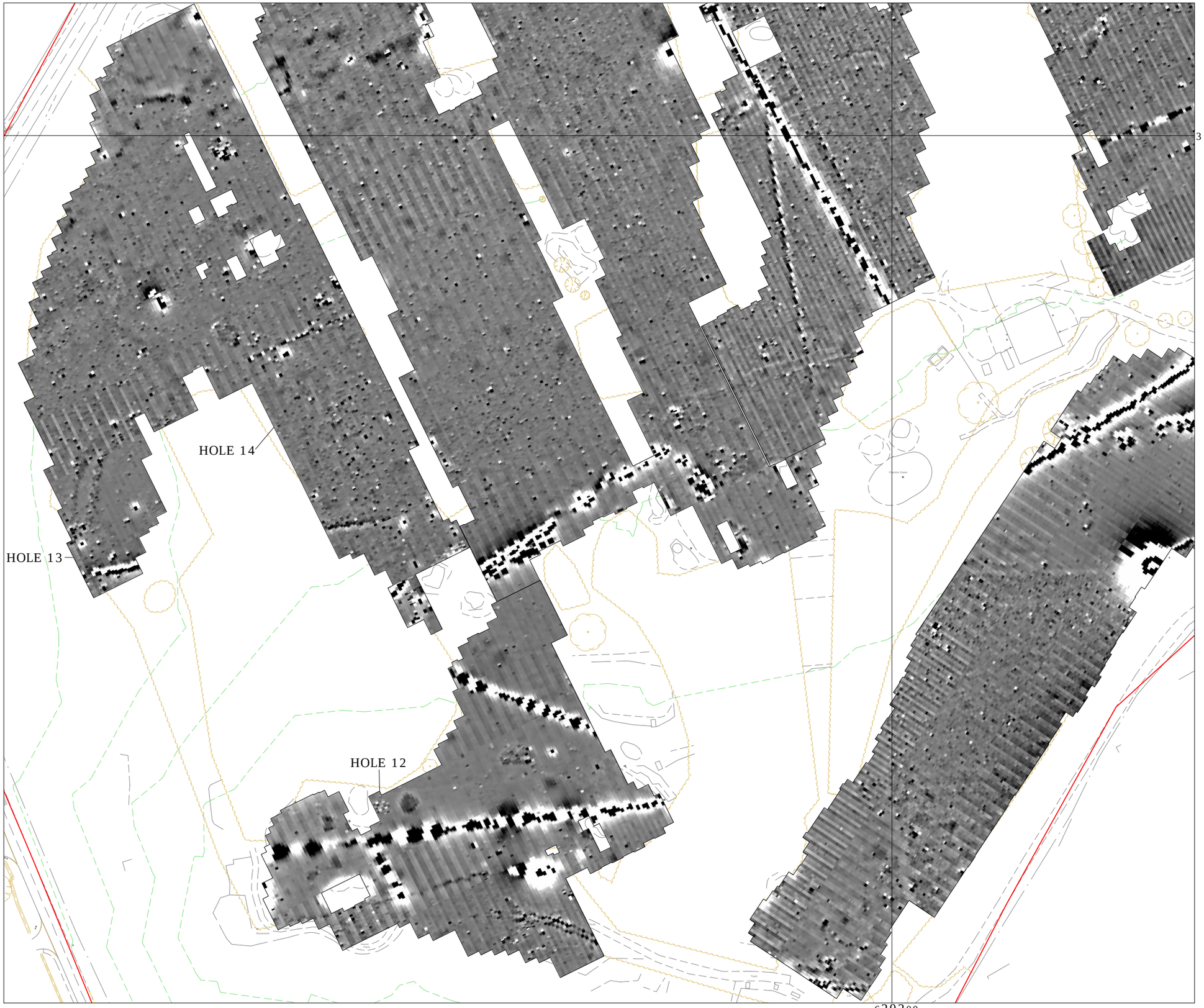
APPROVED: DPM

VERSION: 01

DATE: JUN 2015

AUTHOR: TPS

FIGURE: 4D



N

+10nT

-10nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
RAW MAGNETOMETER GREYSCALE PLOT, HOLES 12, 13 & 14

