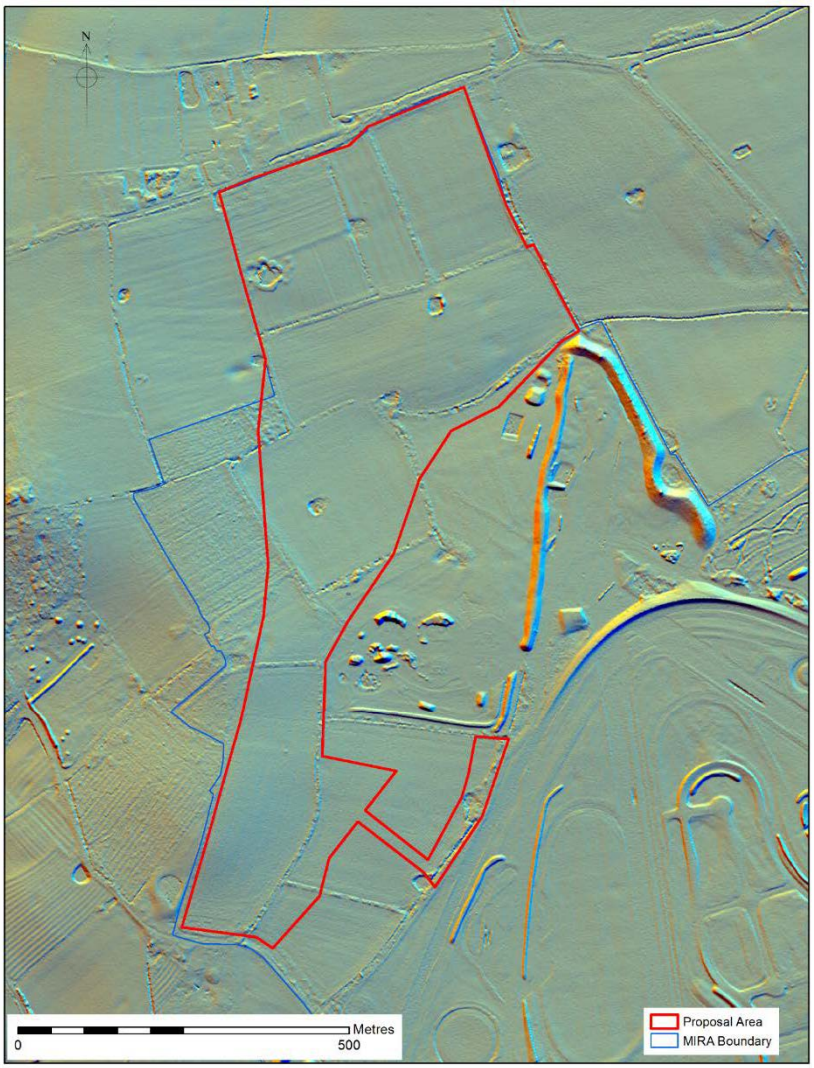
UNIVERSITY OF LEICESTER
Archaeological Services

An archaeological earthwork survey by LiDAR study for land at MIRA, TICIT Project, Higham on the Hill, Leicestershire.

(SP 37011 97102)

By **Matthew Beamish**



ULAS Report No 2018-054

An archaeological earthwork survey by LiDAR study for land off MIRA, Higham on the Hill, Leicestershire

NGR: SP 74700 88700

Matthew Beamish

for:
Swanvale Developments on behalf of

HORIBA MIRA Ltd

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ULAS Report Number 2018-054

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An archaeological earthwork survey by LiDAR study for land off MIRA, Higham on the Hill, Leicestershire

M. Beamish

Summary

An archaeological earthwork survey by LiDAR study has been prepared for Swanvale Developments on behalf of HORIBA MIRA Ltd by University of Leicester Archaeological Services (ULAS) for land to the west of MIRA, Higham on the Hill, Leicestershire (SP 7470 8870*). The survey was undertaken in advance of the proposed development of the site.*

Earthwork survival across the area is generally poor. Some pieces of evidence are used to identify previous land-uses. Features that can be identified can mostly be matched in historic mapping or aerial photographs. The broad topography of the area is discussed and its relationship with the registered battlefield of Bosworth Field.

This study has been preceded by a desk-based assessment, a geophysical survey and a fieldwalking survey (Hunt 2018; Gater 2018, Gonzalez Rodriquez 2018 respectively, while the results of a metal detector survey are in preparation

1. Introduction

In accordance with National Planning Policy Framework (NPPF), Section 12 (Conserving and Enhancing the Historic Environment) this document is an Archaeological desk-based assessment for land at MIRA, Higham on the Hill Leicestershire (SP74717 88687).

The assessment was commissioned by Langton Developments from University of Leicester Archaeological Services (ULAS) in connection with a proposed planning application for residential development of the site.

The LiDAR study has been commissioned with the aim of enabling clear assessment of the extent and character of any earthwork features within and immediately adjacent to the site.

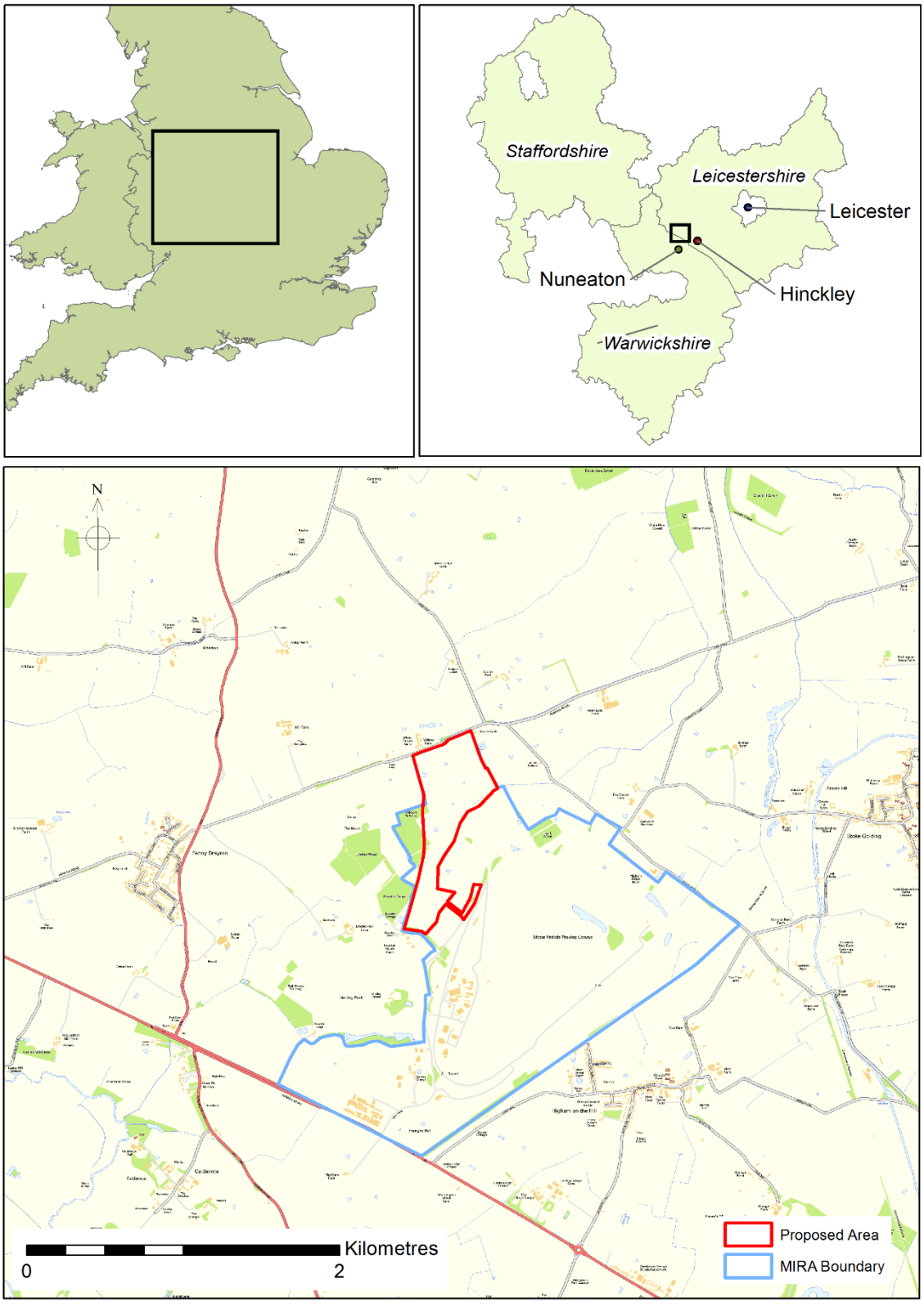

Figure 1: Site Location

2. Site Description, Topography and Geology

The MIRA site lies within the parish of Higham-on-the-Hill, in the District of Hinckley and Bosworth, Leicestershire, around 5 miles north-west of Hinckley and 3.5 miles north-east of Nuneaton (Figure 1). It is bordered by the A5 (Roman Watling Street) to the south; which is the border with Warwickshire. The dismantled Ashby and Nuneaton Joint Railway runs to the south-east of the site and to the north-west and north-east lie fields and local roads. The proposal area lies on fields at the north-western edge of the area. The northern part of these fields lie within Witherley parish.

The site lies at a height of around 100m aOD, with the high point of the site lying at 104m aOD close to the southern edge. The total area of the MIRA site is around 310ha. The TIC-IT site covers around 33.7 hectares.

The British Geological Survey website indicates that the underlying geology across most of the site consists of Thrussington Member Diamicton overlying Mercia Mudstone, with Mercia Mudstone to the south and some areas of Bosworth Clay Member overlying Mercia Mudstone over most of the TIC-IT site. An area of alluvium is mapped in the northern part of the area.

The broad topography is generally flat with little undulation. Slightly more elevated ground forms a low broad north-south ridge to the west of the proposed area (at the apex of which a mound is located MLE3297) while Higham on the Hill clearly occupies high ground to the south (Figure 5). Contours have been generated from the LiDAR data (Figure 17).

