AD434

Land off Commercial Road, Coxhoe, Co. Durham

Archaeological Geophysical Survey

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EXECUTIVE SUMMARY

AD Archaeology Ltd. was commissioned by Pre-Construct Archaeology to carry out a geophysical survey (magnetometry) in advance of a proposed residential development on land off Commercial Road, Coxhoe.

The objective of the geophysical survey was to evaluate the presence of sub-surface archaeological remains on the site by means of the location and interpretation of geophysical anomalies.

The geophysical survey has produced good results and it has been possible to distinguish anomalies relating to modern disturbance and geology from other magnetic anomalies of possible archaeological origin.

The geophysical survey has identified magnetic anomalies suggestive of a former field system of ridge and furrow cultivation of probable post-medieval date along with an associated boundary feature in the southern area of the site. The geophysical survey has also identified magnetic anomalies which match the location of a more modern field boundary and road crossing the northern part of the site which tally with the findings of the historic map regression.

1 INTRODUCTION

1.1 The Project (Figs. 1, 2)

1.1.1 AD Archaeology Ltd. was commissioned by Pre-Construct Archaeology to carry out a geophysical survey (magnetometry) in advance of a proposed residential development on land off Commercial Road, Coxhoe.

1.1.2 The proposed development measures 2.9ha centred on NGR: NZ 3223 3627.

1.1.3 The geophysical survey was carried out in the week commencing 21st August 2023.

1.2 Aims and Objectives

1.2.1 The objective of the geophysical survey was to evaluate the presence of sub-surface archaeological remains on the site by means of the location and interpretation of geophysical anomalies.

1.3 Geology and Topography (Figs. 1, 2)

1.3.1 The underlying solid geology of the area comprises Pennine Middle Coal Measures Formation (mudstone, siltstone and sandstone), Sedimentary bedrock formed approximately 310 to 318 million years ago in the Carboniferous Period when the local environment was dominated by swamps, estuaries and deltas. The solid geology is overlain by superficial deposits made up of Devensian glacial till formed up to 2 million years ago in the Quaternary Period when the local environment was dominated by ice age conditions (BGS, 2023).

1.3.2 The site consists of a single large grazing field. The northern side of the field is relatively flat, though the land slopes from the southern and south-eastern edge of the site quite steeply.

1.3.3 At the time of survey the ground conditions were good and the site consisted of low recently grazed grass with some areas of tall rough vegetation and areas of dumped cut vegetation which were obstructive to the survey and were therefore excluded.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 A site specific desk-based assessment has been produced for this site (Omar Quadir PCA Report R15359)

2.2 There is a background of prehistoric activity in the area of the site. An Iron Age settlement was excavated by C. Haslegrove in 1979-80 at distance of 300m to the east of the site. This rectilinear ditched enclosure (H362) at this site, known as West House Iron Age Settlement, was 0.4ha in area.

2.3 Cades Roman road (H3328 & H3330)- section from Great Stainton to Chester-le-Street runs NNW-SSE through Coxhoe. The existence of a Roman road linking York and Newcastle east of Dere Street had long been accepted as a general concept when John Cade of Durham suggested its course in more detail in 1785. His "conjectured" route crossed the Tees at Sockburn and ran via Sadberge and Great Stainton through Bradbury and Mainsforth, Old Durham, Chester-le-Street and Gateshead. Contemporary writers, Hutchinson in particular, disagreed with his evidence, and other courses were suggested, mostly with a Tees crossing at Middleton St. George. The route as shown on Ordnance Survey maps is the suggestion of O. G. S. Crawford and lies along the route of the present B6291 through Coxhoe. A local historian R. Walton suggests the line of the Roman road lies further west parallel to B6291 but to the west of properties lining the west side of this main road through Coxhoe. His line for the road was established by 'informal rowelling' at a number of points in the 1980s. Neither of the proposed courses for “Cades Roman Road” has been substantiated by archaeological excavation.

2.4 There is documentary evidence for a medieval manor house at Coxhoe (H1075) which refers to it being a ruinous structure by end of the 14th Century. There are also records of medieval mining (H49094) in the vicinity and a mill (H45570). A deserted village developed at Coxhoe East House to the south-east of the site, but this was probably deserted by the early 15th century. Coxhoe West House (H16164), which in its current form dates to the post-medieval period, is located 350m south-east of the proposed development area and has also been associated through documentary evidence with a horse engine and ridge and furrow ploughing from the medieval period.