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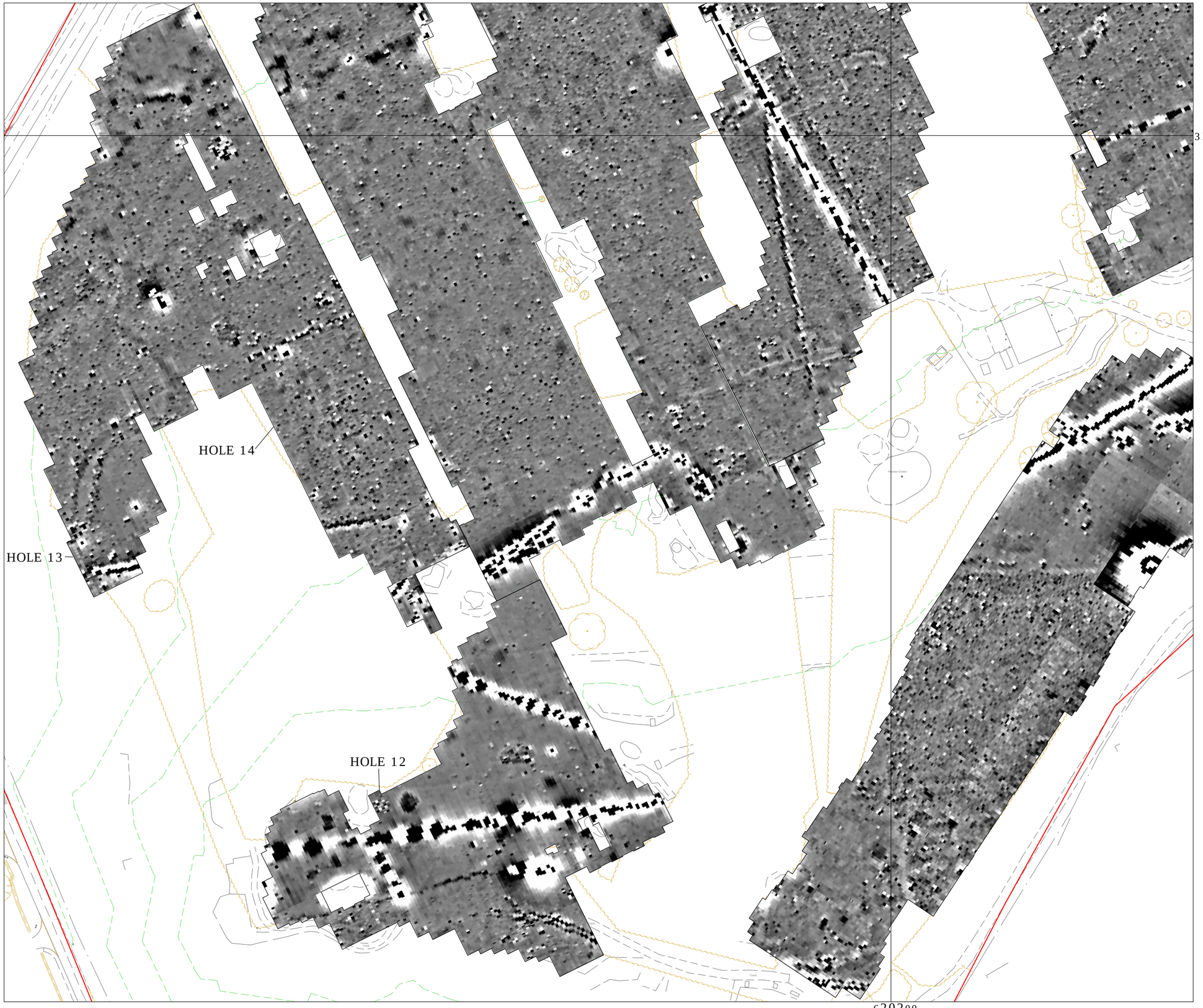
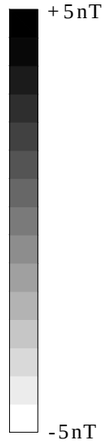
SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 5A





Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER GREYSCALE PLOT,
HOLES 12, 13 & 14

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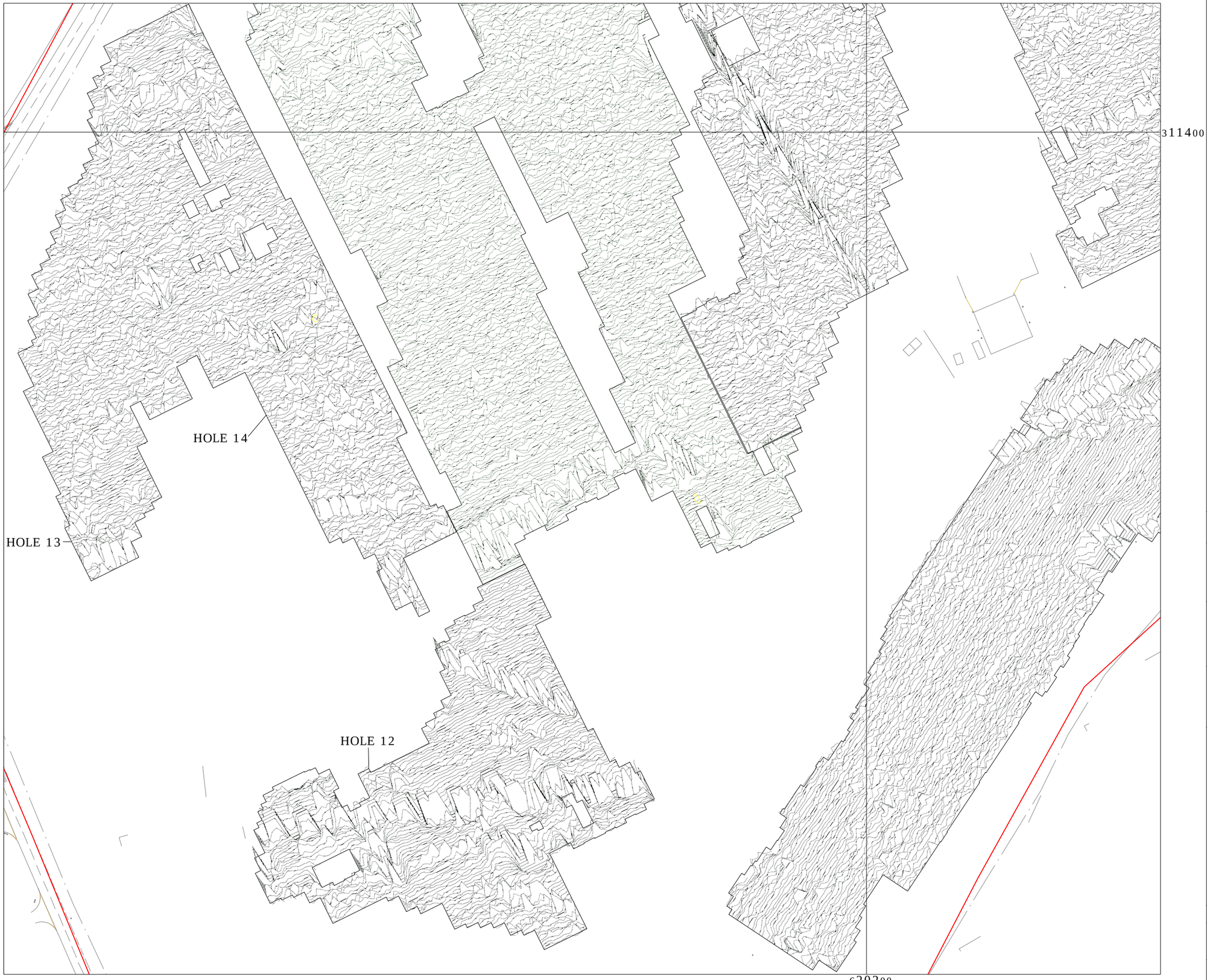
SCALE: 1:1250