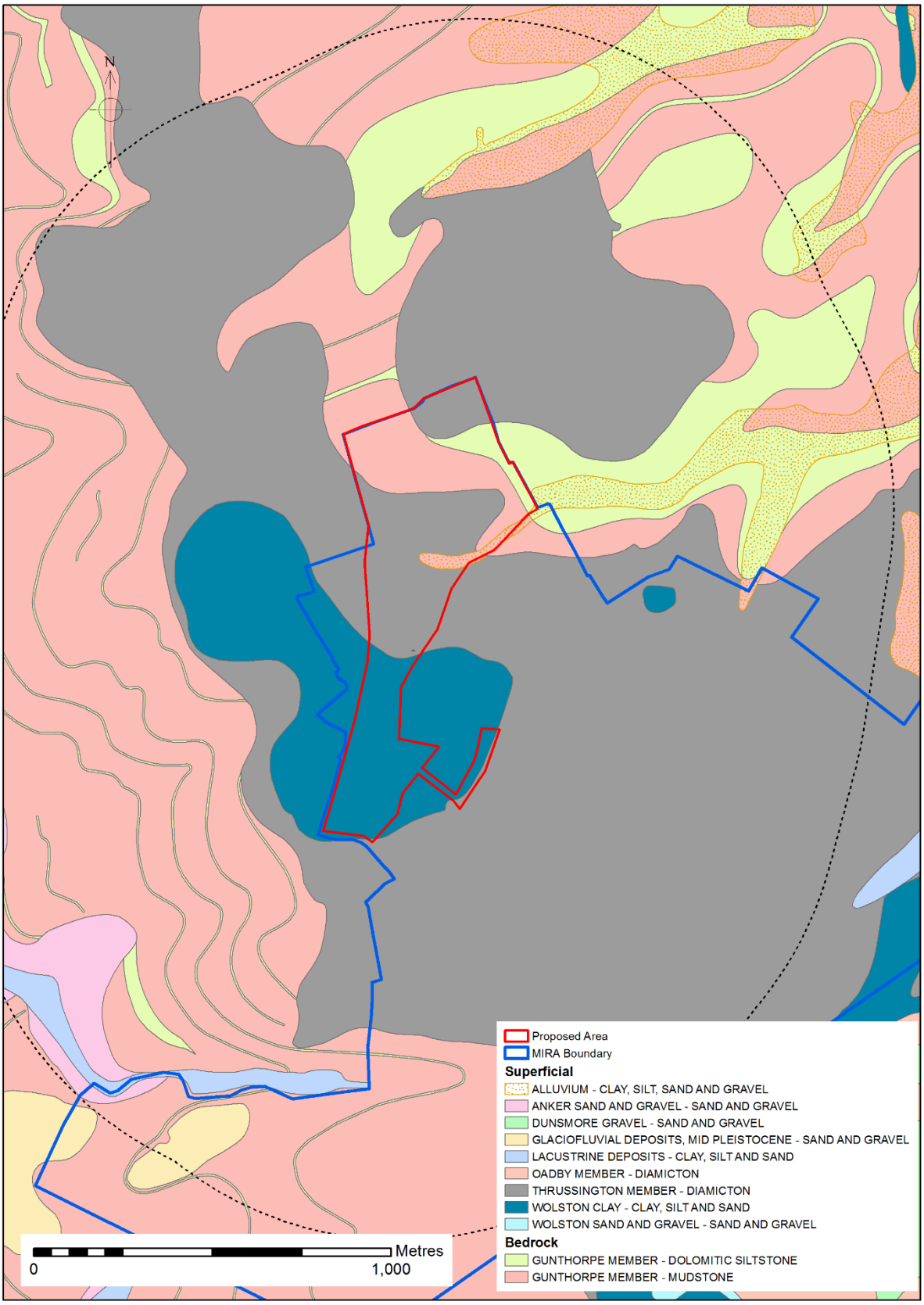

Figure 2: Geology

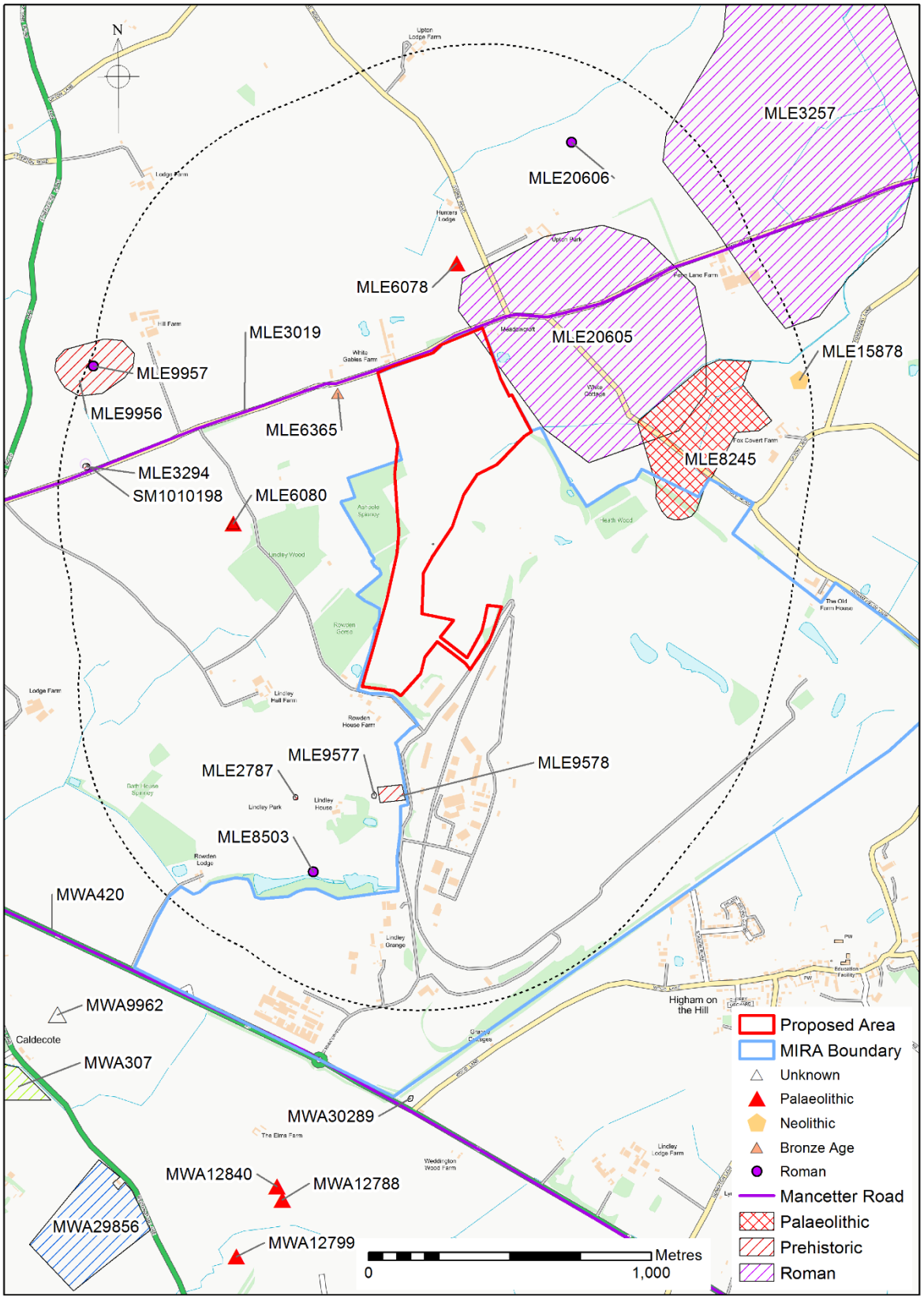

Figure 3: Monuments (Roman and earlier)

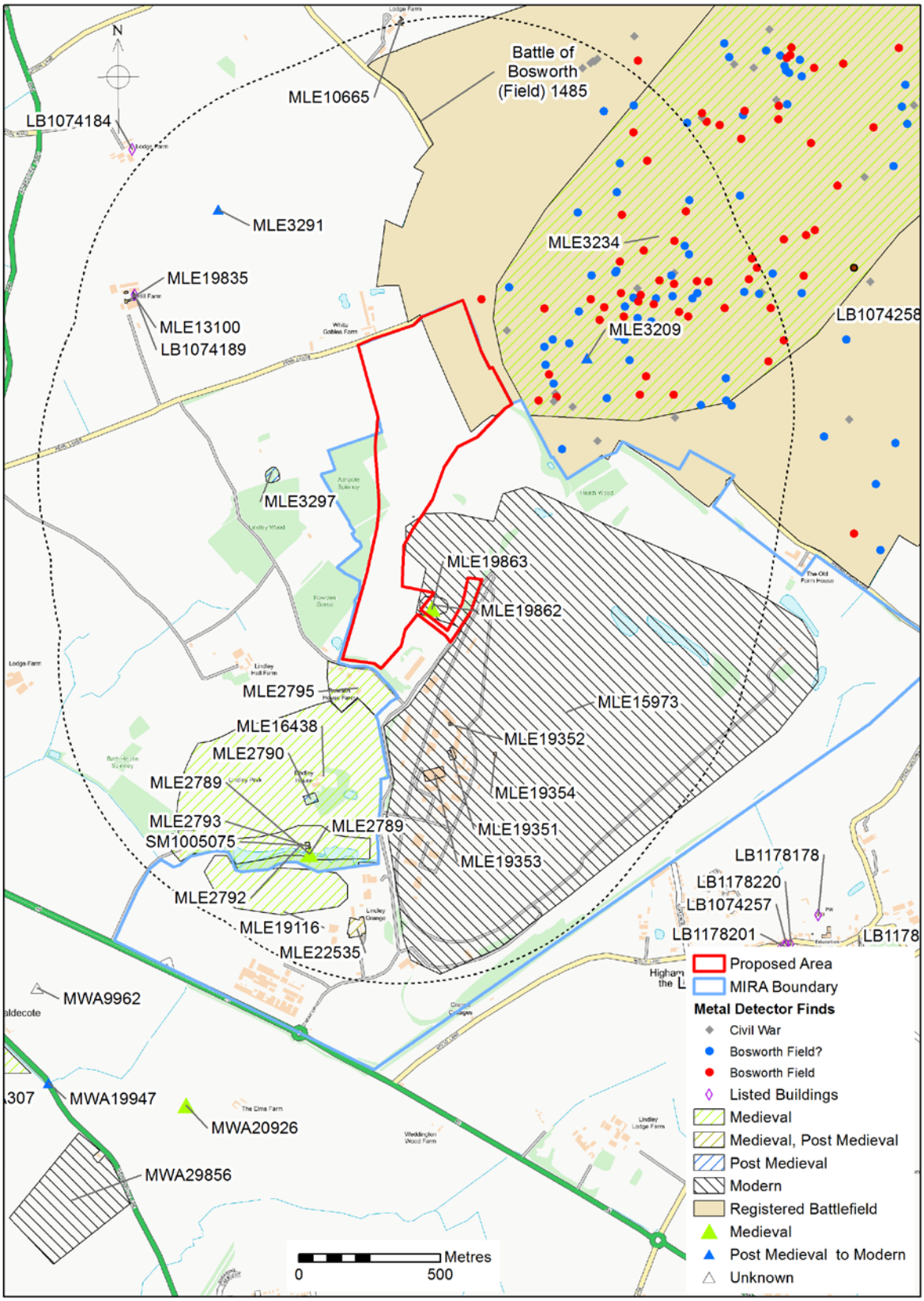

Figure 4: Monuments (Medieval and later) and findspots from metal detector survey in adjacent fields.