2.5 The modern village of Coxhoe developed during the 18th and 19th centuries, spurred by the rapid growth of coal mining. Coxhoe Colliery was sunk in 1827; from 1801 to 1841 the population rose from 117 to 3904. A number of collieries and supporting infrastructure developed in the vicinity of the site. Coxhoe Colliery (H3014) was located to the south of the site, with a pit village (H46018) further to the south. Bowburn Colliery (H6988) opened in the 1850s located to north of the site. Clay Hole Colliery (H16160) was located immediately to the west of the site, with Clarence Hetton Colliery (H46014) further to the west. Much of the coal from Coxhoe Colliery was transported on the Clarence Railway (H6989) built in the 1830s.

2.6 Other industrial activities in the immediate area included Steetley Lime Works (H6991) located 100m north of the site. Bowburn Brick Works (H6992) was constructed on the site of Bowburn Colliery and claypits (H6996) to the north of the site. West Hetton Iron Works (H16159) was located 250m to the west of the site. Two quarries (H16162 & H 16163) were located to the east of the site.

2.7 Map regression of Ordnance Survey maps show the site as being open agricultural fields with no evidence for former structures. The first edition Ordnance survey map of the area 1857 shows the Clay Hole Colliery immediately to the west of the site. By the time of the second edition OS Map 1897 Clay Hole Colliery had been removed. The 1919 Ordnance Survey Map, shows the landscape still much the same as in previous examples, except for the expansion of the railway line eastwards to connect the collieries with the main railway line in Coxhoe village. By this time, Steetley Lime and Basic Works had been constructed to the north of the site. The 1939 Ordnance Survey Map shows an expansion of the Steetley Limeworks. The 1952 Ordnance Survey Map shows further development of the Limeworks. To the south in the area of the site the northern field had been divided, with a heap having been deposited. The heap had been removed by the time of the 1962 Ordnance Survey. The Limeworks have subsequently been demolished.

3 THE GEOPHYSICAL SURVEY

3.1 Technique

3.1.1 Geophysical survey is a method by which examination of the Earth's physical properties takes place using non-invasive ground survey techniques in order to reveal buried sub-surface features and anomalies (Gaffney and Gater 2004). A hand-held magnetic fluxgate gradiometer records differences in electromagnetic field to a depth of approximately 1 metre into the ground. Differences or disturbances in sub-soil magnetic susceptibility can be the result of archaeological features, geology or modern intrusions.

3.1.2 This geophysical survey was conducted in line with all professional guidelines (CIfA 2014a, b) and recommendations as laid out and presented in *EAC Guidelines for the use of geophysics in archaeology* (Schmidt et al. 2015) *Geophysical survey in archaeological field evaluation* (David, Linford and Linford 2008), *Geophysical Data in Archaeology* (Schmidt 2001), and discussed in, *Revealing the Buried Past: Geophysics for Archaeologists* (Gaffney & Gater 2004).

3.2 **Methodology** (Fig. 3)

3.2.1 The magnetometer survey was carried out using a *Bartington Grad 601-2* fluxgate gradiometer, which scanned and stored all magnetic data. The sample interval was set at 0.25m and the traverse interval at 1m using a north-south traverse direction in a zigzag scheme. The data was then downloaded onto a laptop computer on site for assessment, and later processed on a PC.

3.2.2 The survey comprised 35 full and partial 30m by 30m grids (see Fig. 2) which were set out using a Trimble R6 GNSS GPS system.

3.2.3 All grid locations have been accurately tied into Ordnance Survey mapping and NGR co-ordinates.

3.3 Post-Processing

3.3.1 *TerraSurveyor* software was used to process all of the data recorded. AutoCAD software was used for the presentation of the figures.