0 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	5B



N

20nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT,
HOLES 12, 13 & 14

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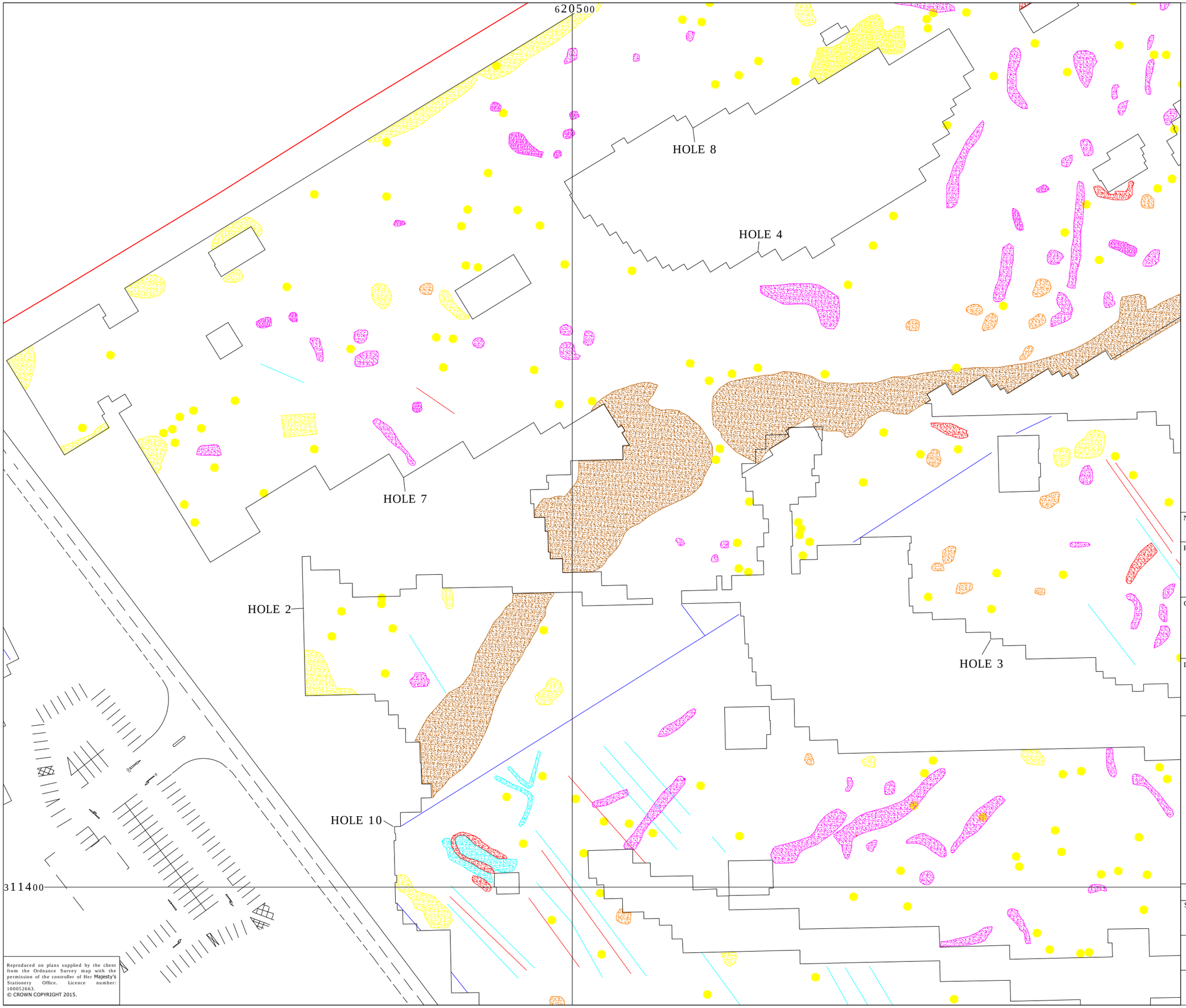
SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	5C



N

	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, NORTHERN SURVEY AREA

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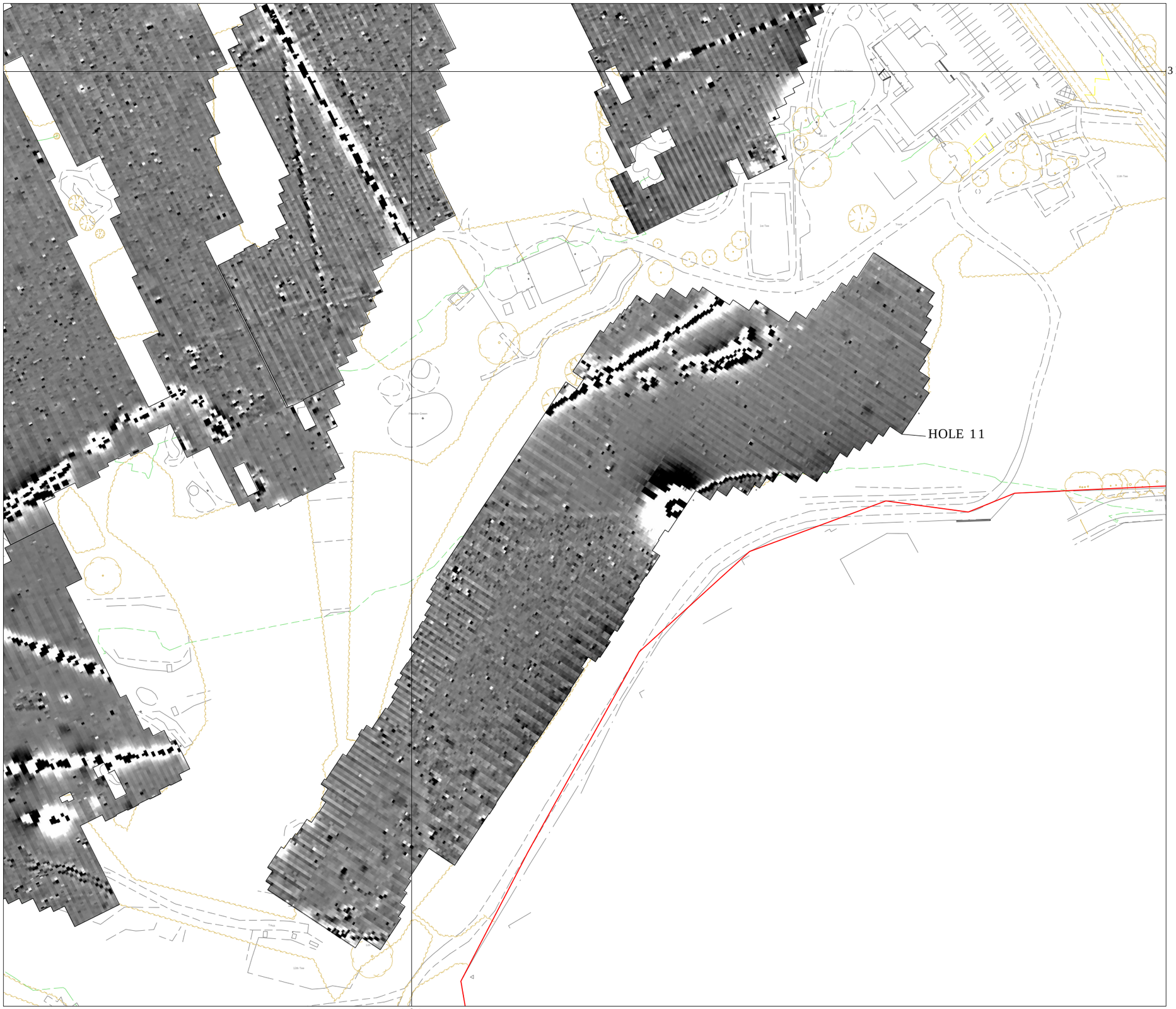
SCALE: 1:1000 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 5D



