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Land at Alton Priors Alton Priors, Wiltshire

Detailed Gradiometer Survey Report



Ref: 111600.01
December 2015



**Land at Alton Priors,
Alton Priors, Wiltshire**

Detailed Gradiometer Survey Report

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Summary

A detailed gradiometer survey was conducted over land at Alton Priors, Wiltshire (centred on NGR 410925, 162130). The project was commissioned by the Churches Conservation Trust with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features.

The site comprises pastoral land surrounding the church of All Saints, Alton Priors, covering an area of 3.5 ha. The geophysical survey was undertaken on 27th November 2015. The detailed gradiometer survey has demonstrated the presence of a number of anomalies of potential archaeological interest across the Site.

The anomalies identified as being of archaeological interest are primarily pit- and ditch-like features. Features identified are likely to represent former field boundaries and areas of archaeology of possible medieval origin.

The Site as a whole is dominated by strong ferrous responses, many of which are considered to be modern in origin though some may be related to the buildings which once stood in this area but have been demolished in the last few decades.

An additional rapid assessment of LiDAR data was then carried out in order to place the Site within its wider landscape. Due to limitations in LiDAR data coverage it has only been possible to assess data to the south of the Site. A total of 979 hectares were assessed, revealing extensive blocks of ridge and furrow, lynchets and earthworks.



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Acknowledgements

Wessex Archaeology would like to thank the Churches Conservation Trust for commissioning the geophysical survey. The assistance of Neil Rushton is gratefully acknowledged in this regard.

The fieldwork was undertaken by Alistair Salisbury, Nick Crabb and Jennifer Smith. Alistair Salisbury processed and interpreted the geophysical data with help from Lizzie Richey who wrote the report. The LiDAR data assessment was carried out by Richard Milwain. The geophysical work was quality controlled by Garreth Davey and Lucy Learmonth. Illustrations were prepared by Lizzie Richey and Richard Milwain. The project was managed on behalf of Wessex Archaeology by Paul Baggaley.



Land at Alton Priors, Alton Priors, Wiltshire

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1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by the Churches Conservation Trust to carry out a geophysical survey at on land surrounding the Church of All Saints, Alton Priors, Wiltshire (hereafter “the Site”, centred on NGR 410925, 162130) (**Figure 1**).
- 1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent and character of detectable archaeological remains within the survey area.
- 1.1.3 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

1.2 Site location and topography

- 1.2.1 The Site is located west of the village of Alton Priors, east of the village of Alton Barnes and 10 km southeast of Marlborough, in the county of Wiltshire.
- 1.2.2 The Site occupies an area of 3.5 ha of pastoral land. The Site is bounded by a strip of woodland on the west, Alton Road to the north and hedgerow boundaries to the east and south. Beyond these extents there is a mixture of agricultural land and gardens. The Site occupies a mostly flat piece of land at approximately 130 m aOD.
- 1.2.3 The Site surrounds the Church of All Saints which sits on a small raised platform. As such this area could not be surveyed. The Site has several trackways crossing it and a number of trees causing obstacles to the survey.

1.3 Soils and geology

- 1.3.1 The solid geology comprises Calcareous Sandstone and siltstone of the Upper Greensand Formation. No overlying superficial geological deposits are recorded (BGS 2015).
- 1.3.2 The soils underlying the Site are likely to consist of Calcaric Endoleptic Cambisol soils of the 511d (Blewbury) association (SSEW SE Sheet 3-1 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.



1.4 Archaeological background

- 1.4.1 The following information is summarised from the Heritage Gateway website (www.heritagegateway.org.uk). A search was performed for all heritage assets within 1 km of the Site in order to ascertain the archaeological potential of the Site.
- 1.4.2 There a number of designated historical assets within 1 km of the Site including several grade II listed buildings, such as The Priory (immediately south of the site), The Old Rectory (southwest), Chandlers House (northwest), Maslen's Farmhouse (northwest), Alton Barnes Manor Farmhouse (south) and Neate's Farmhouse (west); all dating from C17. St Mary's Church 200 m west of the Site is Grade I listed and dates from C10-11.
- 1.4.3 Within the Site the Church of All Saints is grade II listed, dating from C12. A number of buildings are referenced to as having being present within the Site area however these are no longer standing (*pers.comms* 2015).
- 1.4.4 An early medieval settlement is mentioned in documents of 825 with 'Awltone Prioris' mentioned in documents of 1199. Earthwork remains of a possible hollow way and a number of boundaries around the present village may be parts of the medieval and/or post medieval settlement.
- 1.4.5 The search identified no recorded evidence of any prehistoric, Romano-British, Saxon or medieval activity within the Study Area. The archaeological potential for these periods is therefore classified as low. The absence of recorded evidence is however more likely to be reflective of the limited archaeological works undertaken in the vicinity rather than signifying a genuine absence of archaeological remains.
- 1.4.6 Post-medieval records are predominantly occupied by buildings associated with the rural landscape, comprising numerous houses, farmsteads and barns dating from the 17th, 18th and 19th centuries.



2 METHODOLOGY

2.1 Introduction

2.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team the 27th November 2015. Field conditions at the time of the survey were good, with dry conditions throughout the period of survey. An overall coverage of 3.5 ha was achieved.

2.2 Method

2.2.1 The detailed gradiometer survey was conducted using Bartington Grad-601 gradiometers which have a vertical separation of 1m between sensors mounted on a Non-Magnetic Cart. The use of a non-magnetic cart enables the simultaneous collection of 2 or more transects of data. The program MLgrad601 was used to acquire and record the survey data from the array of Grad601 probes with a GPS system providing real time locational data for each data point.

2.2.2 Data were collected at approximately 0.25 m intervals, using 4 gradiometers spaced at 1 m intervals on the cart with an effective sensitivity of 0.03 nT in accordance with Historic England guidelines (English Heritage 2008). The navigation display mode on MLgrad601 provides real time positioning allowing coverage to be viewed and enabling full Site coverage without the needed to set up individual grid nodes across the site.

2.2.3 GPS position data was collected using a Leica Viva Instrument with rover and base station to record NMEA stream data which is precise to approximately 0.02 m and therefore exceeds Historic England recommendations (2008).

2.2.4 Data from the survey was subject to minimal data correction processes. These comprise a smoothing function applied to correct for any variation between the Bartington sensors and a spline function to increase resolution.

2.2.5 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.



3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

- 3.1.1 The detailed gradiometer survey has identified magnetic anomalies across the Site, along with areas of increased magnetic response and a large amount of ferrous. Results are presented as a series of greyscale plots and archaeological interpretations at a scale of 1:1000 (**Figures 2 to 3**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image.
- 3.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figure 3**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 3.1.3 Numerous ferrous anomalies are visible throughout the dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 3.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.
- 3.1.5 Gradiometer survey may not detect all services present on Site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on Site.

3.2 Gradiometer survey results and interpretation

- 3.2.1 To the north of the area at **4000** and **4001** are a number of positive magnetic linear responses of +1-2 nT. These appear to be related to each other and form a curving linear feature from the north to the southwest, running for c.100 m. These appear to represent a ditch type feature.
- 3.2.2 To the northwest, positive responses at **4002** of +2-3nT show another possible ditch-like feature. This feature is aligned northsouth and is potentially related to the parallel linear trends that have been identified to the west and south of this response.
- 3.2.3 The linear feature **4003** aligned south-east to north-west is heavily masked by magnetic disturbance. This has been interpreted as possible archaeology; the ferrous readings around it may be associated with it however any relationship is difficult to ascertain from the gradiometer results alone.
- 3.2.4 At **4004**, a curvilinear response can be seen with a linear trend extending southwest showing a potential extension. The provenance of this feature is unknown but it may be agricultural in origin or related to the medieval activity documented in the area.
- 3.2.5 Bisecting the Site **4005**, identifies a further linear positive anomaly of +1-+6 nT that extends from east to west. This feature is slightly staggered, it is uncertain whether this is the true form of the feature or as a result of the data collection process. To the north of **4005**, is **4006**, a strong positive anomaly with a vague rectilinear form. It is unclear what this response is, but given its similarity in response to **4005** and close proximity to an area of magnetic disturbance it has been interpreted as possible archaeology.