3. Historical and Archaeological Background

A desk based assessment has been compiled (Hunt 2018). The proposed area lies to the west of the current MIRA vehicle testing facility, which itself lies upon a former WWII airfield. The proposed new development site lies within pasture and arable fields, except for a section that was once the dispersal point for aircraft and is covered in hard standing and dumped material.

The site lies close to findspots for a number of prehistoric artefacts. There is also a Bronze Age barrow located 900m west of the site which is a scheduled monument. There are also cropmarks associated with prehistoric enclosures close to the proposed development area.

The site lies close to the line of two Roman roads, the Mancetter Road and Watling Street. Roman settlement remains have been found to the north-east of the site with further findspots from the Roman period nearby.

There are two deserted medieval villages in the vicinity of the site (Lindley and Rowden). The remains of the chapel at Lindley Park are also scheduled monuments.

The site of the Battle of Bosworth (1485) lies to the north-east of the proposed area and both the proposed area and the MIRA site lie partially within the area designated as the extent of the battlefield. A large amount of medieval finds have been discovered from the battlefield including a halberd, cannonballs, badges and rings. Some finds have been located within the proposed area.

Features associated with the site's former use as an airfield have been located during previous archaeological work.

Therefore there is moderate potential for archaeological remains and finds from prehistoric, Roman, medieval and post-medieval and modern periods to be revealed during the proposed new development on the site. There will be an impact on the setting of the battlefield as well as a direct impact from the new development on the part of the battlefield that lies within the proposed development area.

4. Geophysical Survey

A geophysical survey was undertaken for ULAS by Stratascan Ltd (Gater 2018). No responses of archaeological interest were recorded and no burial pits associated with the Battle of Bosworth were identifiable. Features related to the WWII airfield were mapped as were former field boundaries, ridge and furrow cultivation patterns and several service pipes.

5. Aims and Objectives

The overall aim of the survey was to accurately record the location and state of preservation of surviving earthwork features within and immediately adjacent to the site in order that their significance could be assessed.

Objectives included

- Defining the extent of positive (bank) and negative (ditch) features within the proposed area
- Defining the extent of positive (bank) and negative (ditch) features within the MIRA site with particular consideration of the airfield history of the site

- With reference to the Geophysical Survey identify common features within the proposed area possibly enable further interpretation

- Review the topographic location of the site in order to understand the landscape context of features identified.

Research Aims

The initial assessment suggested that archaeological work would be able to contribute towards several research objectives derived from *The Archaeology of the East Midlands: An Archaeological Resource Assessment and Research Agenda* (Cooper 2006) and *East Midlands Heritage: An updated research agenda and strategy for the Historic Environment of the East Midlands* (Knight et al. 2012).

The archaeological evaluation was identified as having the potential to contribute to the following research aims.

The Medieval period (Vince 2006, Lewis 2006, Knight et al 2012; English Heritage 2012).

The study has the potential to contribute towards research into the origins and development of medieval settlement, landscape and society. The work has the potential to contribute to Research Agenda topics 7.1.2, 7.1.4, 7.2.1-7.2.4, 7.3.1-7.3.5, 7.5.4, 7.6.1-2, 7.7.1-7.7.5 and Research Objective 7E - Investigate the morphology of rural settlements.

Modern (1750 to Present)

The work can also contribute to Research Agenda topic 9.8 Military sites: Can we establish a typology of surviving post-1750 military remains? How are military sites distributed across the region? What impacts have military developments had upon settlement development, landscapes, industry and transport?

6. Methodology

Analysis based upon aerial LiDAR data was requested by the Leicestershire County Council, Principal Planning Archaeologist, as archaeological advisor to the planning authority. Following a search of Environment Agency archived data, aerial LiDAR data at 1m resolution was downloaded in ASCII file format from the Open Data web portal (http://environment.data.gov.uk/ds/survey#/download?grid=SP70).

The LiDAR data had been collected in 2013: details of the data source are given on page 29. As the study area was mostly clear of trees, the data was acquired in both DSM unfiltered and DTM filtered format. The filtered data has had obstructions such as buildings and vegetation removed to and provide a 'bare-earth' model. If the removal of any obstruction left a gap in the surface data this gap was interpolated by the EA (using an undisclosed algorithm) to provide a continuous surface. Although this data is very useful to identify potential features in woodland, the data in open areas can lose clarity.

The methodology used followed that set out by Hannon (Hannon *et al* 2014, 8) with some modification.

LiDAR ASCII Data Processing

Most operations were conducted in Esri ArcMap10.3 SP1 build 3143. The Relief Visualisation Toolbox which enables the rapid output of multiple hillshade, slope analysis, relief model and sky view analysis was also used (Zakšek et al. 2011; Kokal et al. 2011).

Data files were imported into ArcGIS using the ASCII to Raster function (System Toolboxes>Conversion Tools>To Raster>ASCII to Raster), the output data type was set to 'Float' and the original ASCII filename was retained as the output raster name. These files were placed in a newly created file geodatabase called '15710_MarketHarborough.gdb'.

Creation of Hillshade layers

To aid feature identification, four basic hillshade layers were generated for each LiDAR flight. 'Hillshades' are a data processing method available in most GIS which allow an artificial sun to be shone from any chosen compass bearing and from angle above the horizon onto a DEM. This process helps identify ground features by casting an artificial shadow behind changes in elevation (for a full discussion of the process see Bewley et al 2005).

Each of these layers were created using the hillshade function (System Toolboxes>Spatial Analyst Tools>Surface>Hillshade). The input raster for each hillshade was the DTM or the Clipped DEM if one was generated, for each LiDAR flight. Three basic parameters were utilised to generate the four different hillshade views and Z factor relating to the degree of exaggeration applied to the input DEM, with 1 indicating no exaggeration.

Each output raster was named to preserve the original input DEM information and include the hillshade parameters (e.g.'Sitename_1mDTMHS315451') and saved to 'JobCode_and_Sitename.gdb'. Once each hillshade was generated they were grouped within the TOC to aid navigation.

Automatic multiple hillshade using the Relief Visualisation Toolbox (no of directions 16, sun elevation angle 30^{o}) were also created and saved to the Geodatabase (SP7288_DTM_1M1_MULTI_HS_D16_H30_RGB).

Sky-View Factor Analysis

'Sky-View Factor' (SVF) analysis was also applied to the LiDAR data (Zakšek *et al* 2011). This method, instead of applying false shadows to a surface, calculates the volume of sky visible from a given position, a position at the bottom of a ditch affords a lower level of visibility to one atop a mound. This method produces a raster layer showing the volume of sky visible from each position within the raster which can highlight subtle archaeological features. SVF is not a function available in ArcMap, therefore a free to use version of the tool is available online (http://iaps.zrc-sazu.si/index.php?q=en/svf).

To utilise the tool the DEM for the area was exported as a TIFF. This was achieved by right-clicking on the DEM layer within the TOC (Data>Export Data) selecting a destination for the TIFF file and leaving all other parameters at default. Once the TIFF had been exported the SVF tool was run. The exported TIFF was used as the input DEM and Search Radius was left at the default 10. The Vertical exaggeration was set to either 1, 2 or 3 and Direction set to either 16 or 32, multiple Sky-Views were run for each focus area using a range of values. The tool created an output TIFF file which reflected the name of the input DEM and settings used (e.g. 'LiDAR_1m_SVF_d32_r10_ve3'). This TIFF was then imported into ArcMap and added to the TOC.

The SVF images were then also interrogated and potential features recorded in the same manner as is detailed above for the initial feature identification process.

Feature Identification

The hillshade layers that had been generated were systematically analysed for potential archaeological features, working from north to south and west to east. This was achieved by working through each of the hillshade and Sky View Factor layers individually. The shapefile layers containing both the HER and scheduled monument data were enabled to prevent re-identification of an already recorded archaeological feature.

Once the areas of ridge and furrow within the study area had been identified as part of the LiDAR analysis, the hillshade plots that contained the clearest representations of the different elements were combined using varying transparencies to produce figures contained in this report.

Profiles

Profiles were generated with ARCGIS from the DTM data using the 3d Analyst tool, Interpolate line, choosing the profile line and Profile Graph options.

Images were processed in Standard Raster image and CAD packages.

6. Results (Figure 10 and Figure 12)

The site was visited on 26/3/2018 and the study area walked over. A number of anomalies identified within woodland to the immediate north-east of the airfield were positively identified as vehicle testing tracks.

- Preservation of surface features across the area is poor.
- Ridge and furrow earthworks can be identified in the north of the area immediately south of Fenns Lane (Figure 7, A)
- Immediately outside the proposed area on the east side, two parallel positive linear features up to 150mm in depth and 160m in length and 30m apart, are aligned with the southeast-northwest airstrip, and may be an extension of the strip (Figure 7, Figure 10, B)
- A slight bank feature in the north of the area is probably a post-medieval field boundary as it is represented by a line of trees in the 1st edition mapping (Figure 10, C).
- To the north of Fenn Lanes, a line of poorly defined negative anomalies at 95-100m centres can be identified in some of the data plots. These cannot be matched with the location of ponds in historic mapping (Figure 12, D).
- A second north-south bank feature less than 100mm in depth and broadly parallel with the bank at ‘C’ can be traced in the south-east of the northern area (Figure 10, E).
- Immediately adjacent with the possible bank feature are two poorly defined negative features that cannot be matched with the location of ponds on historic mapping (Figure 12, E).
- An area of disturbance can be identified in the area of buildings thought to be in military use and related to the airfield, to the immediate north of ‘The Mount’ (Figure 10, F and Figure 14) and also in the vicinity of farm buildings recorded in the 1st edition mapping (Figure 10, G).
- Various paths and tracks can be traced that be identified in other sources and are of 19th or 20th Century date (Figure 10, H, I, J).
- The area of woodland ‘Ashpole Spinney’ increases in its size following 1st edition mapping (Figure 16)