N

+10nT

-10nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1011

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
RAW MAGNETOMETER GREYSCALE PLOT, HOLE 11

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SCALE: 1:1250

0 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	6A

N

+5nT

-5nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER GREYSCALE PLOT, HOLE 11

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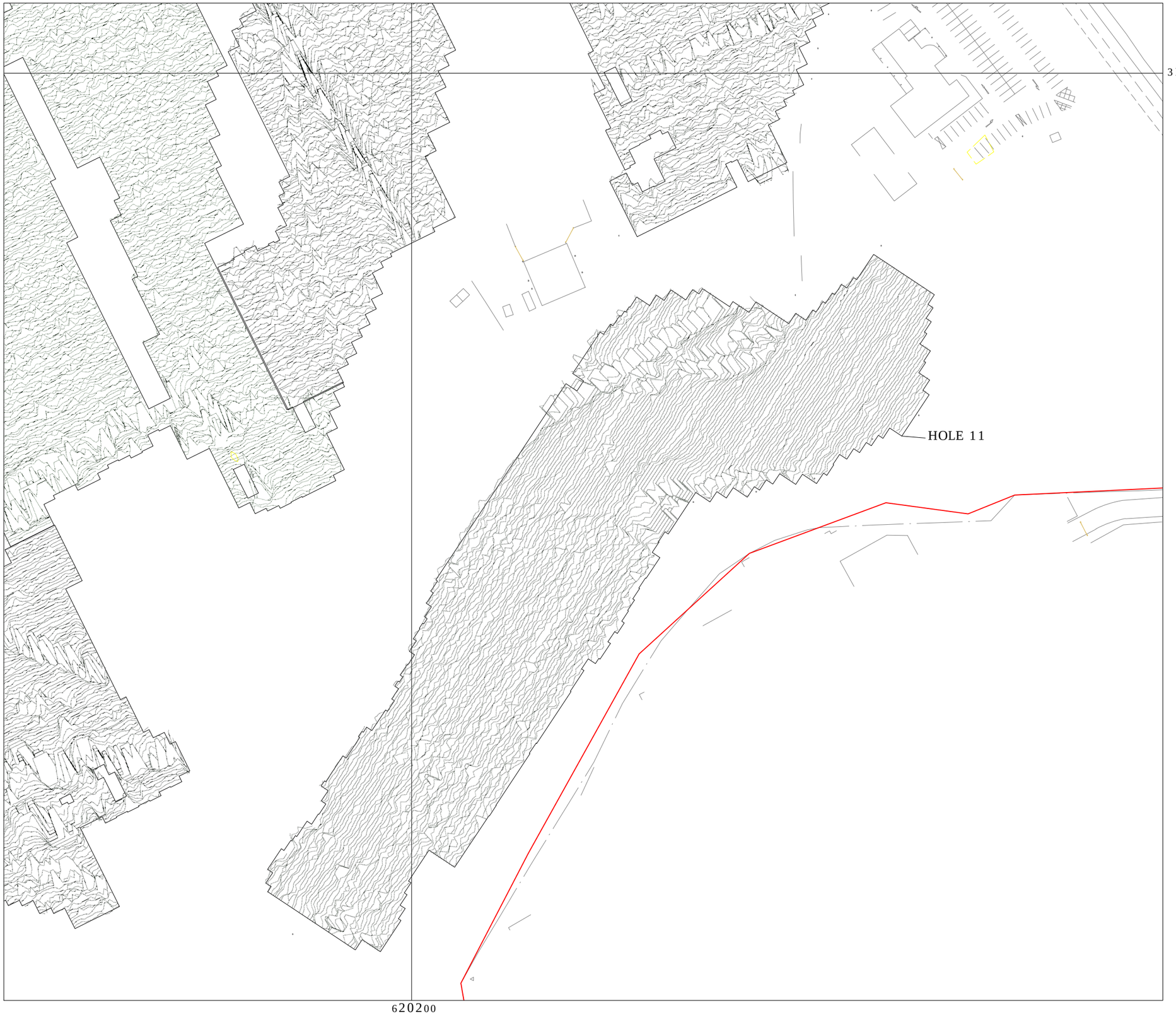
SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	6B



N

20nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT, HOLE 11

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SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	6C