- 3.2.6 Two further positive linear responses have been identified within the gradiometer results, **4007** (+ 1-2 nT), in the southern part of the south and **4008** (+5 nT) to the south of **4004** with their respective lengths being c.7 m and c.10 m. These anomalies are both isolated, making their identification difficult.
- 3.2.7 The whole site is characterised by high level magnetic responses that are attributed to modern debris, however it is possible that some of the more magnetically intense areas may indicate the locations of previous buildings.
- 3.2.8 A number of linear trends have been identified across the Site; these are likely to relate to the trackways that cross the site.



4 LIDAR DATA ASSESSMENT METHODOLOGY

4.1 Introduction

4.1.1 A rapid assessment of LiDAR data has been carried out in order to place the Site within its wider landscape. The LiDAR data assessment study area covers 979 hectares of land to the south of Alton Priors, bounded by a 4 km x 3 km box located between NGR 409000 163090 in the north-west and NGR 413000 160120 (**Figure 4**).

4.1.2 There is complete LiDAR data coverage at 1 m horizontal resolution southwards of Alton Priors, although LiDAR data is unavailable northwards of the village until Cow Down. Consequently, it has only been possible to provide a clear picture of how the Site sits within the wider landscape based solely on the assessment of LiDAR data. Despite this, the assessment has provided a means of recording a large number of sites of archaeological interest.

4.2 Data processing, analysis and interpretation

4.2.1 Digital Terrain Model (DTM) LiDAR data was sourced from the Environment Agency via the GeoStore portal and downloaded as a series of ESRI ASCII raster files at 1 m horizontal resolution. The DTM option provides a model of the bare surface of the earth stripped of buildings and vegetation.

4.2.2 ArcGIS 10.3 Advanced was used to both display and analyse the survey datasets, and to record features of archaeological and historical interest. Firstly, a seamless DTM of the entire LiDAR data assessment study area was created by merging the ESRI ASCII raster files.

4.2.3 ArcGIS 10.3 Advanced was used to both display and analyse the survey datasets, and to record features of archaeological and historical interest. A seamless DTM of the entire LiDAR data assessment study area was created by merging the ESRI ASCII raster files, from which a slope map (highlighting changes in the height values between adjacent cells) and eight hillshade models were derived.

4.2.4 The eight hillshade models were created with the direction of the light source increasing at 45° intervals from the north. Principal Components Analysis (PCA) was then carried out on the eight resulting hillshades, creating a single dataset in which common values across the eight datasets were retained, eliminating redundancy across the hillshade datasets and creating a single dataset representative of these models.

4.2.5 ArcMap 10.3 was then used to map features of archaeological interest.



5 LIDAR DATA ASSESSMENT RESULTS

5.1 Introduction

5.1.1 A total of 318 separate components were recorded (**Figures 5-13**). The features are distributed across LiDAR data assessment study area and include examples of ridge and furrow and associated plough headlands, lynchets and other earthwork banks and ditches. Most of these features are likely to have medieval and post-medieval origins, with the majority of agricultural origin.

5.2 LiDAR data assessment results and interpretation

5.2.1 A number of features are present between Stanton St Bernard, including areas of ridge and furrow (**5001**) and a number of lengthy banks of a possible natural origin (**5002** and **5003**). These include a 1 km length of bank which appears to enclose Honeystreet and Alton Barnes, before continuing beyond the area of data coverage, and a section of bank immediately to the west of Alton Barnes.

5.2.2 Further ridge and furrow can be traced to the south of Alton Barnes Farm, where they are related to a series of ditches appearing to represent a number of smaller subdivisions (**5004**). Some of these features may also represent earlier settlement remains. The features are contained by a bank to the west and a stream to the east and are present across 6.8 hectares.

5.2.3 To the east of **5004** and the stream lie a series of features relating to the Ridgeway. The path of the Ridgeway itself is visible as a 530 m long, north-south running ditch, from which a series of short, perpendicular ditches run eastwards. To the east, it is possible to trace further evidence of ridge and furrow.

5.2.4 A further block of ridge and furrow is present to the east of Alton Priors, within East Field (**5006**). These appear to be associated with **5007**, a linear, angled bank which can be traced for 435 m before running north-westwards beyond the area of data coverage. Additional bank features (**5008** and **5009**) are present to the south of **5007**, a number of which represent plough headlands associated with further ridge and furrow.

5.2.5 On Woodborough Hill, 400 m to the south of **5009**, lie a series of well-defined strip lynchets (**5010**). A large cut feature representing a disused chalk pit is present on the south-west of the hill. Immediately to the south of the summit lie further banks and ridge and furrow. Picked Hill, 700 m to the south-east of Woodborough Hill, also displays evidence of lynchets (**5011**), as well as ridge and furrow to the north and south of the hill.

5.2.6 A number of prominent banks are present to the south-west of Woodborough Hill (**5013** and **5014**). These features follow the topography of the hill and may represent either former field boundaries or plough headlands. Further evidence of agricultural activity is present to the south of the Kennet and Avon Canal in the form of ridge and furrow and associated earthworks (**5015**). Further to the west lie a number of ditches representing water meadows (**5016**).

5.2.7 To the north of **5014** lies **5017**, a series of banks which may represent part of a field system. Further west, to the south-west of Honeystreet, it possible to trace further ridge and associated plough headlands (**5018-5020**).



6 CONCLUSION

- 6.1.1 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest in both the north and south fields. In addition to these, anomalies interpreted as ploughing trends, areas of increased magnetic response and former field boundaries have also been identified.
- 6.1.2 The anomalies of archaeological interest are primarily ditch-like features. These have been noted across the Site (**4000-4002**, **4004** and **4005**) and may relate to earlier field divisions or trackways of unknown origin and date. Documented medieval activity at the Site suggests that these features are of potential medieval provenance however this can only be speculated.
- 6.1.3 Heavy magnetic disturbance on the eastern side of the Site has potentially masked features of archaeological interest. A linear response at **4003**, can be discerned despite the disturbance suggesting an area of potential archaeological interest.
- 6.1.4 A number of linear trends and further ditch-line features (**4007** and **4008**) suggest further activity at the site however their isolation and varied orientation makes interpretation impossible.
- 6.1.5 The assessment of LiDAR data has provided a useful overview of the wider landscape that the Site lies in and, despite the lack of available LiDAR data to the north, it is clear that the Site exists in a complex landscape.



REFERENCES

6.2 Bibliography

English Heritage, 2008. *Geophysical Survey in Archaeological Field Evaluation*. Research and Professional Service Guideline No 1, 2nd edition.

6.3 Cartographic and documentary sources

Soil Survey of England and Wales, 1983. *Sheet 6, Soils of Midland and Western England*. Ordnance Survey: Southampton.

6.4 Online resources

British Geological Survey, <http://www.bgs.ac.uk> [accessed December 2015]

UK Soil Observatory, <http://www.ukso.org> [accessed December 2015]

Heritage Gateway, <http://www.heritagegateway.org.uk/> [accessed December 2015]



APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey methods and equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03nT over a ± 100 nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. Both types depend upon the establishment of an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by Historic England (English Heritage 2008) for geophysical surveys.

Scanning surveys consist of recording data at 0.25m intervals along transects spaced 10m apart, acquiring a minimum of 80 data points per transect. Due to the relatively coarse transect interval, scanning surveys should only be expected to detect extended regions of archaeological anomalies, when there is a greater likelihood of distinguishing such responses from the background magnetic field.

The detailed surveys consist of 20m x 20m or 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20m or 30m grid respectively, and are the recommended methodologies for archaeological surveys of this type (EH, 2008).

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by Historic England (English Heritage 2008) for characterisation surveys.

Post-processing

The magnetic data collected during the detail survey are downloaded from the Bartington system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

Typical data and image processing steps may include:

- Destripe – Applying a zero mean traverse in order to remove differences caused by directional effects inherent in the magnetometer;



- Destagger – Shifting each traverse longitudinally by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Despiking – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data)

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.