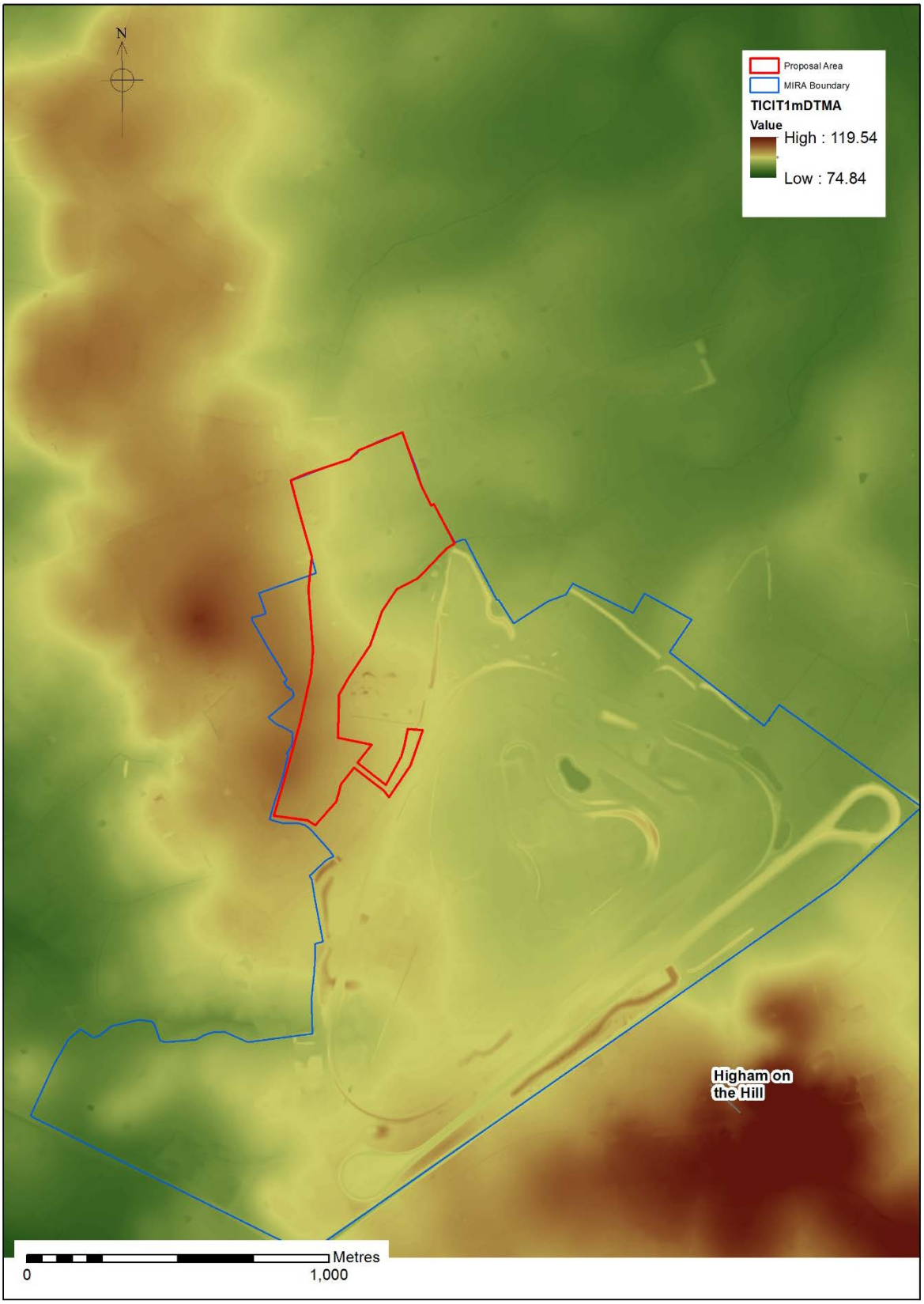

Figure 5: Digital Elevation Model generated from 1m DTM (filtered) date

Lidar source Environment Agency 2018

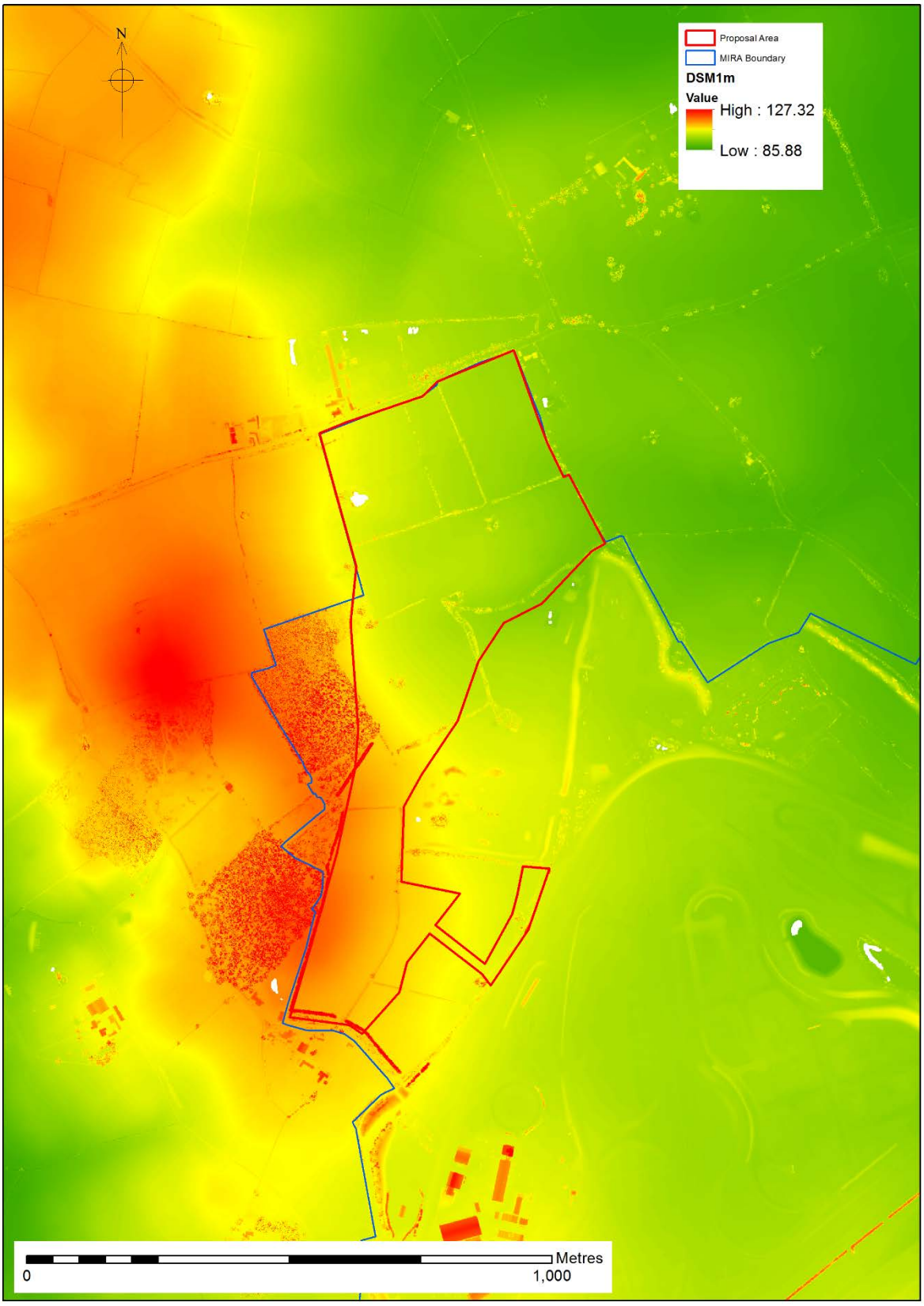

Figure 6 Digital Elevation Model of unfiltered 1m DSM aerial Lidar

Lidar source Environment Agency 2018

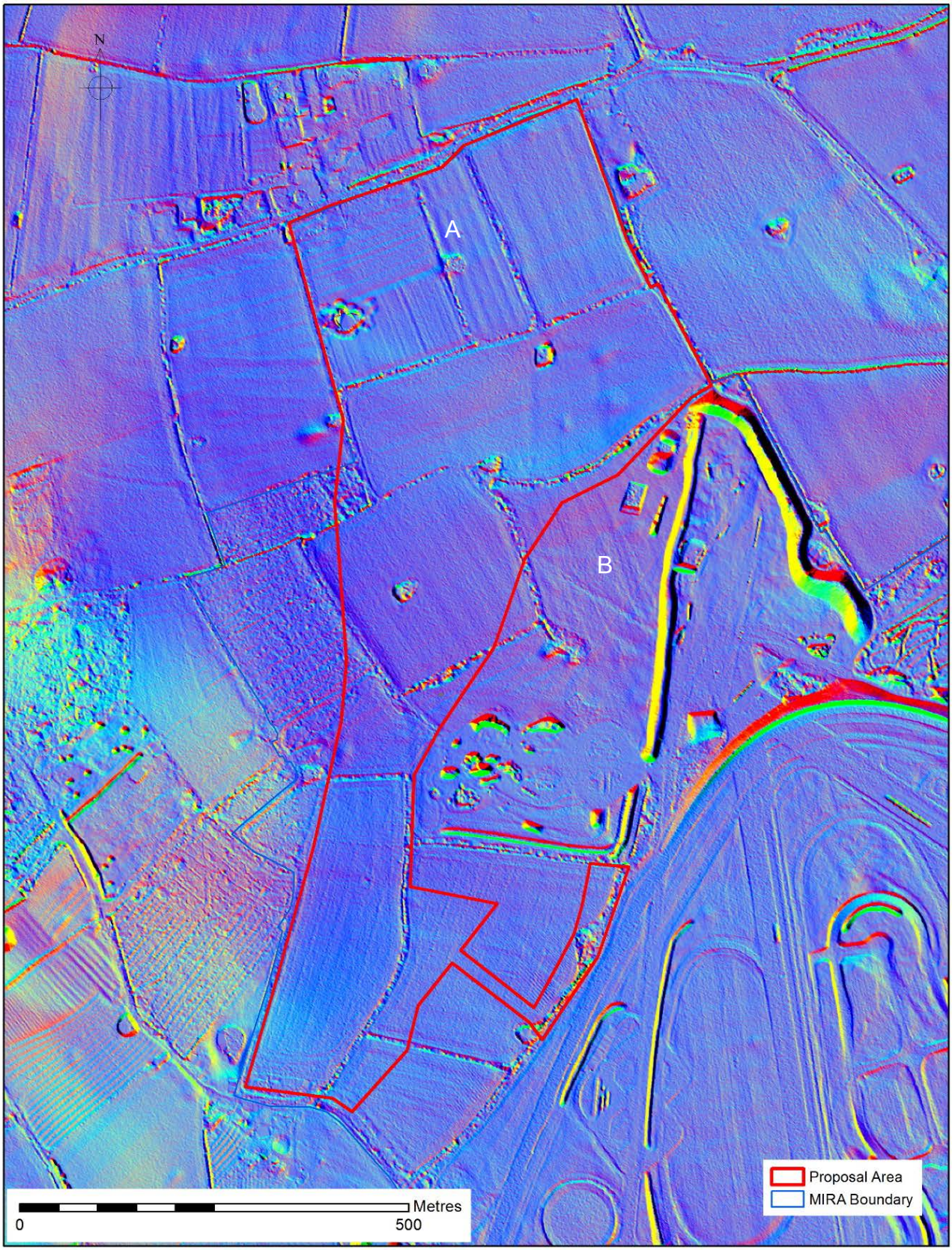

Figure 7: Results of LiDAR assessment showing Principal Component Analysis plot of 1m DTM data.