620200

HOLE 17

HOLE 18

HOLE 16

HOLE 15

HOLE 1

311400

N

	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, NORTHERN SURVEY AREA

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
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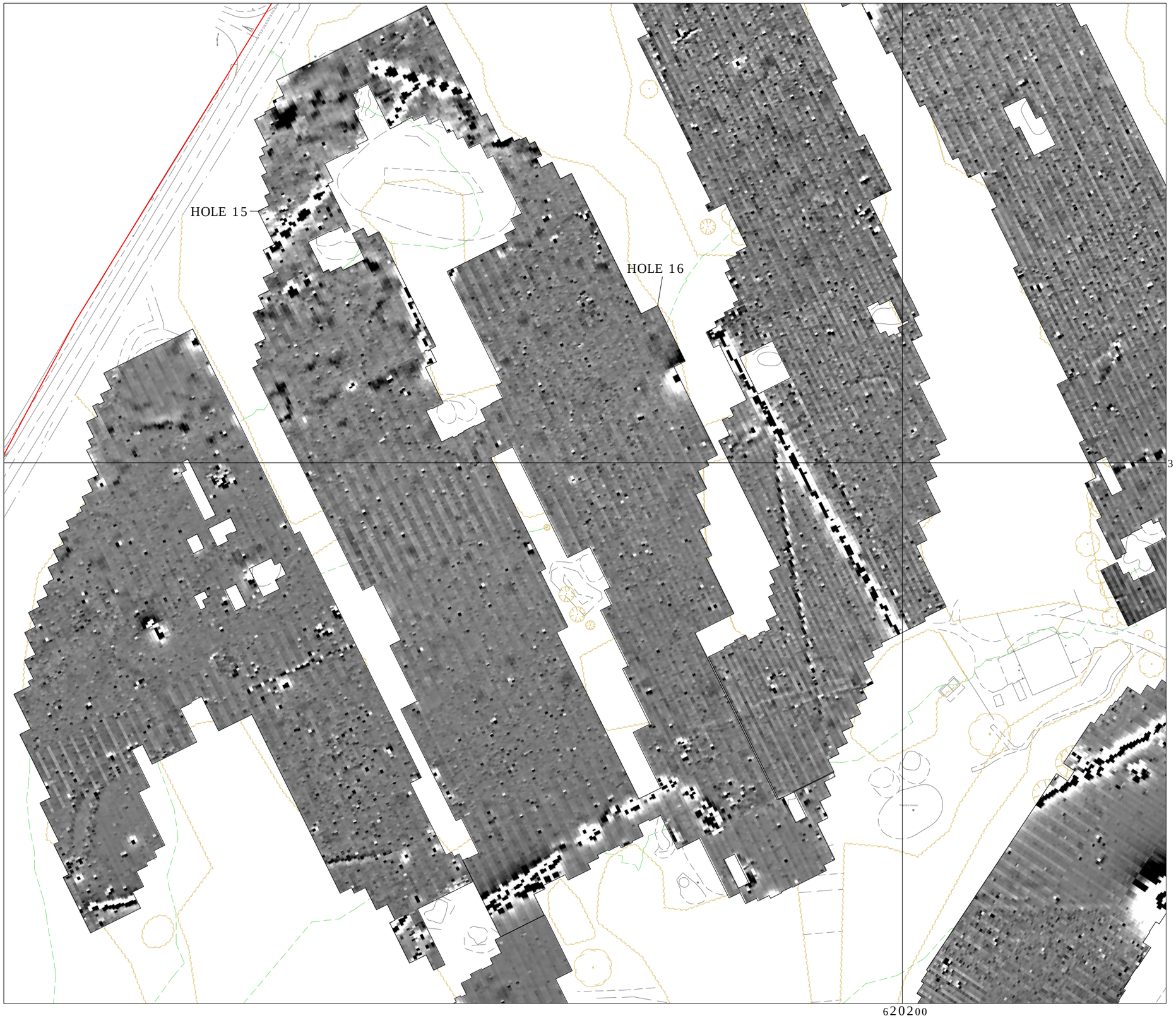
SCALE: 1:1000 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 6D