APPENDIX 2: GEOPHYSICAL INTERPRETATION

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Possible archaeology – used for features which give a response but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

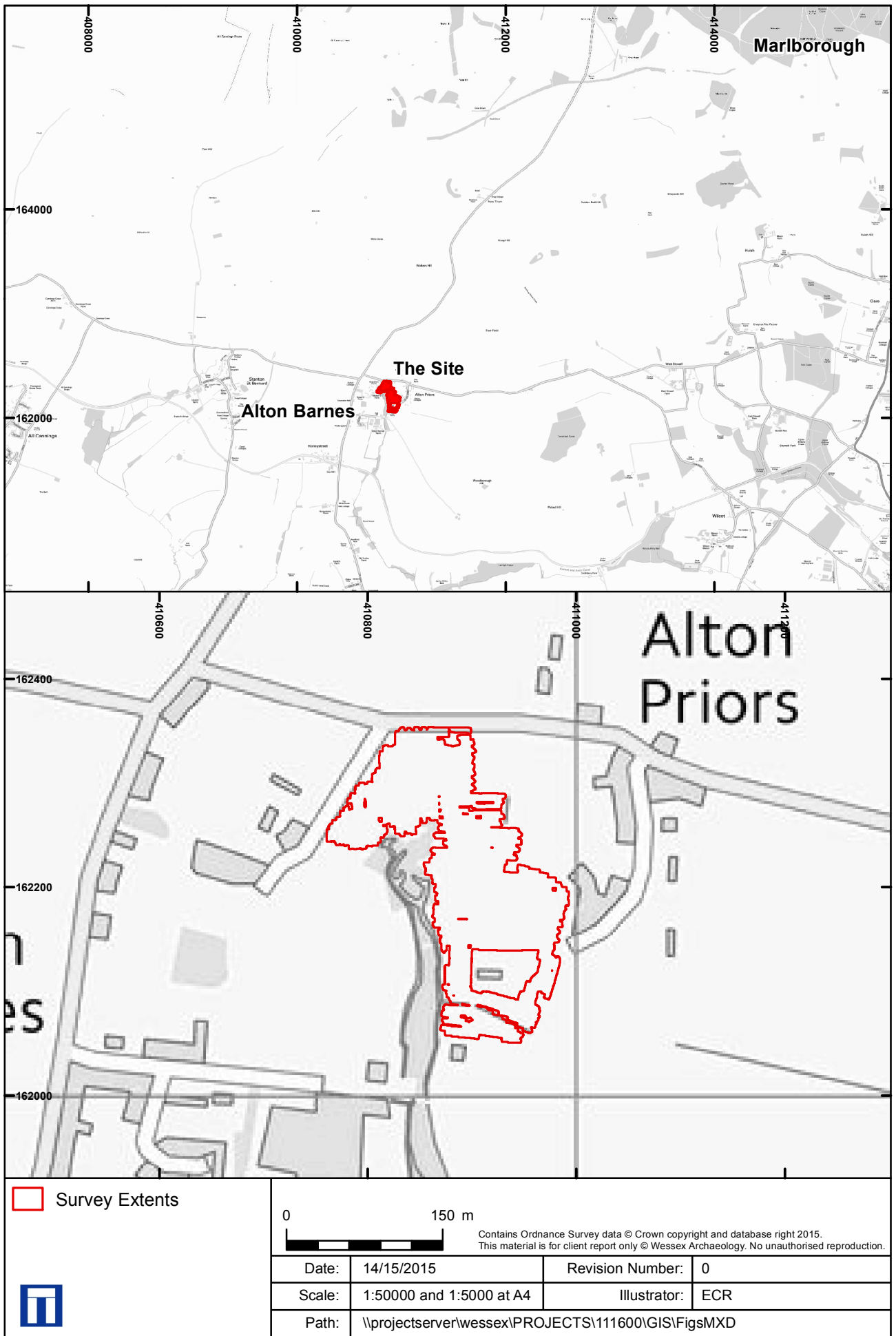
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

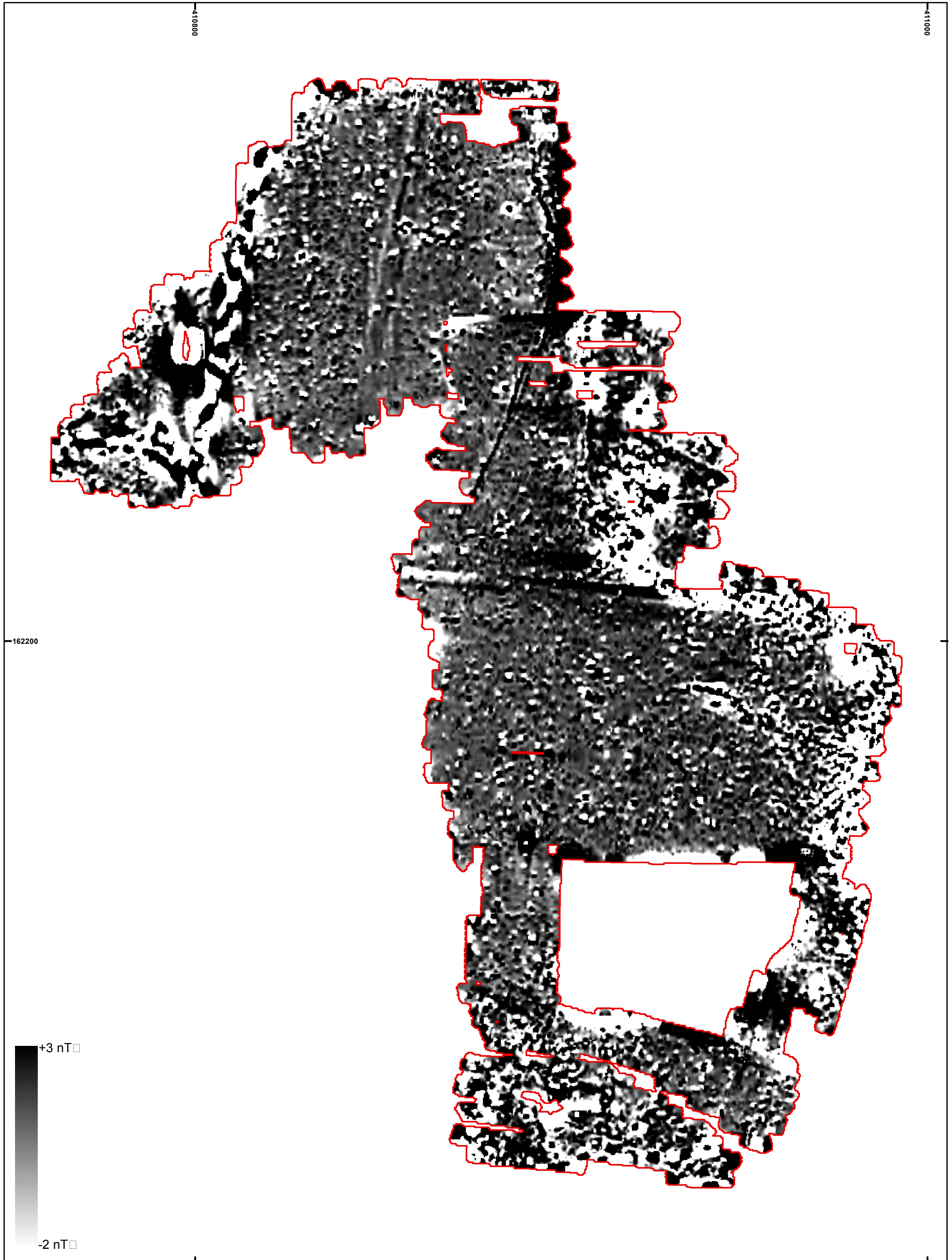
The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:


- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.