Lidar source Environment Agency 2018

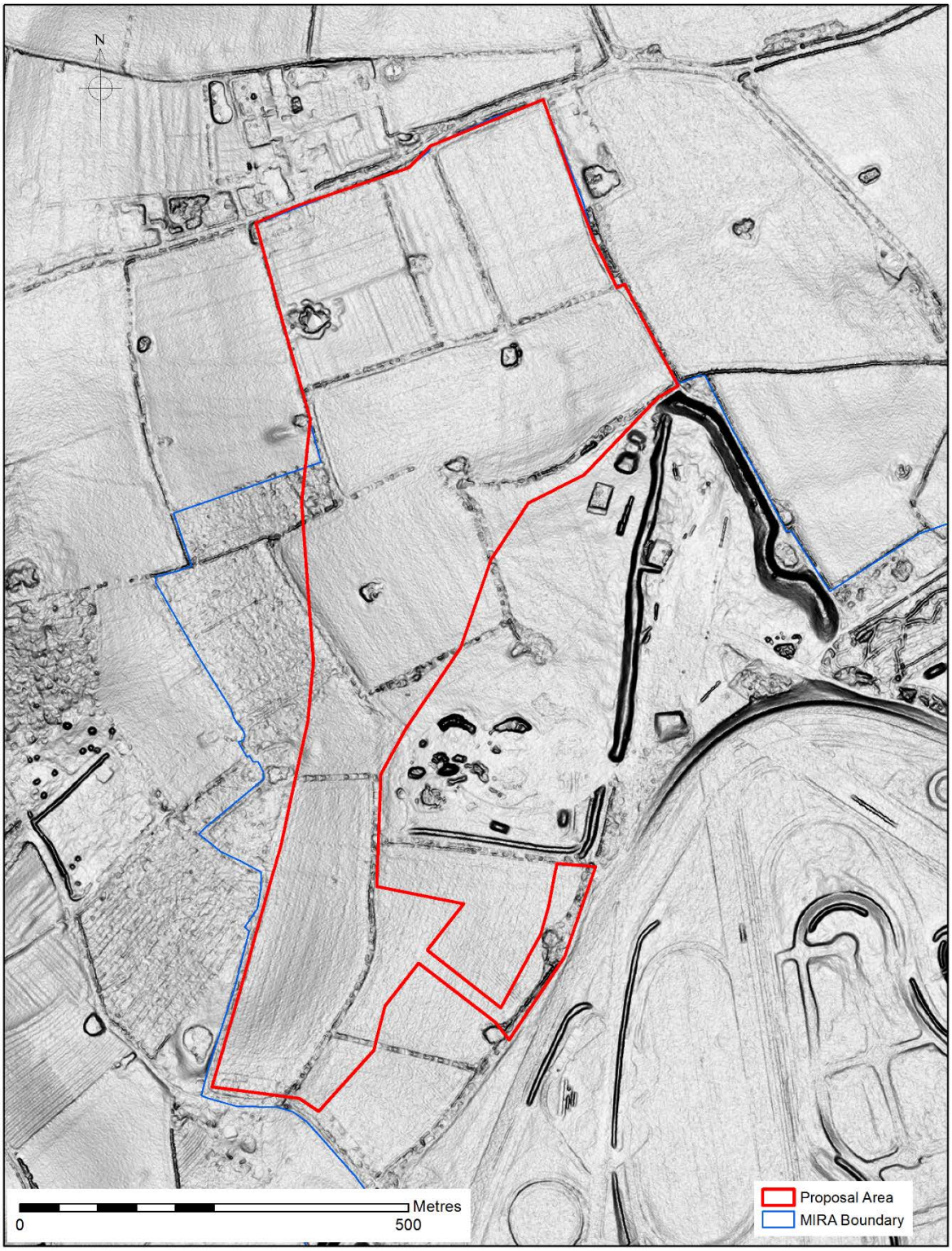

Figure 8: Results of LiDAR assessment showing Slope Analysis plot of 1m DTM data.

Lidar source Environment Agency 2018

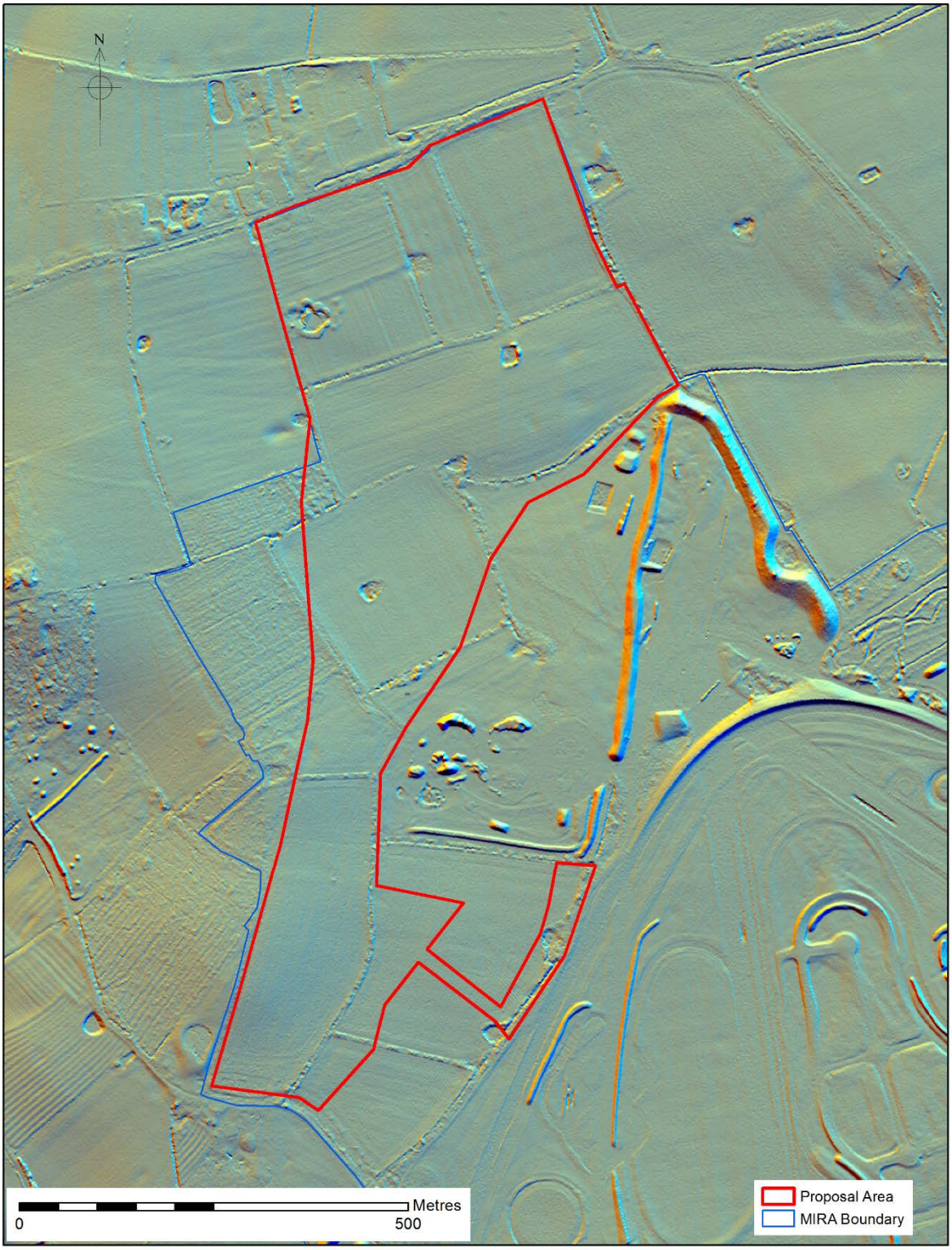

Figure 9: Results of LiDAR assessment showing Multi Hillshade Analysis plot of 1m DTM data.

Lidar source Environment Agency 2018

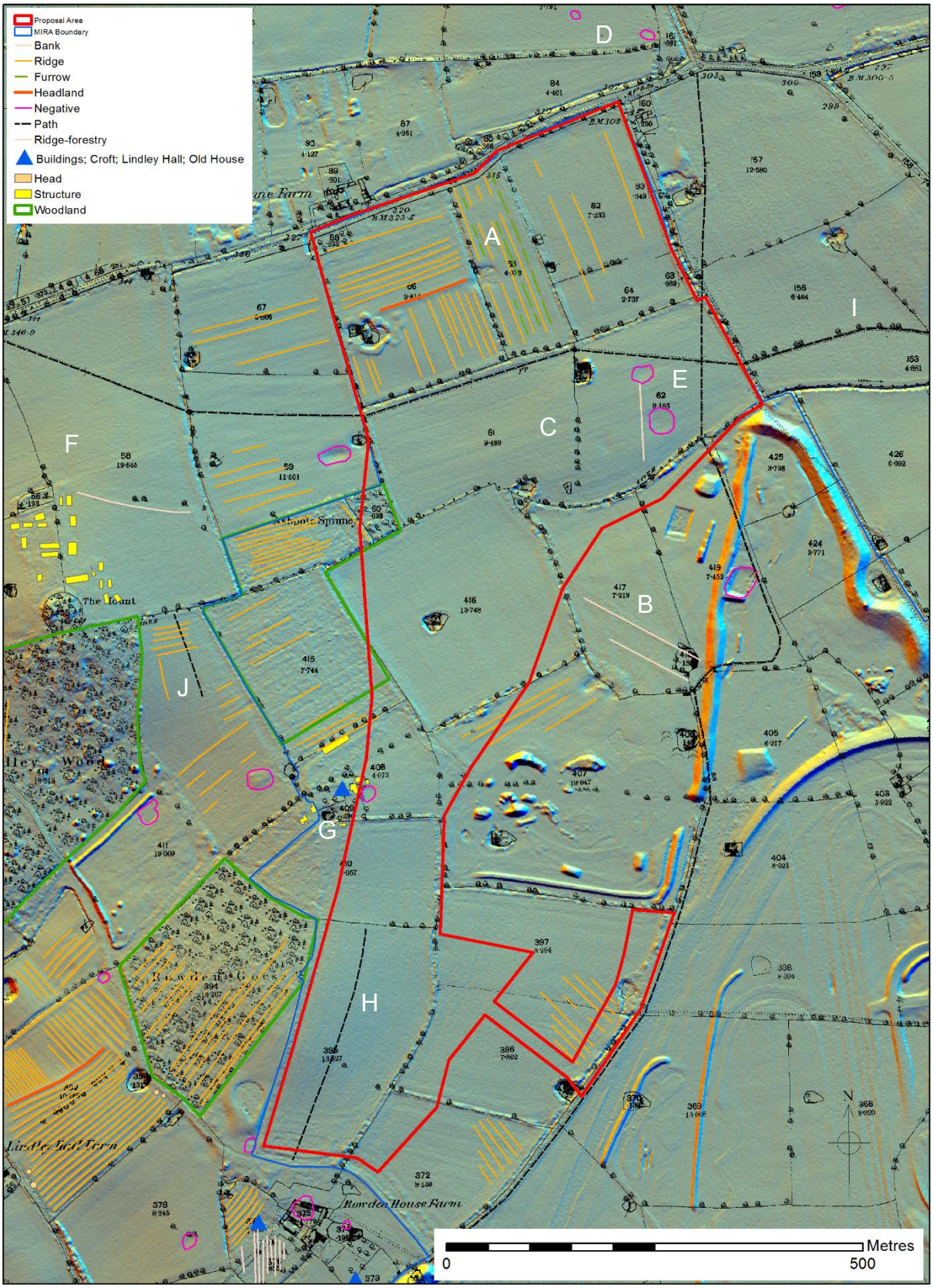

Figure 10: Results of LiDAR assessment showing Multi Hillshade Analysis plot of 1m DTM data along with interpretations, and 1st edition Ordnance Survey mapping (1888) and transcription of structures visible around 'The Mount' in the west of the area, in a 1944 Aerial Photograph. Lidar source Environment Agency 2018