N

+10nT

-10nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

RAW MAGNETOMETER GREYSCALE PLOT, HOLES 15 & 16

BRITANNIA ARCHAEOLOGY LTD

115 OSPREY DRIVE, STOWMARKET, SUFFOLK
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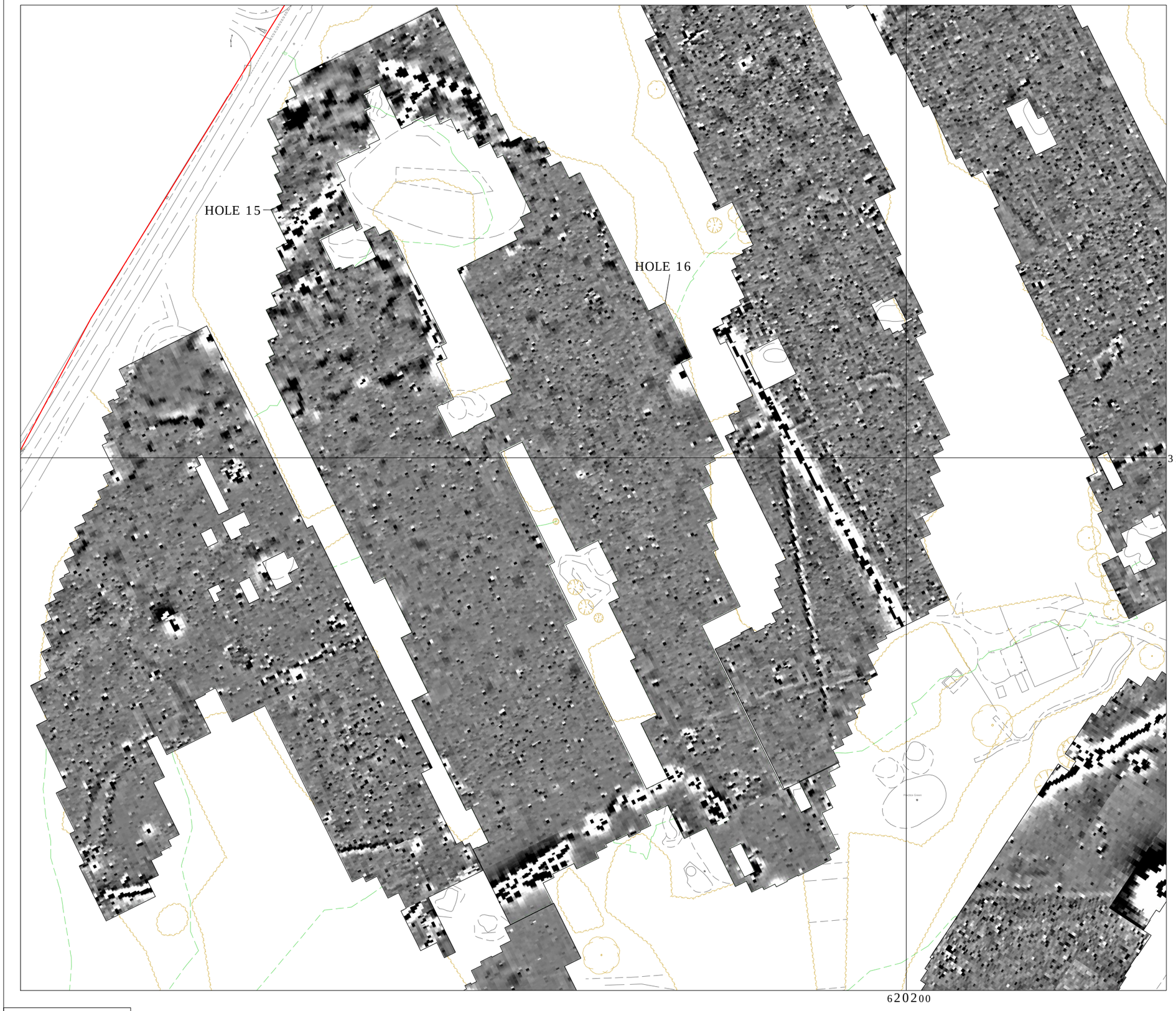
SCALE: 1:1250

0 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	7A



N

+5nT

-5nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER
GREYSCALE PLOT, HOLES 15 & 16

BRITANNIA ARCHAEOLOGY LTD

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IP14 5UX

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W: www.britannia-archaeology.com

SCALE: 1:1250

0 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01

DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	7B

N

20nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT, HOLES 15 & 16

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T: 01449 763034
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W: www.britannia-archaeology.com

SCALE: 1:1250 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	7C

HOLE 11
HOLE 13
HOLE 14
HOLE 15
HOLE 16
HOLE 17
HOLE 18

311400

620200

N

	Positive Rectilinear Anomaly, Archaeology?
	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, NORTH-WEST SURVEY AREA

BRITANNIA ARCHAEOLOGY LTD
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SCALE: 1:1000 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 7D

N

+10nT

-10nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

RAW MAGNETOMETER GREYSCALE PLOT, HOLES 1, 17 & 18

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SCALE: 1:1250

0 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	8A

N

+5nT

-5nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

PROCESSED MAGNETOMETER
GREYSCALE PLOT, HOLES 1, 17 & 18

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W: www.britannia-archaeology.com

SCALE: 1:1250

0 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01

DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	8B

N

20nT/cm	Scale Interval
	Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

PROCESSED MAGNETOMETER XY TRACE PLOT, HOLES 1, 17 & 18

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SCALE: 1:1250 — 0 — 50m

PLOT:	APPROVED:	VERSION:
A3	MCA	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	8C

311400

HOLE 17

HOLE 13

HOLE 14

HOLE 15

HOLE 16

HOLE 12

HOLE 11

620200

N

	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, SOUTH-WEST SURVEY AREA

BRITANNIA ARCHAEOLOGY LTD

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SCALE: 1:1000 (0 – 50m)