Site Location and Detailed Survey Extents

Figure 1



 Survey Extents



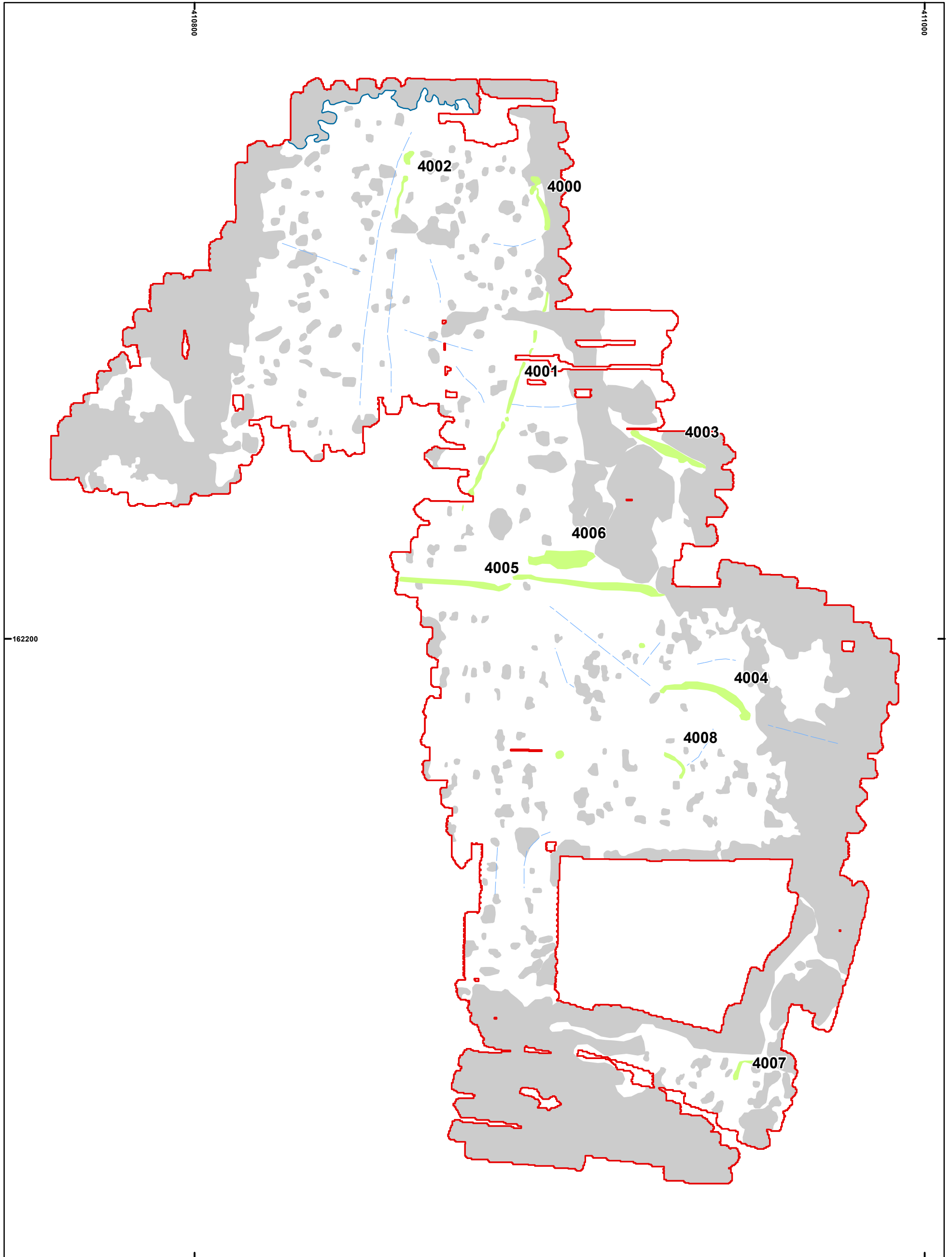
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Gradiometer Results - Greyscale

Figure 2



- Survey Extents
- Trend
- Possible Archaeology
- Ferrous



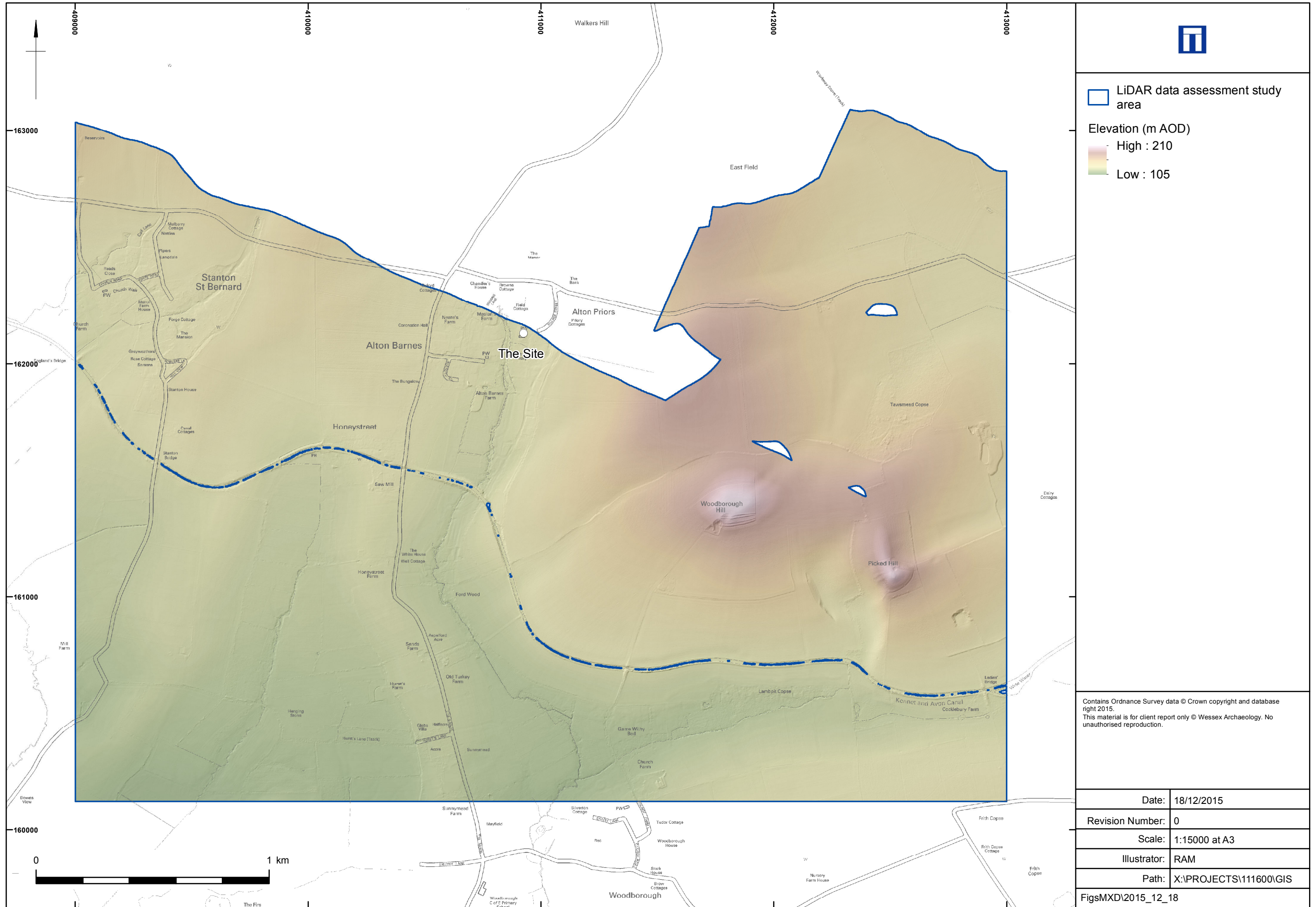
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Gradiometer Results - Interpretations

Figure 3



LiDAR data assessment study area

Elevation (m AOD)