3.3.2 The post-processing of the recorded raw data includes the application of certain functions in order to aid both the presentation and interpretation of the results. In this instance, data has been 'de-striped' to negate the effect of a zig-zag traverse a cause of striped data; 'despiked' to remove data spikes caused by small surface iron anomalies usually the result of metal 'rubbish' in the topmost surface layers; 'Destagger' to adjust the displacement of geomagnetic anomalies caused by alternate zig-zag traverses; 'clipped' to limit data to specified minimum and maximum values; thus removing extreme data point values. The data presentation

includes two formats: Greyscale Plot (demonstrating processed data); Magnetic Anomaly Interpretation Plan (identifying possible archaeological features, modern features and other anomalies).

4 SURVEY RESULTS (Figs. 3 & 4)

4.1 Magnetic Anomaly Interpretation

4.1.1 The data displays three different types of magnetic anomalies:

- *Positive magnetic anomalies* identifiable through darker grey shades on the greyscale images, which can be suggestive of soil-filled pit and ditch type features representing high magnetic susceptibility.

- *Negative magnetic anomalies* are identifiable through lighter grey shades on the greyscale images, which can be suggestive of wall footings and other stone concentrations or features representing low magnetic susceptibility.

- *Dipolar magnetic anomalies* identifiable through concentrations of mixed dark and light grey shades on the greyscale images which can be suggestive of fired and ferrous materials and structures; and/or modern intrusion and disturbance, representing paired positive and negative magnetic susceptibility.

4.2 Magnetic Anomalies

4.2.1 Along the southern boundary of the site areas of strong dipolar magnetic disturbance (grey hatch on Figure 4) represent the response of metallic elements within the modern boundaries of the development site in the form of post and wire fencing.

4.2.2 In the northern section of the site large areas of strong dipolar response have been noted within the survey results (**1**, grey hatch on Fig. 4). Some of these anomalies near the boundaries of the site are probably derived from metallic elements within the modern boundaries and from modern surface features including a metallic horse-feeder noted on site at the time of survey. Where these large areas of magnetic disturbance extend further on to the site it is probable that this disturbance is associated with the dumping of material on the site noted from the 1952 Ordnance Survey. The extent of this disturbance is unknown and it is possible that magnetically responsive dumped material within the upper soil horizons of the site could mask potential surviving archaeological remains below.

4.2.3 An anomaly with a dipolar response (**2**, red hatch on Fig. 4) has been identified running roughly northwest - southeast across the northern area of the site. This anomaly closely matches the alignment of a modern field boundary in the

adjacent field immediately east of the development site. It is probable that this anomaly represents an earlier layout of the field system where this boundary continued through the site, this is backed-up by the map regression. Similarly a second broad area of dipolar response (**3**) detected by the survey running roughly northeast - southwest across the northern corner of the development site which runs up to anomaly (**2)** is probably the remains of a former road/farm track noted in the desk based assessment (Quadir 2023). The strong dipolar response of the feature (**3**), postulated to be the road/farm track, is most likely associated with its surfacing material. Similarly the dipolar response along the line of the field boundary (**2**) and the fact that the road terminates at this boundary could suggest the presence of a similarly surfaced path or tracking running along the line of the former field boundary.

4.2.4 In the central area of the development site a linear positive anomaly (**4**, magenta on Fig. 4) has been detected running roughly northwest – southeast. The magnetic response of this anomaly suggests a soil-filled cut feature such as a ditch or gully. The close association of this anomaly with the line and length of the probable former field boundary (**2**) immediately to its north suggests that this may be an associated feature. It is probable that this linear anomaly represents an earlier iteration of this field boundary. In the area to the south of this feature the survey has detected a series of magnetic trends made up of parallel fragmentary linear positive and negative anomalies. These anomalies probably represent the remains of ridge and furrow agricultural cultivation surviving as sub-surface features. The wavelength of the probable ridge and furrow would suggest narrow rigg cultivation of post-medieval date. The parallel alignment of these feature with the probable former field boundaries suggest that these anomalies all represent elements of an earlier agricultural field system.

4.2.5 In the southwest corner of the site a strong area of dipolar of magnetic disturbance (**5**, red on Fig. 4) represents an area of significant ground disturbance. It is probable that this disturbance is associated with the development of the football ground which lies immediately west of the development site, as this area has seen considerable landscaping and levelling in its construction. It is also worth noting however that this area was also the site of Clay Hole Colliery, noted from the Ordnance Survey map regression, and that there is a possibility that this disturbance represents remains associated with the colliery.