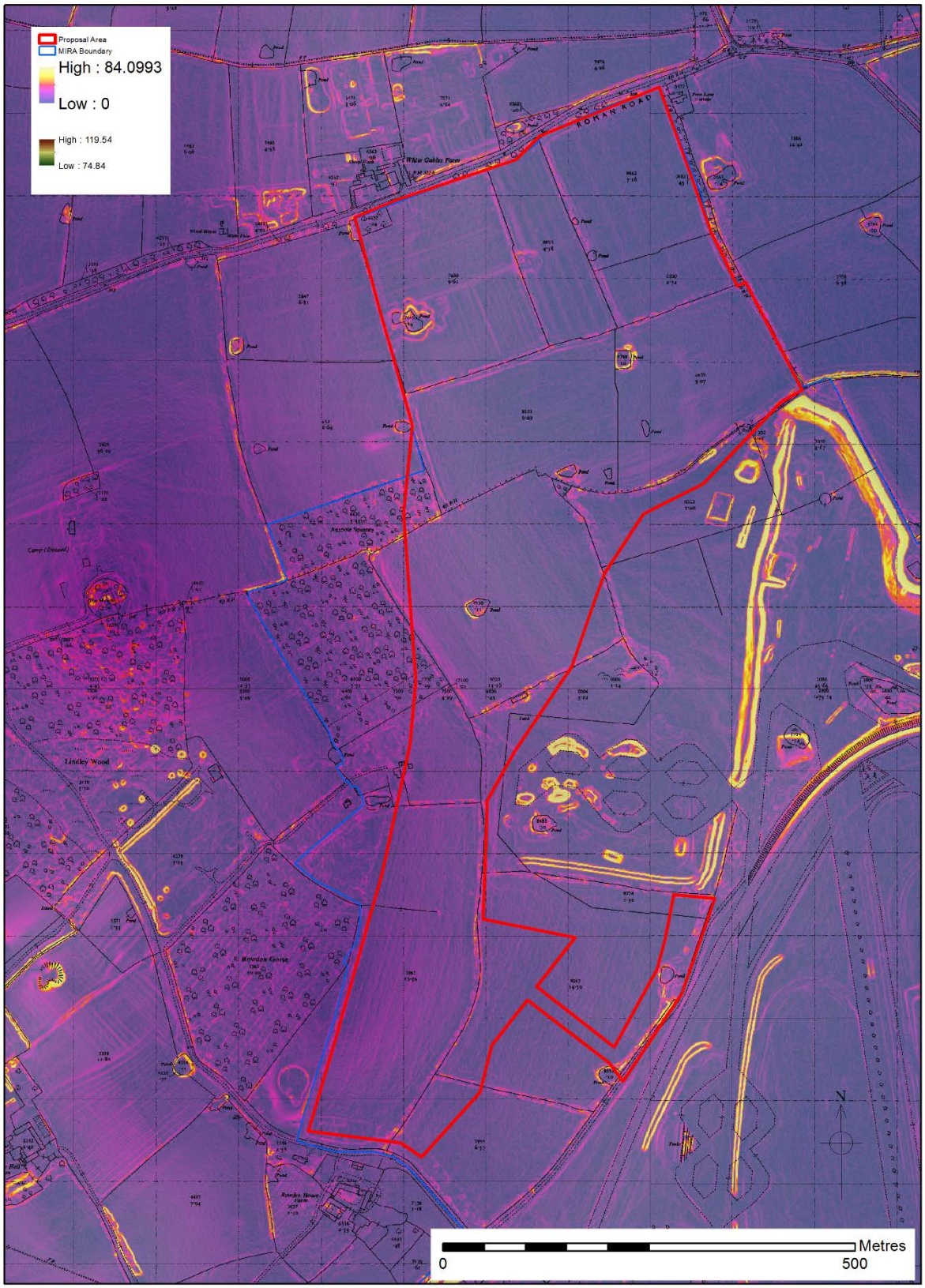

Figure 11: Results of Lidar assessment showing Slope analysis of DTM overlying DTM Digital elevation model, alongwith area of alluvial sediments.

Lidar source Environment Agency 2018

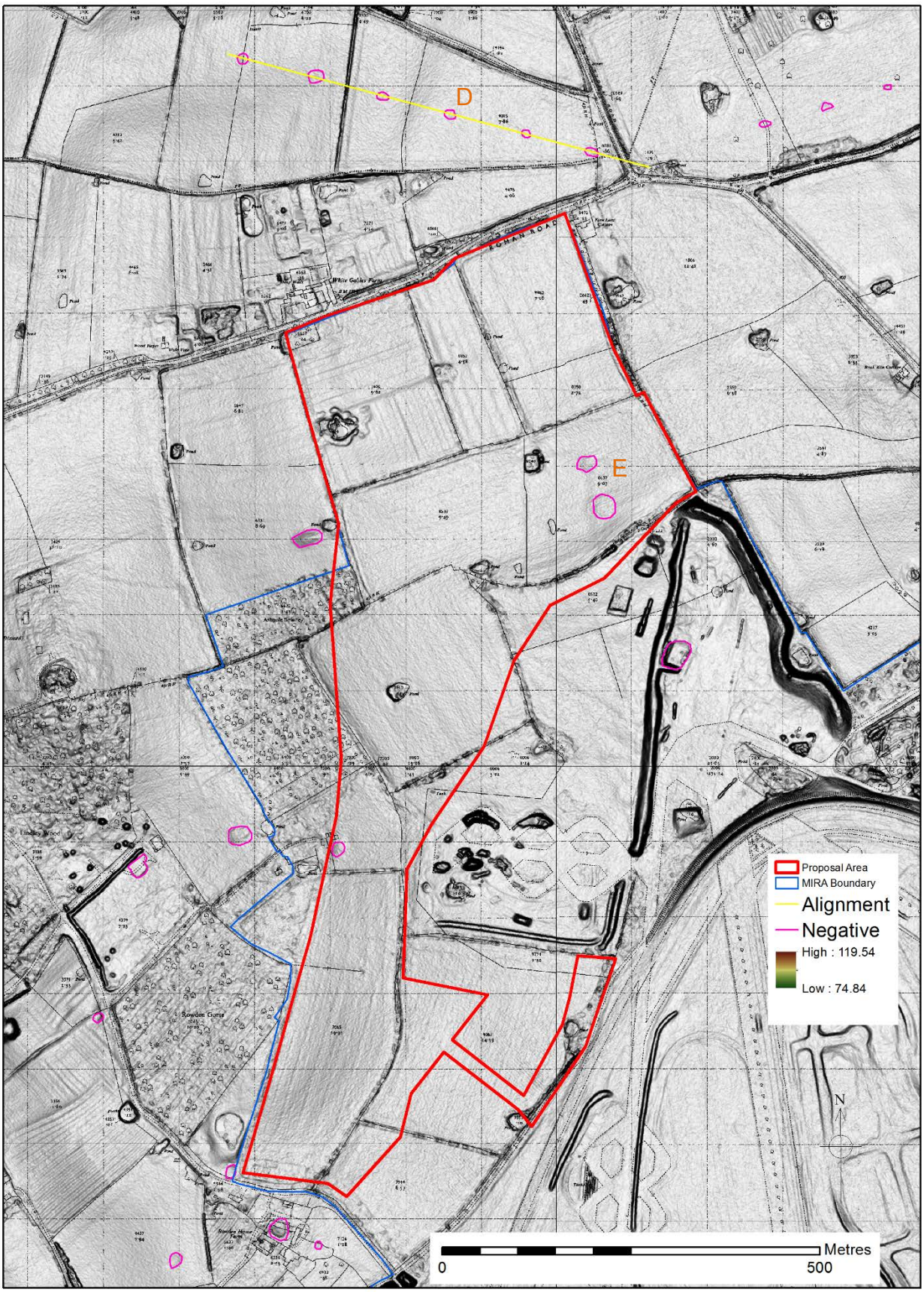

Figure 12: Results of LiDAR analysis showing shallow slope plot of 1m DTM and negative features that are not present in historic mapping

Lidar source Environment Agency 2018

Figure 13: 1944 Aerial Photograph alongwith Geophysics interpretation and LiDAR interpretation.