High : 210

Low : 105

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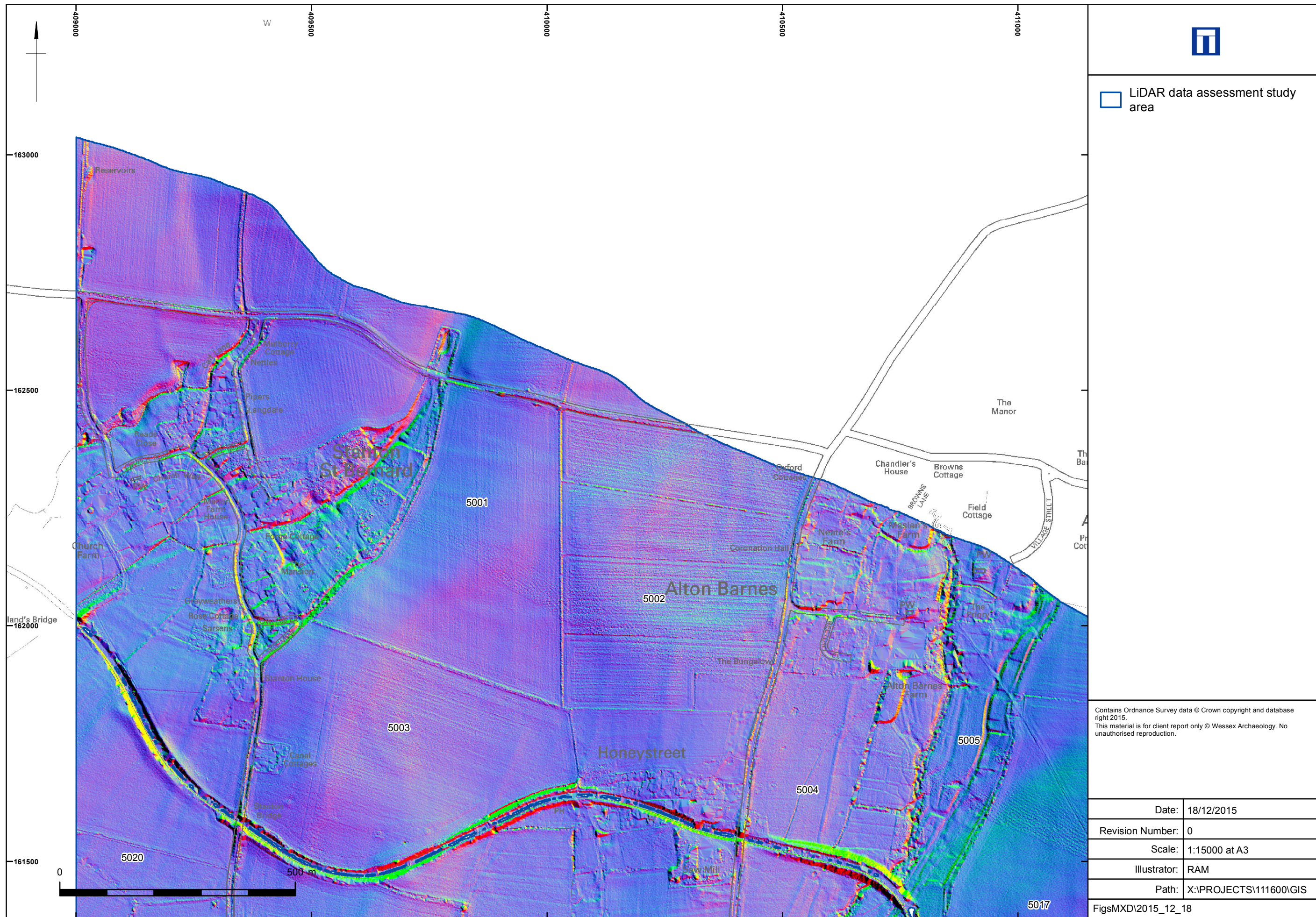
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LiDAR data assessment study area

Figure 4



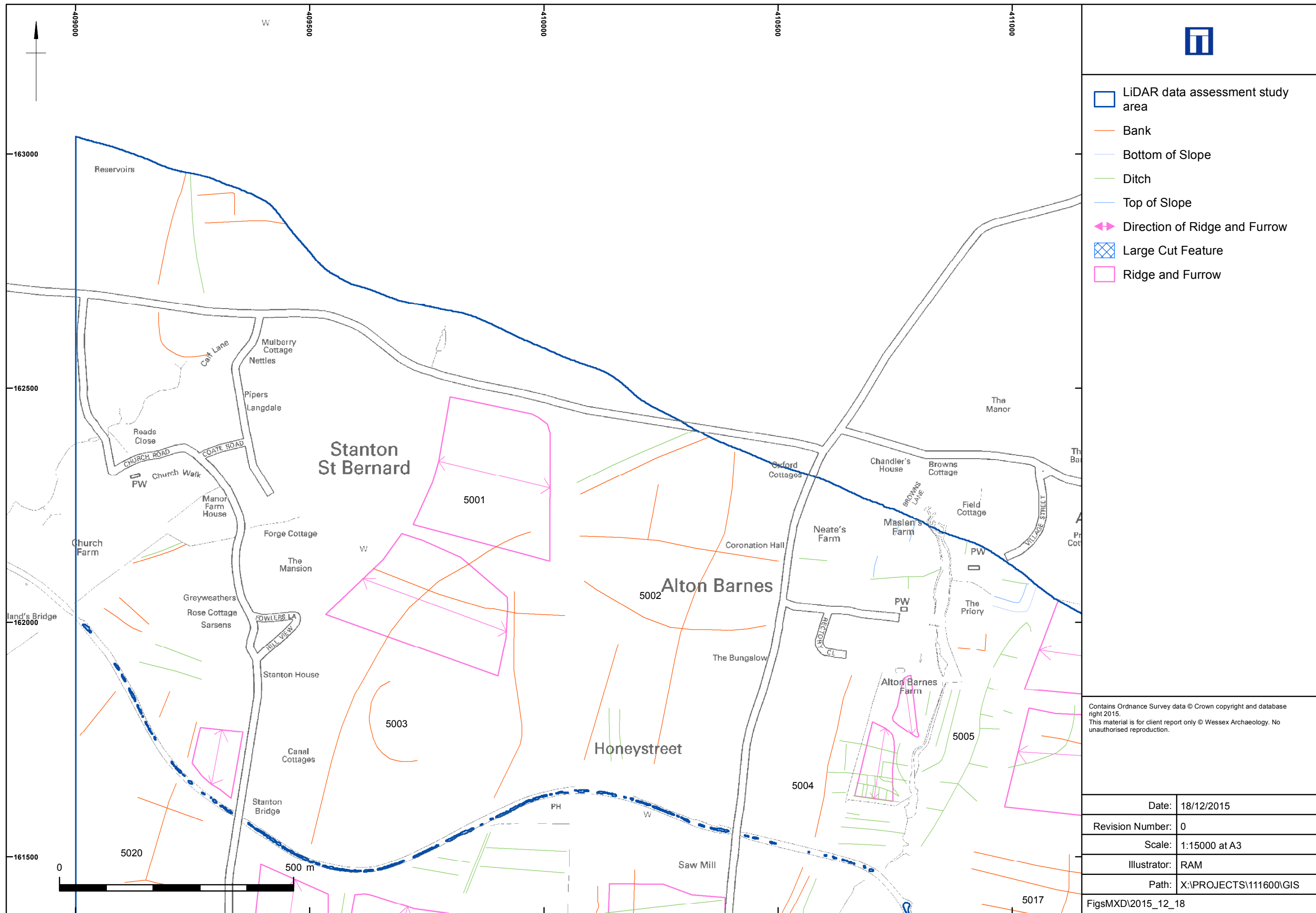
LiDAR data assessment study area

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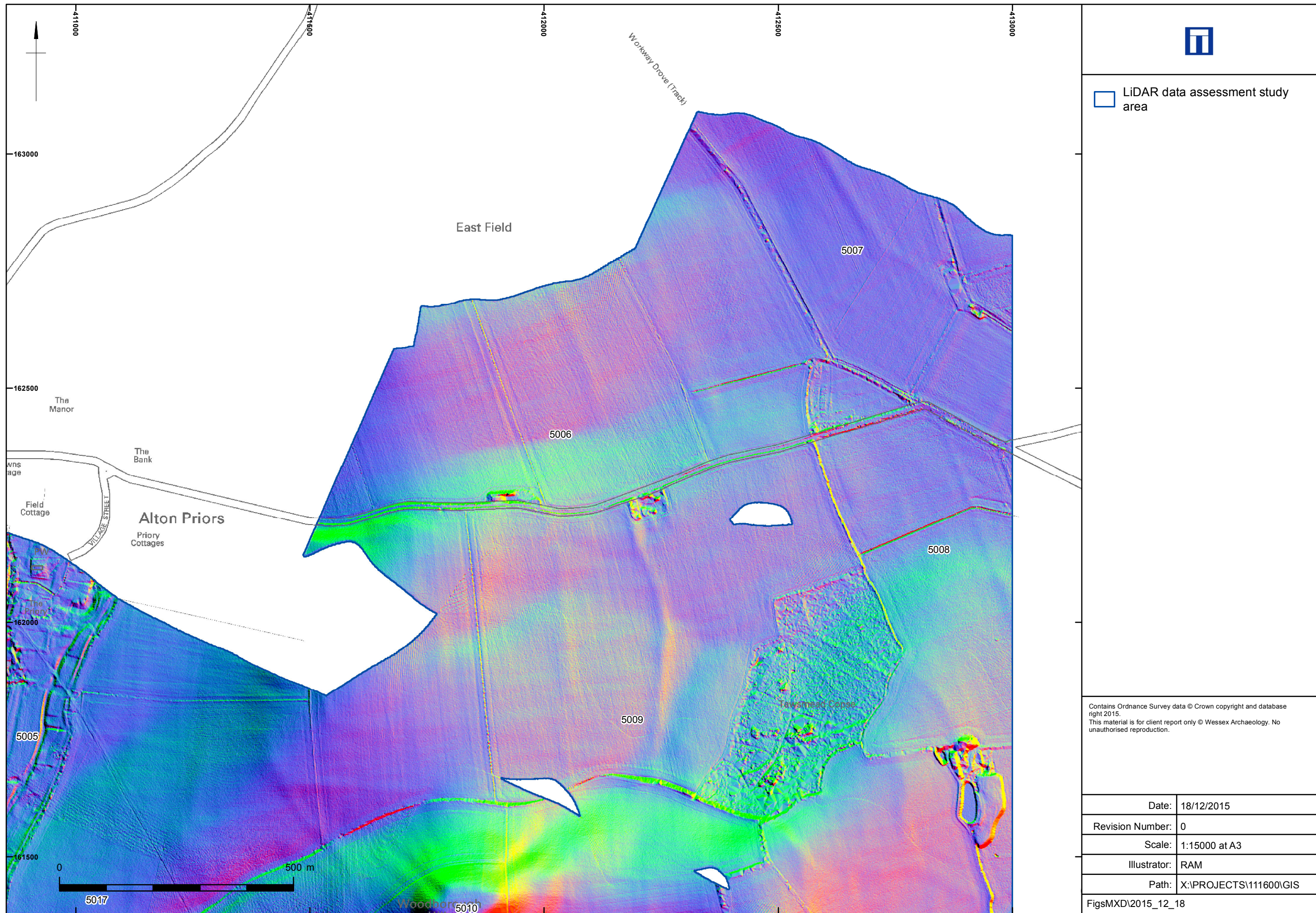
PCA of the hillshade datasets (north-west)