5 DISCUSSION

5.1 The geophysical survey has produced good results and it has been possible to distinguish anomalies relating to modern disturbance and geology from other magnetic anomalies of possible archaeological origin.

5.2 The geophysical survey has identified magnetic anomalies suggestive of a former field system of ridge and furrow cultivation of probable post-medieval date along with an associated boundary feature in the southern area of the site.

5.3 The geophysical survey has also identified magnetic anomalies which match the location of a more modern field boundary and road crossing the northern part of the site which tally with the findings of the historic map regression.

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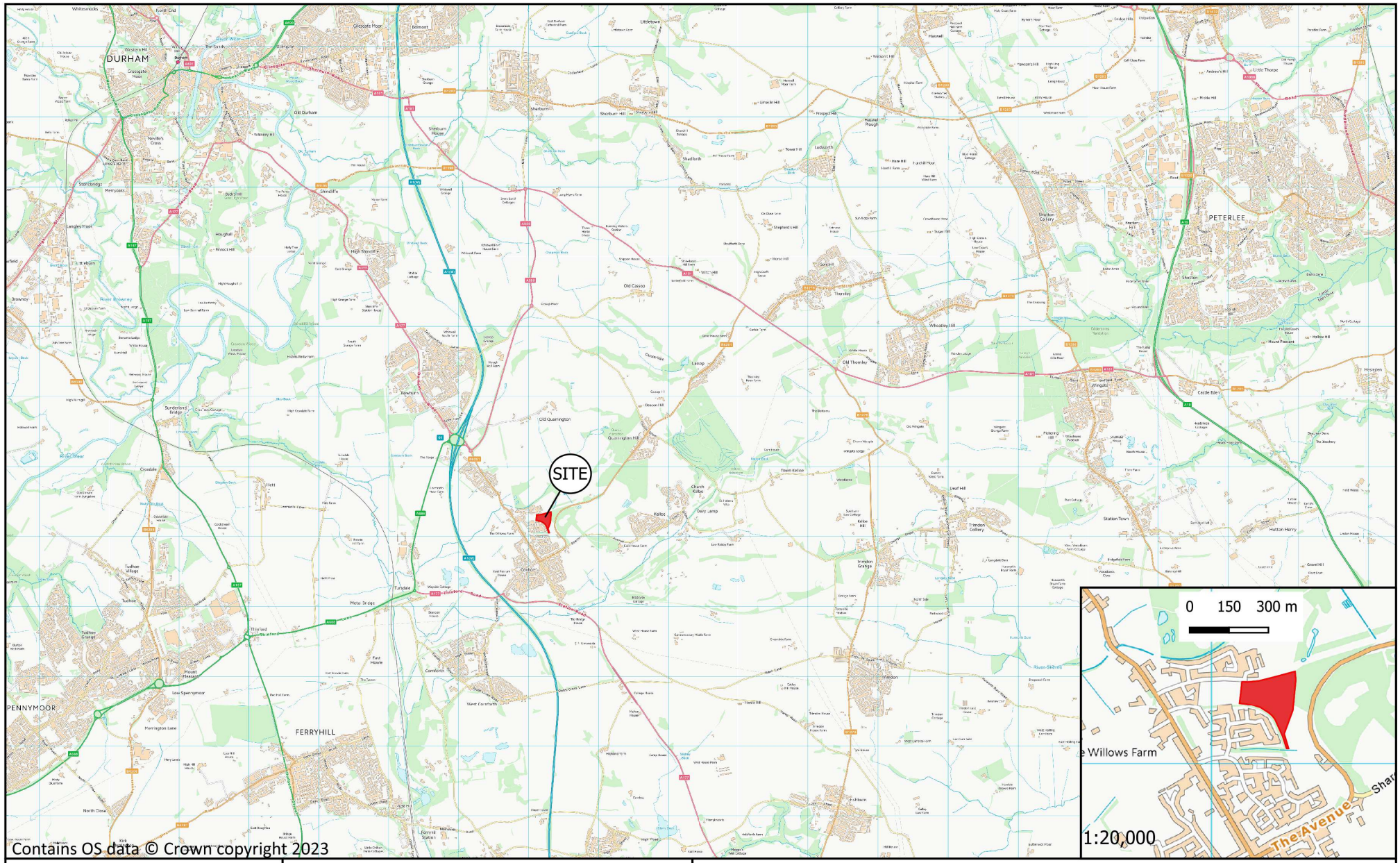