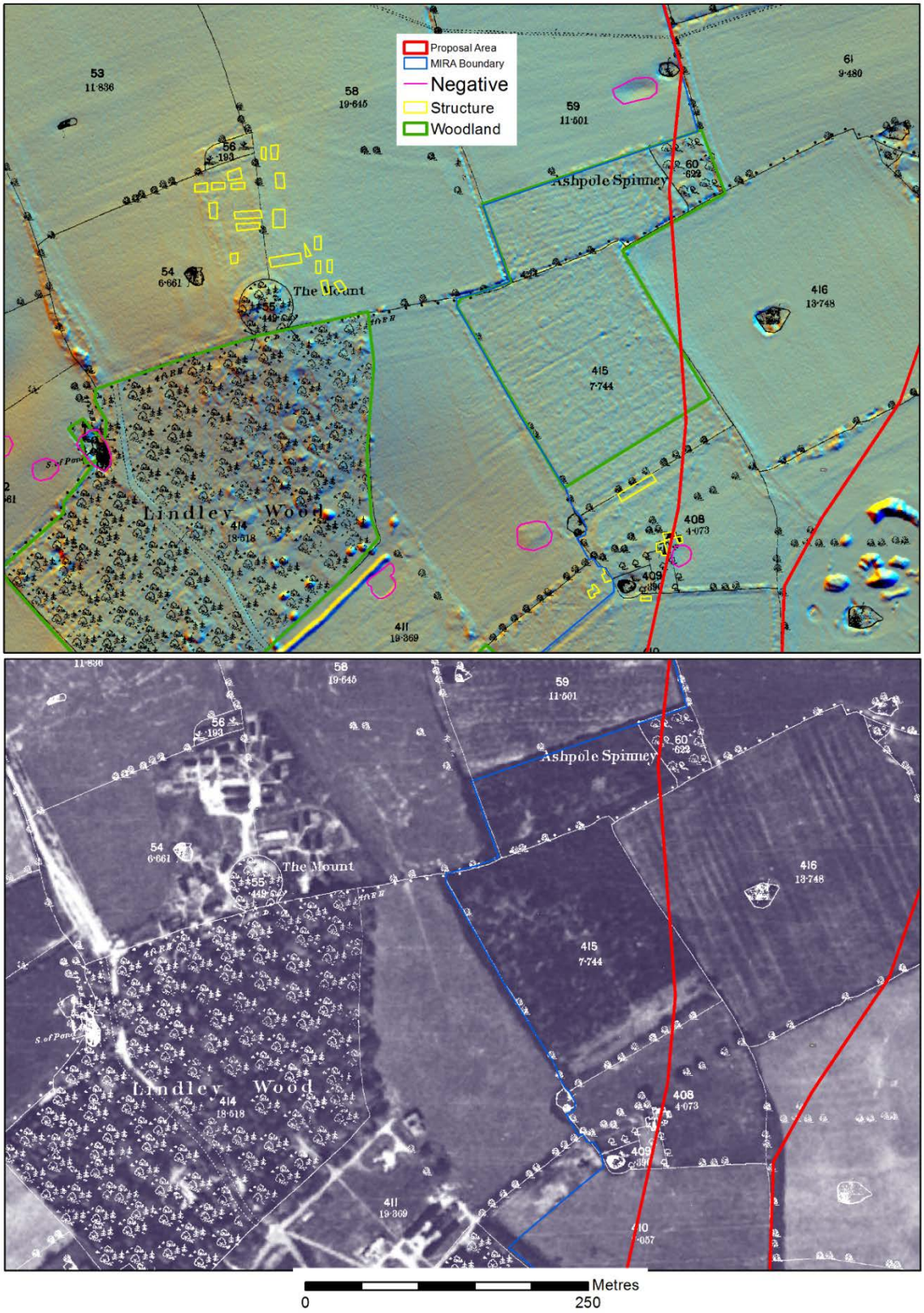

Figure 14: Detail of probable barracks visible in 1944 aerial photograph to west of the proposed area to the north of 'The Mount' (MLE3297), and buildings recorded in the 1888 1st edition Ordnance Survey in the west of the proposed area.

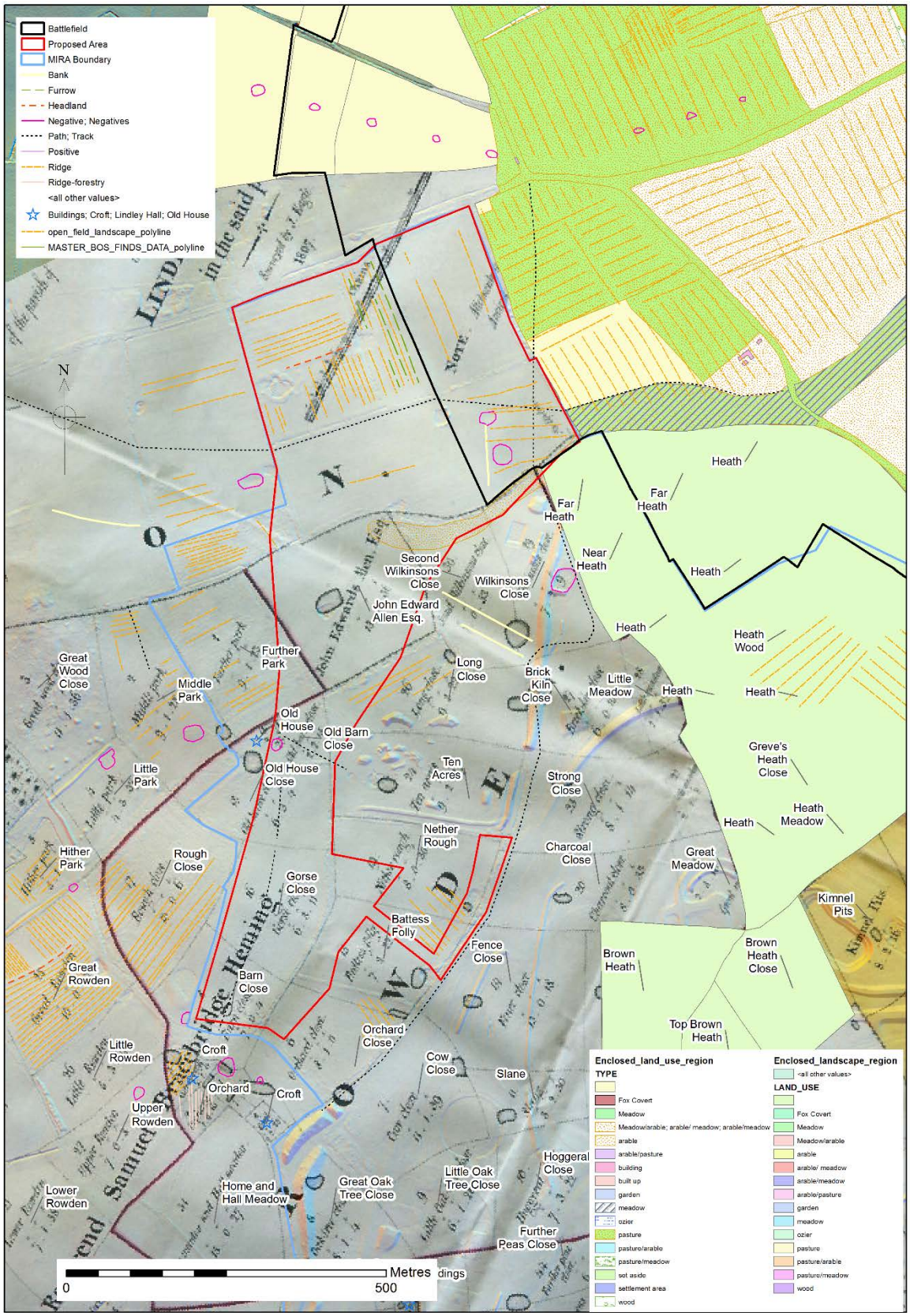

Figure 15: Composite image showing Eagle's map with field names, landuse datasets from the Bosworth Battlefield project for the area to the east of the proposed area, and possible LiDAR features, above a shade plot of the LiDAR DTM.

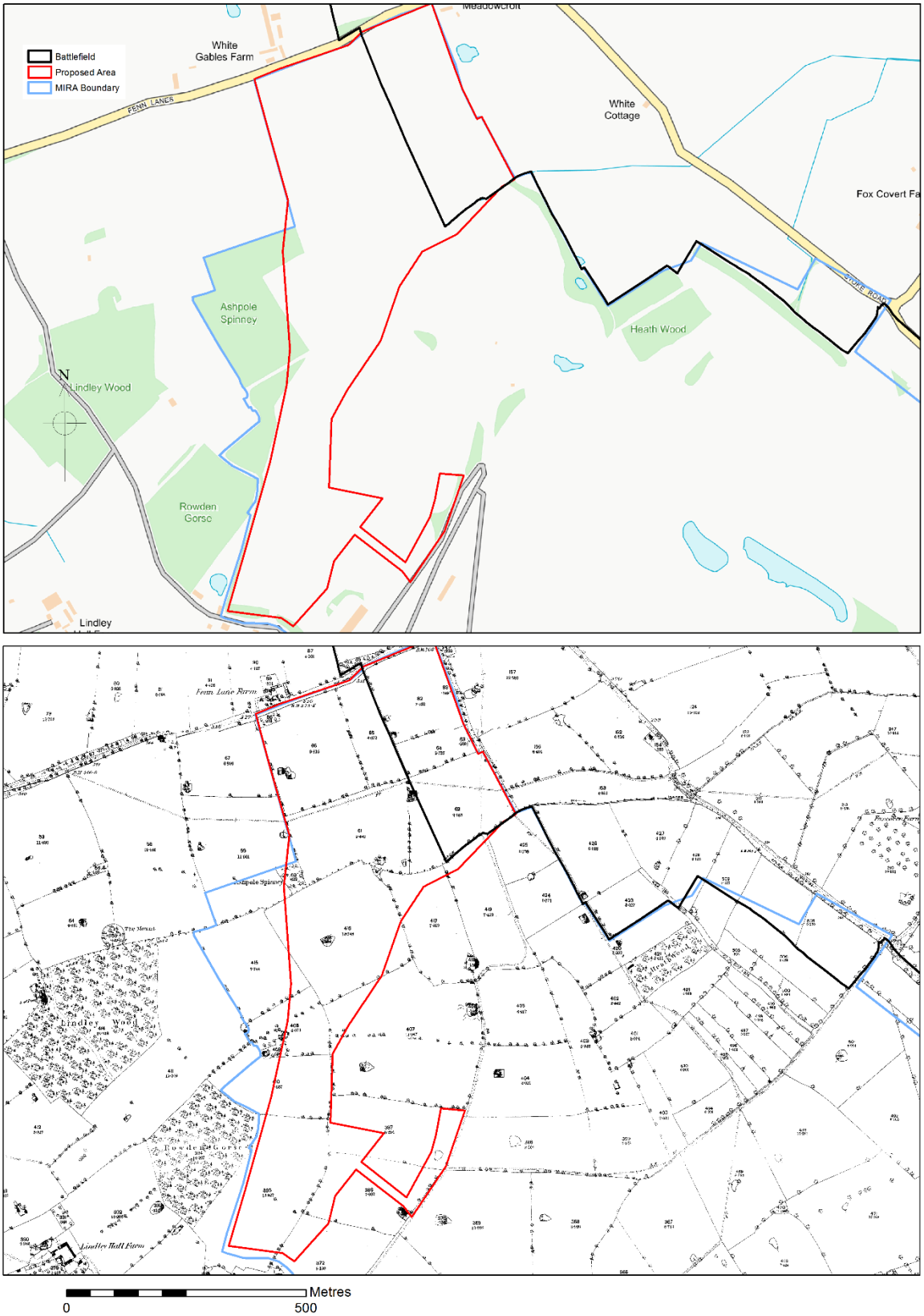

Figure 16: Current mapping above with 1st edition Ordnance Survey below showing Ashpole Spinney has been extended south from a much smaller area of woodland in the later 19th or earlier 20th Century.