Figure 5



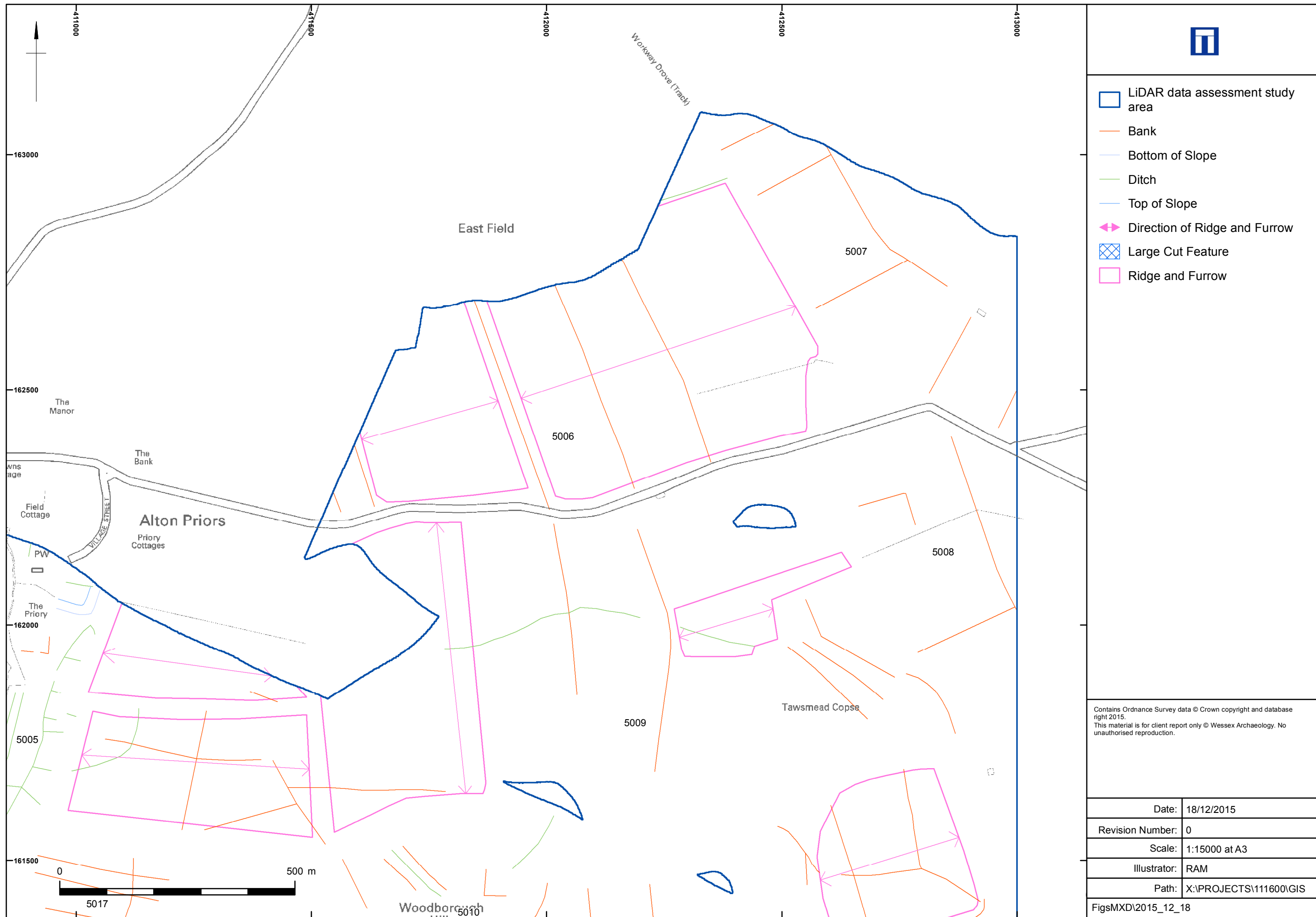
LiDAR data interpretation (north-west)

Figure 6



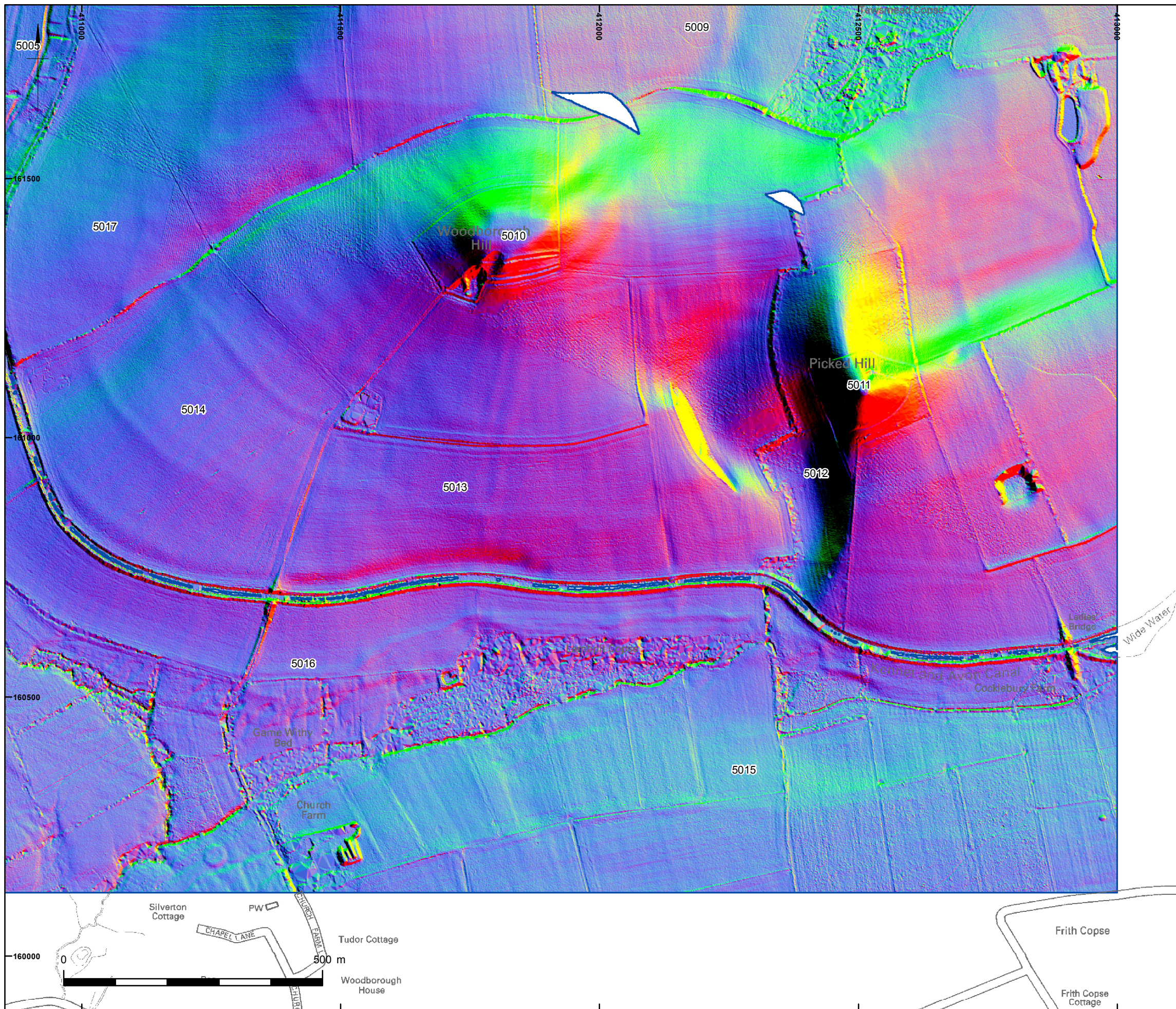
PCA of the hillshade datasets (north-east)