PLOT: A3

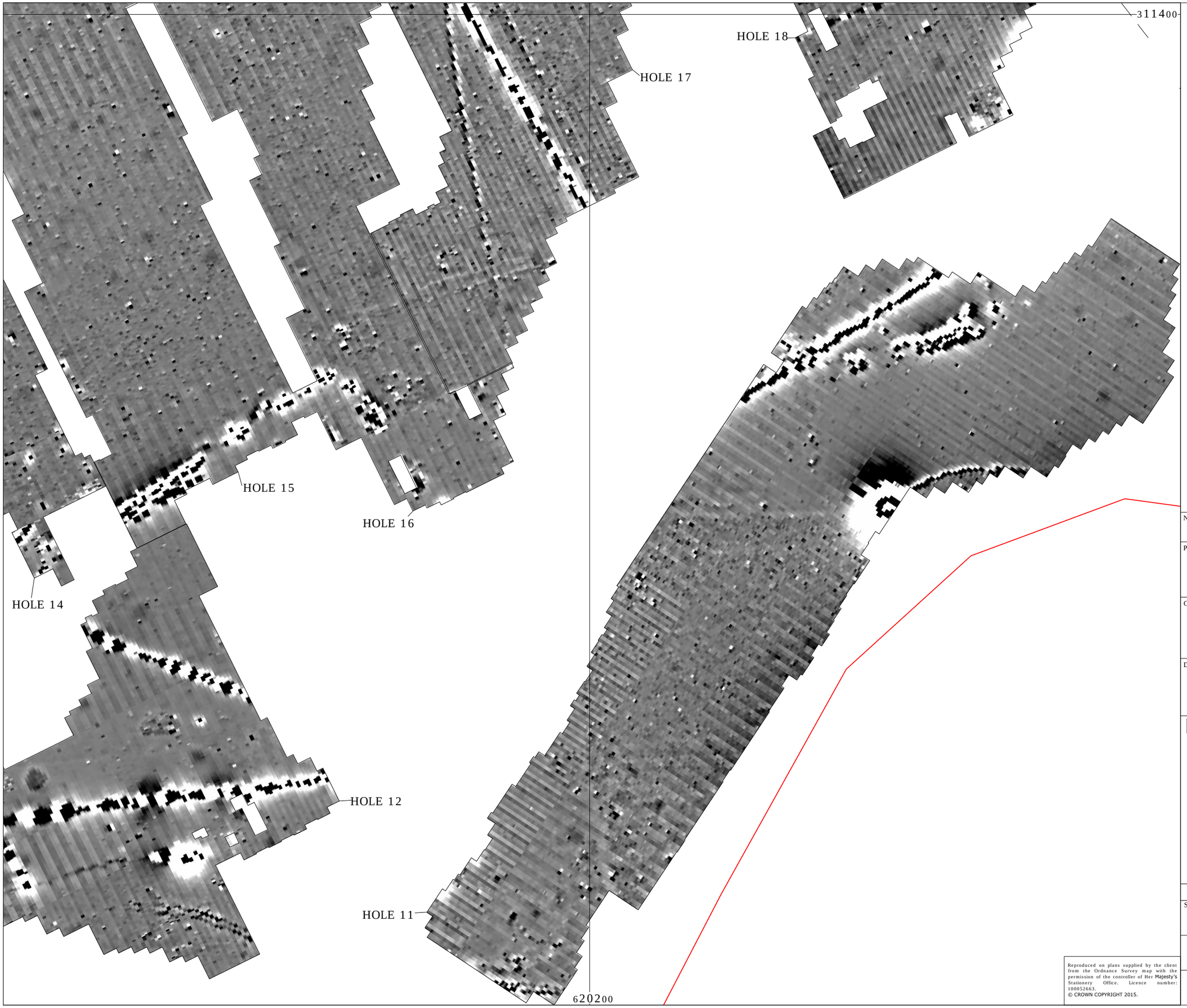
APPROVED: DPM

VERSION: 01

DATE: JUN 2015

AUTHOR: TPS

FIGURE: 8D



N

+10nT

-10nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
RAW MAGNETOMETER GREYSCALE PLOT, SOUTHERN SURVEY AREA

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SCALE: 1:1000 (0 – 50m)

PLOT: A3

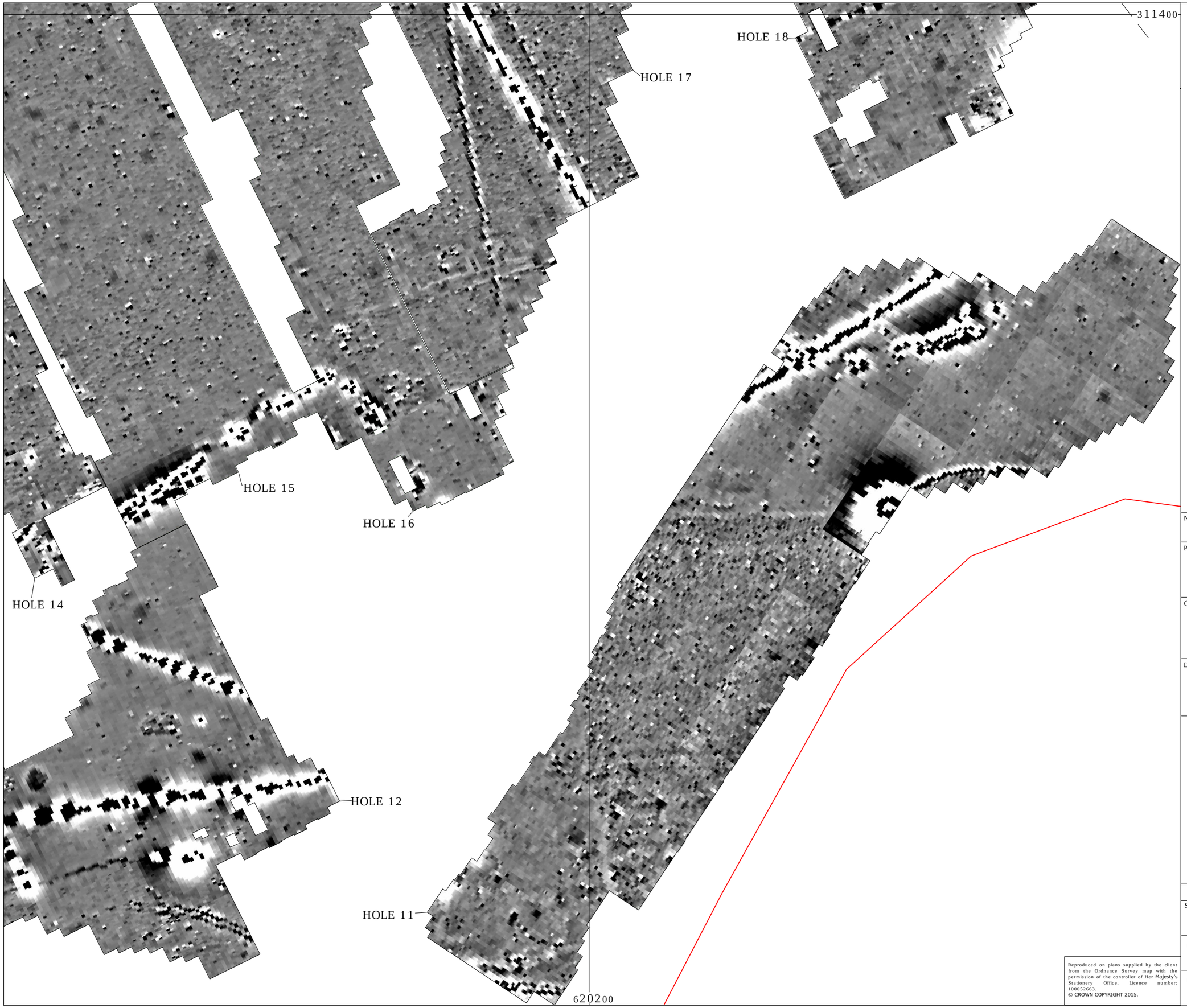
APPROVED: DPM

VERSION: 01

DATE: JUN 2015

AUTHOR: TPS

FIGURE: 9A



N

+5nT

-5nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

PROCESSED MAGNETOMETER GREYSCALE PLOT, SOUTHERN SURVEY AREA

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E: info@britannia-archaeology.com
W: www.britannia-archaeology.com