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0 1 2 km

scale: 1:75,000

Commercial Road, Coxhoe Project number AD434

Figure 1: General location of site

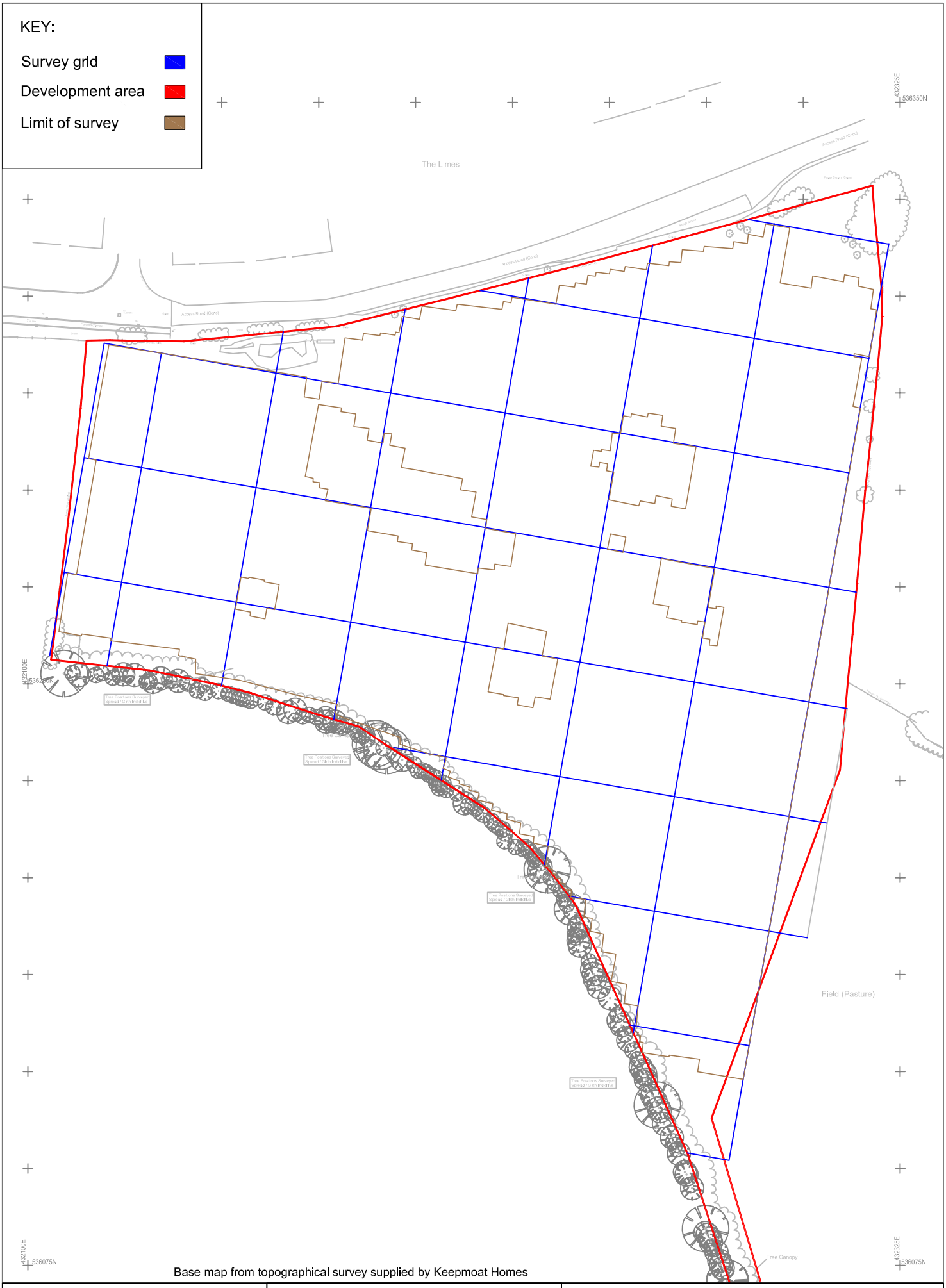

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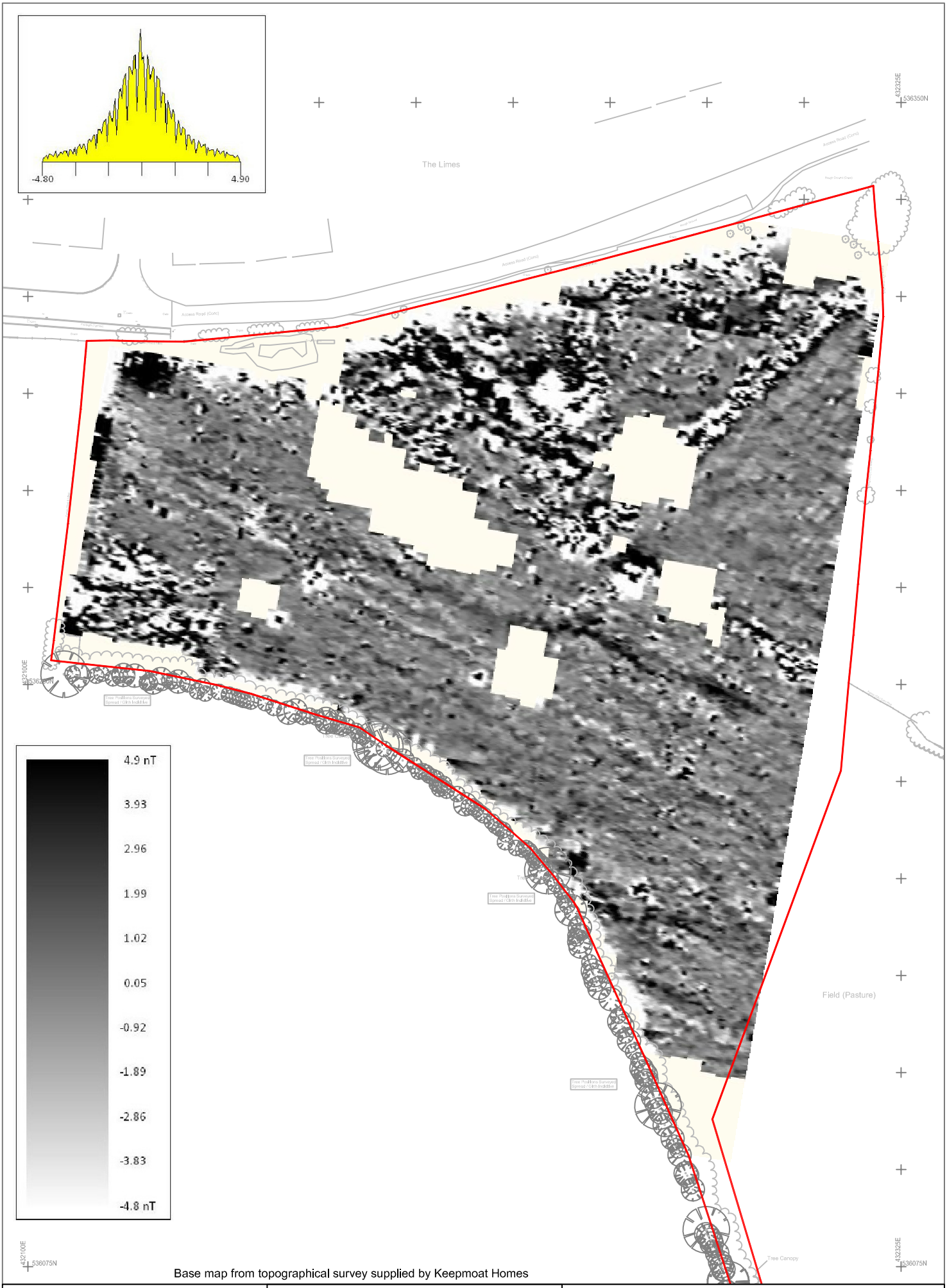
Figure 2: Plan of geophysical survey grids

N

0 1:1250 at A4 75m

Commercial Road, Coxhoe Project number AD000



Base map from topographical survey supplied by Keepmoat Homes

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Figure 3: Greyscale plot of geophysical survey