Figure 7



LiDAR data interpretation (north-east)

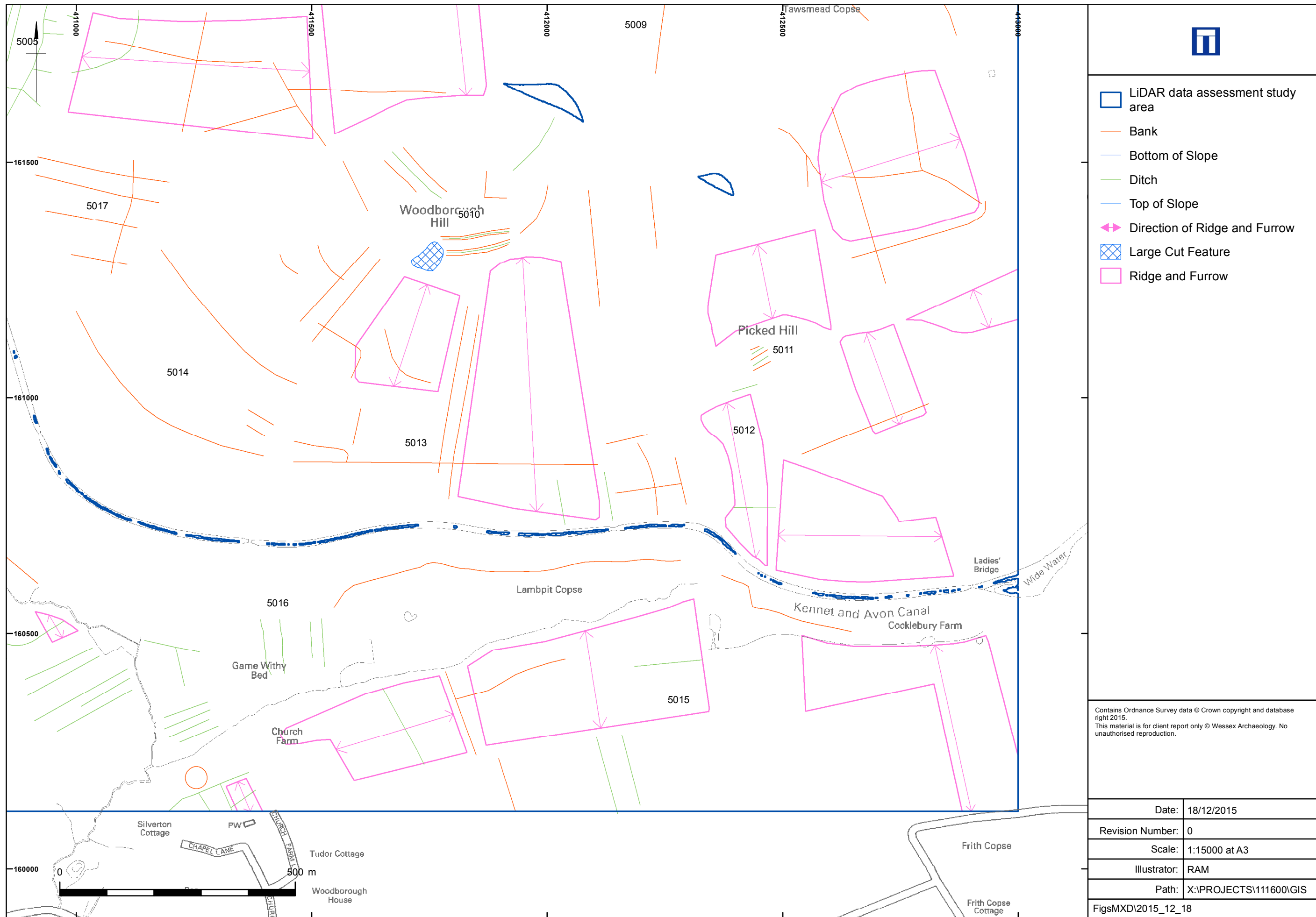
Figure 8



<p> LiDAR data assessment study area</p>	
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Illustrator:	RAM
Path:	X:\PROJECTS\111600\GIS
FigsMXD\2015_12_18	

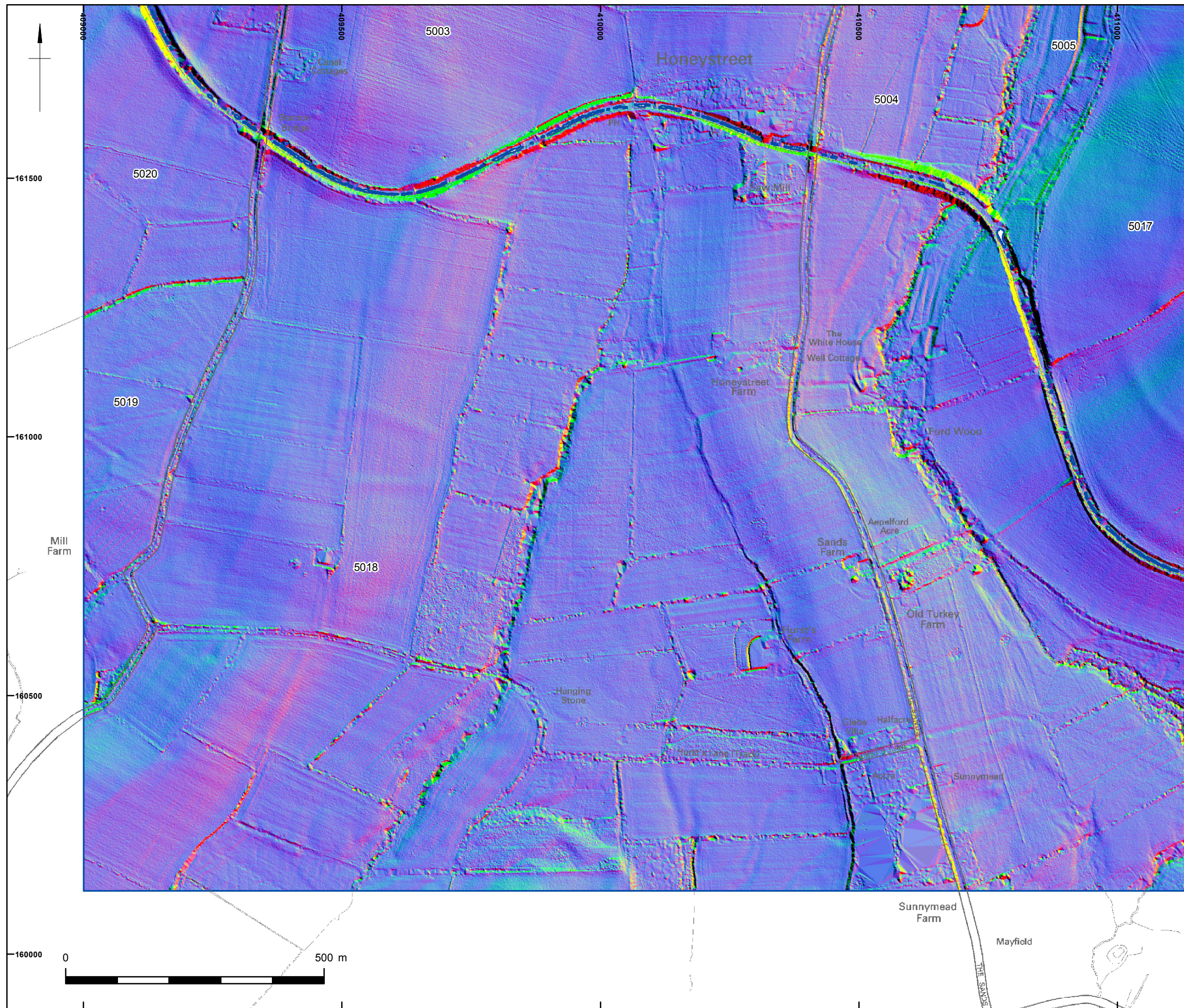
PCA of the hillshade datasets (south-east)