SCALE: 1:1000 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 9B

N

40nT/cm	Scale Interval
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER XY TRACE PLOT, SOUTHERN SURVEY AREA

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SCALE: 1:1000 (0 – 50m)

PLOT: A3

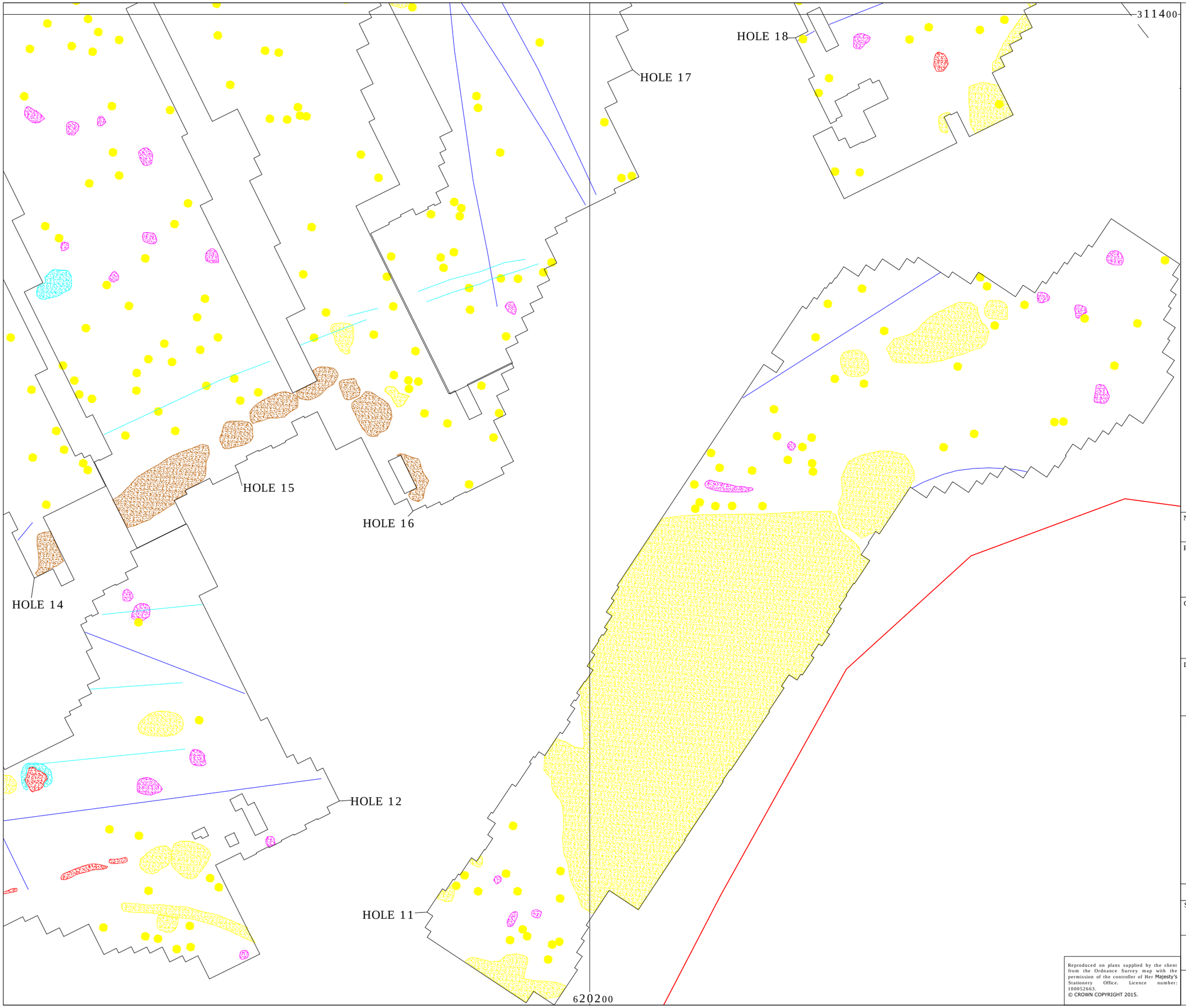
APPROVED: DPM

VERSION: 01

DATE: JUN 2015

AUTHOR: TPS

FIGURE: 9C



N

	Positive Discrete Anomaly, Archaeology?
	Linear Magnetic Disturbance, WWII Anti-Tank Ditch
	Negative Anomaly
	Positive Anomaly
	Broad Positive Anomaly, Geology
	Narrow Positive Linear Trend, Agriculture/Land Drain
	Narrow Negative Linear Trend, Agriculture/Land Drain
	Dipolar Linear Anomaly, Modern Ferrous Service Pipe
	Area of Magnetic Disturbance, Modern
	Isolated Dipolar Responses
	Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
INTERPRETATION PLOT OF MAGNETOMETER ANOMALIES, SOUTHERN SURVEY AREA

BRITANNIA ARCHAEOLOGY LTD

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SCALE: 1:1000 (0 – 50m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE: JUN 2015	AUTHOR: TPS	FIGURE: 9D

N

+5nT

-5nT

Site Boundary

NGR:	REPORT NUMBER:
TG 203 115	1101

PROJECT:

ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:

SUFFOLK ARCHAEOLOGY

DESCRIPTION:

PROCESSED MAGNETOMETER GREYSCALE PLOT, WESTERN SURVEY AREA

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SCALE: 1:2500 (0 – 100m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	10

N

+5nT

-5nT

Site Boundary

NGR: TG 203 115

REPORT NUMBER: 1101

PROJECT:
ROYAL NORWICH GOLF COURSE
HELLESDON, NORWICH, NORFOLK

CLIENT:
SUFFOLK ARCHAEOLOGY

DESCRIPTION:
PROCESSED MAGNETOMETER GREYSCALE PLOT, EASTERN SURVEY AREA

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SCALE: 1:2500 (0 – 100m)

PLOT:	APPROVED:	VERSION:
A3	DPM	01
DATE:	AUTHOR:	FIGURE:
JUN 2015	TPS	11