N

0 1:1250 at A4 75m

Commercial Road, Coxhoe Project number AD000

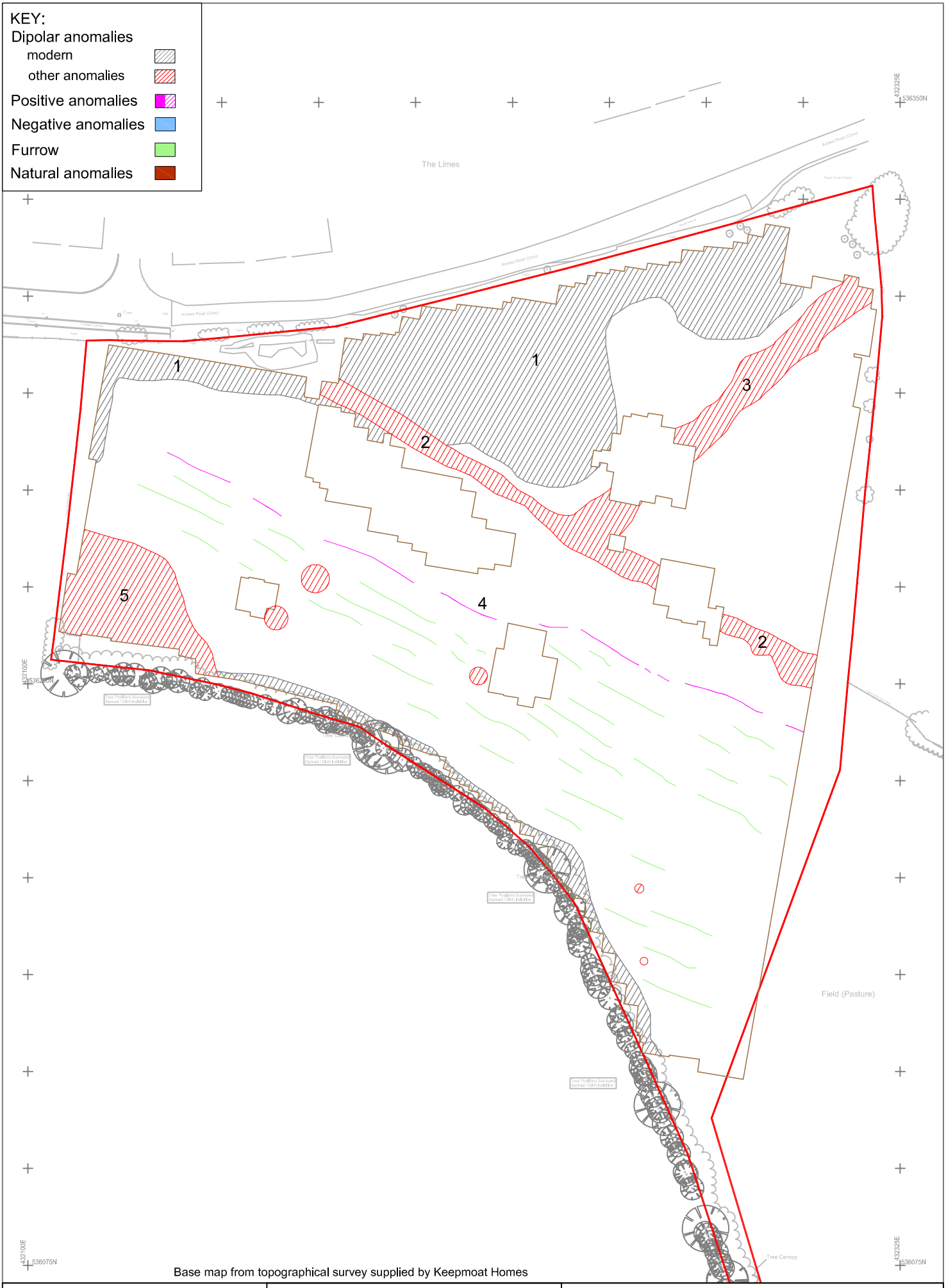

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Figure 4: Interpretative plan of geophysical survey

N

0 1:1250 at A4 75m

Commercial Road, Coxhoe Project number AD000

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