Figure 9



LiDAR data interpretation (south-east)

Figure10



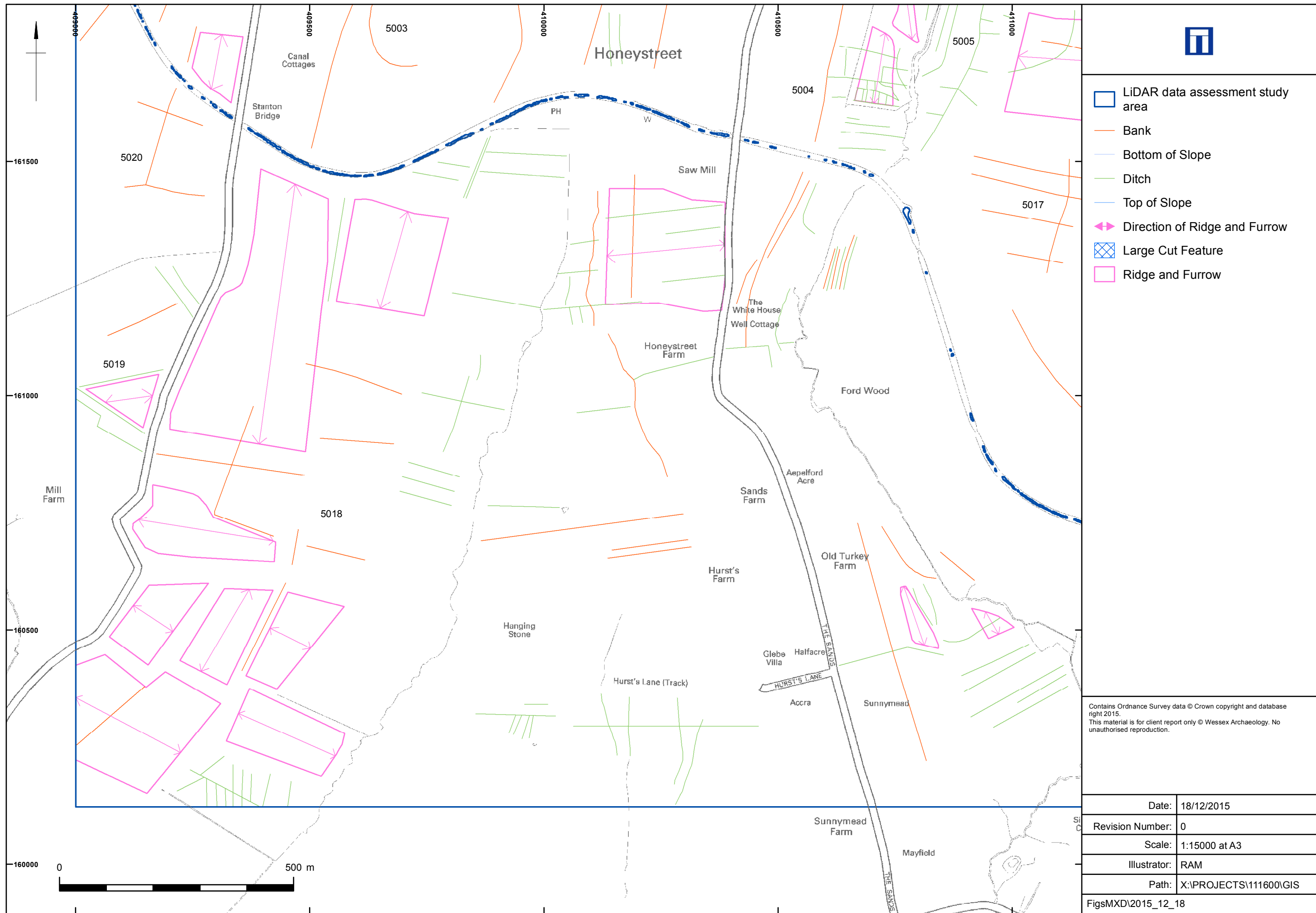
□ LiDAR data assessment study area

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PCA of the hillshade datasets (south-west)

Figure11

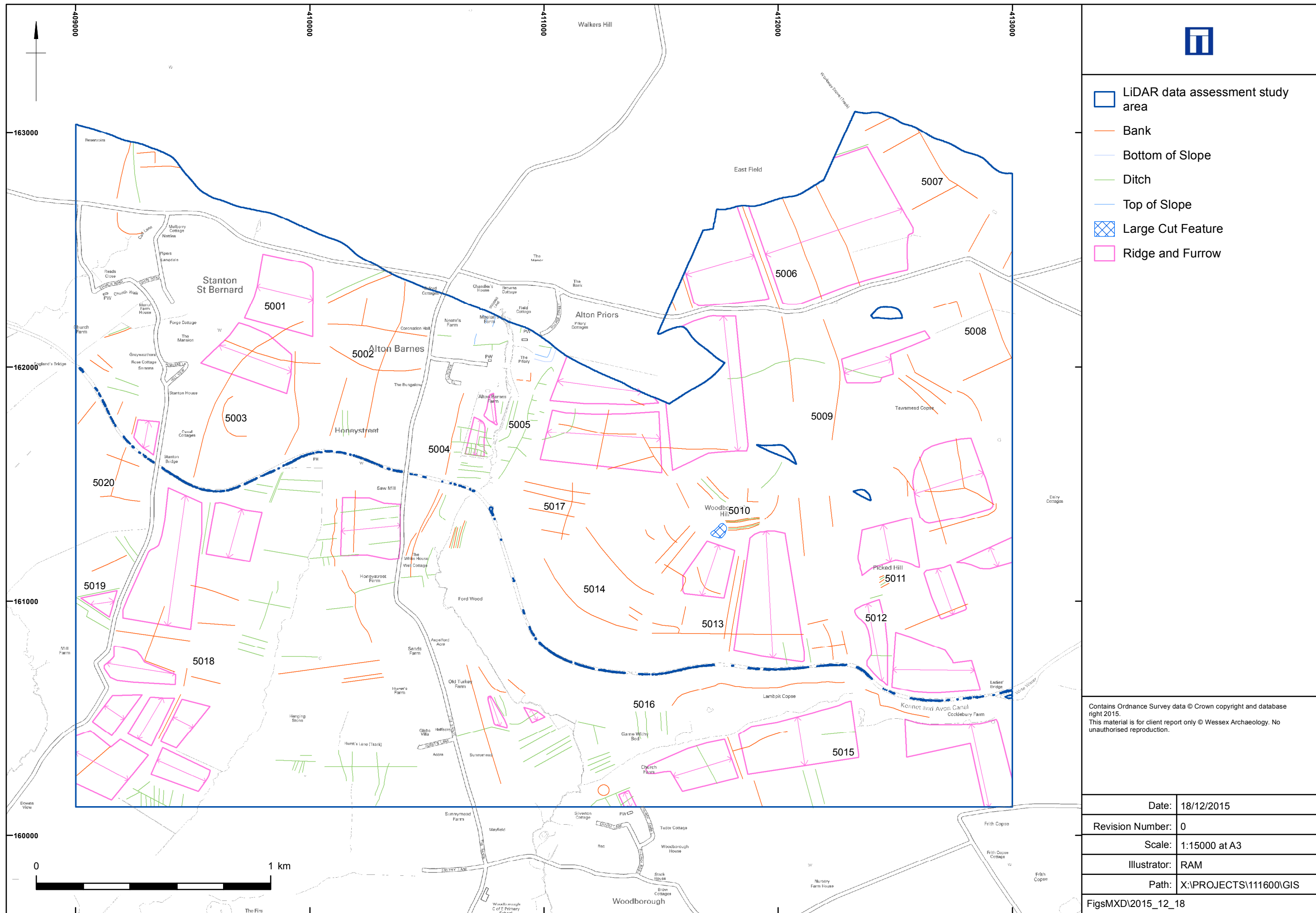


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LiDAR data interpretation (south-west)

Figure12



LiDAR data interpretation across the study area

Figure 13



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