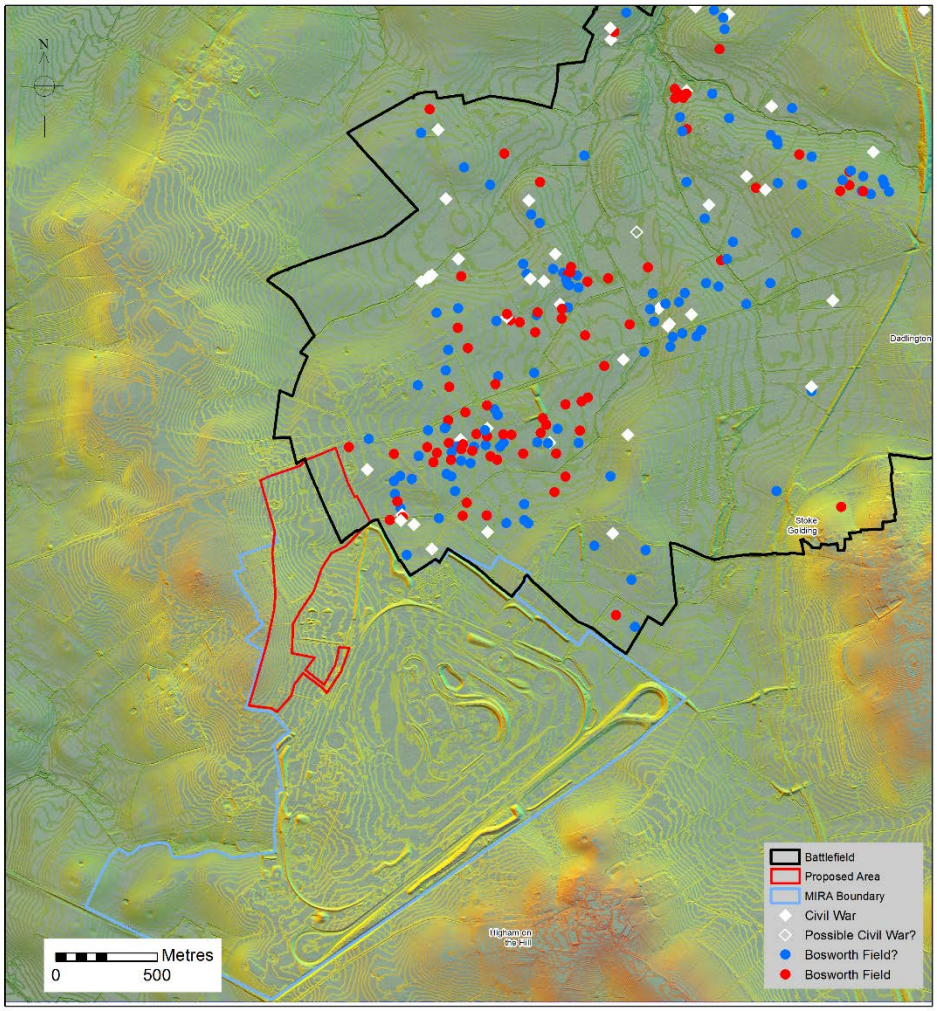

Figure 17: 1m coloured contour plot generated from 1m DTM LiDAR of the proposal area in relation to the registered battlefield and previous finds of archaeological material relating to the Battle of Bosworth 1485, and a Civil War skirmish. Contours span range between 75m 120m aOD.

Lidar source Environment Agency 2018
Bosworth Battlefield Project data from ADS: https://doi.org/10.5284/1019859

Historic Land Use Figure 15

Eagle's map of 1807 has been georeferenced into a GIS with the LiDAR data and the field names have been transcribed. Field names can be identified for all the proposed area bar that which falls in Witherley Parish as the 1807 did not extend into this area.

The Historic Land-use data created as part of the Bosworth Battlefield project and archived with the Archaeological Data Service (https://doi.org/10.5284/1019859) has been downloaded and is shown here.

To the east of the proposed area in the north lies land that is cultivated with strip fields at some stage: the finding of ridge and furrow across the proposed area to the west of this, to the immediate south of Fenns Lane is consistent with this data, and it is likely that all the fields in this area adjoining Fenns Lane on the south side, were in use for arable cultivation at some stage.

The historic use of the land to the north and south of the stream that bisects the area is much less clear. To the east are areas of meadow/pasture/uncultivated land. No strong signatures for strip cultivation have been identified in the adjacent part of the proposed area although there is suggestion of surviving strips to the immediate north of the stream/alluvial deposits in the 1944 aerial photo (Figure 13).

A fieldwalking survey has been undertaken across the available fields within the proposed area (Gonzalez Rodriguez 2018) during which very small quantities of medieval pottery were recovered.

Heath is identified in a number of field names to the east of the proposed area and across the central part of the MIRA site (Figure 15). This heathland has been shown to continue to the north-east and to extend to Fen Hole (Foard and Curry, 2013, Fig 8.2). Skirting the northern edge of the heath, and in the area of alluvial soils, is Meadow (Foard and Curry, 2013, Fig 8.2 and Figure 15).

Parkland (Little Park, Middle Park, and Further Park) is evident from field names to the west of the proposed area in the north. Presumably these areas were used as Deer Parks and were part of Lindley Hall, and did not fall within the Open Fields of any of the surrounding villages/townships.

To the east and south of the parkland, the field names indicate small enclosures – Old Barn Close, Old House Close, Long Close with other Closes to the east of the proposed area indicating 'Brick Kiln Close' and 'Charcoal Close'.

7. Discussion.

The landscape is broadly flat although the ground rises to the west, and a clear north-south ridge lies outside of the proposed area.

Preservation of earthwork features across the proposed area is poor. Features that can be identified include

A: the vestiges of medieval ridge and furrow in the north of the area (Figure 7 and Figure 10).

B: Possible traces of the airfield to the east of the proposed area, although these do not continue into it (Figure 7 and also Figure 13, 3)

C: An eroded bank feature in the south-west of the northern area is probably a post-medieval field boundary.

D: The area in general is notable for the number of ponds most of which can be identified in historic mapping. A line of six poorly defined negative features at between 95 and 100m spacings can be identified in the fields to the north of Fenn Lanes (Figure 12) which do not relate to mapped ponds. It is tentatively suggested that these may be the result of WW2 bombing, although a recent report addressing the potential for unexploded ordnance in the proposed area concludes the presence of unexploded ordnance within the proposed area as unlikely, as 'no available evidence indicates any bomb damage within the site or its immediate surrounds' (1st Line Defence, 2018, pIII).

E: Two similar anomalies are interpreted within the proposed area in the southeast of the northern area (Figure 12). These also correspond with anomalies in the geophysical data, and dark marks in the 1944 aerial photograph (Figure 13). The features may be ponds that have not been recorded in the mapping consulted or may be bomb craters.

F: From a 1944 Aerial photograph, and the 1964 Ordnance Survey Historic Mapping, a series of buildings, probably barracks, are visible to the west of the proposed area, to the north of 'The Mount'.

G: The current area of Ashpole Spinney is created subsequent to the 1888 first edition Ordnance Survey mapping.

H, I, J: A number of trackways and paths can be identified. These can all be related to historic documentary/photographic sources.

Relationship with the 1485 Battlefield

The area lies at the southwestern end of the registered battlefield. There is a topographic change from lower lying land to the east, to higher ground to the west which forms a north-south ridge: this higher ground would surely have provided a vantage point over the battlefield presumably to the advantage of Henry whose army approached from the west (Foard and Curry, Fig 8.1, p180).

A mound has been constructed on the apex of the ridge and is assumed to be a post-medieval feature within Lindley Park.

Some subtle breaks of slope within the proposed area can be identified by widening of contours.

8. Conclusion

Assessment of 1m aerial LiDAR elevation data using a number of analytical techniques has demonstrated that the preservation of earthwork features in the proposed area is generally poor. Linear features that can be identified can be traced in historic mapping or aerial photographs and shown to be either previous field boundaries, or tracks.

Medieval ridge and furrow can be traced in the north of the proposed area and the location of these furlongs is broadly consistent with the medieval land-use researched for the Bosworth Battlefield Project. Medieval and early Post Medieval land-use in the central part of the proposed area is unclear: to the immediate east is heath and some meadow, and to the immediate west, enclosed park land. The lack of identifiable ridge and furrow in this central area, and a low level of finds of medieval pottery from a fieldwalking survey (Gonzalez

Rodriquez 2018) might indicate that this area is not cultivated land in the medieval period and it extends the uncultivated areas of meadow and or heathland known to have existed to the east.

The area is striking for the number of ponds which can found serving most fields, the majority of which are recorded in historic mapping.

Two slight depressions in the southeast of the northern area are of unknown origin. These correspond with areas of disturbance in the geophysical survey interpretation, and also two marks in the 1944 aerial photograph.

Traces of bank features some 30m apart, aligned with the southeast-northwest landing strip are identified in the LiDAR and in the geophysical survey to the east of the proposed area. These are interpreted as part of the airfield's layout.

The broad topography is flat although there is a general slope down to the east. On the western edge of the proposed area the slope is more marked, with elevated ground forming a low broad north-south ridge to the west of the proposed area.

OASIS data entry

PROJECT DETAILS	**Oasis No**	universi1-314787		
	Project Name	Land off MIRA, Higham on the Hill, Leicestershire		
	Start/end dates of field work	10-03-2018 - 19-04-2018		
	Previous/Future Work	Yes / Not known		
	Project Type	Earthwork survey /LiDAR Study		
	Site Status	None		
	Current Land Use	Pasture/Arable		
	Monument Type/Period	Ridge and Furrow/Medieval; Bank/Unknown		
	Significant Finds/Period	N/A		
	Development Type	Industrial		
	Reason for Investigation	NPPF		
	Position in the Planning Process	Pre Planning		
	Planning Ref.			
PROJECT LOCATION	**Site Address/Postcode**	Land off MIRA, Higham on the Hill, Leicestershire		
	Study Area	33 hectare		
	Site Coordinates	SP 370 971		
	Height OD	75-120m OD		
PROJECT CREATORS	**Organisation**	ULAS		
	Project Brief Originator	Local Planning Authority (LCC)		
	Project Design Originator	ULAS		
	Project Manager	Matthew Beamish		
	Project Director/Supervisor	Matthew Beamish		
	Sponsor/Funding Body	Developer / Horiba MIRA Ltd		
PROJECT ARCHIVE		**Physical**	**Digital**	**Paper**
	Recipient	NA	NA	NA
	ID (Acc. No.)			XA512016
	Contents			This report
PROJECT BIBLIOGRAPHY	**Type**	Grey Literature (unpublished)		
	Title	An archaeological earthwork survey by LiDAR study for land off MIRA, Higham on the Hill, Leicestershire.		
	Author	Beamish, M.		
	Other bibliographic details	ULAS Report No 2018-054		
	Date	2018		
	Publisher/Place	University of Leicester Archaeological Services / University of Leicester		
	Description	Developer Report A4 pdf		

10. Publication

A summary of the work will be submitted for publication in the local archaeological journal *Transactions of the Leicestershire Archaeological and Historical Society* in due course. The report has been added to the Archaeology Data Service's (ADS) Online Access to the Index of Archaeological Investigations (OASIS) database held by the University of York.

11. Bibliography

1st Line Defence	Detailed Unexploded Ordnance (UXO) Risk Assessment. Report DA5977-00
Bewley, R.H., Crutchley, S.P. & Shell, C.A., 2005	'New light on an ancient landscape: LiDAR survey in the Stonehenge World Heritage Site'. *Antiquity* **79** 636-647.
CIfA 2014a,	*Code of Conduct*. The Chartered Institute for Archaeologists, December 2014.
CIfA 2014b,	*Standard and Guidance for Archaeological Excavation*. The Chartered Institute for Archaeologists, December 2014.
CIfA 2014c,	*Standard and Guidance for the creation, compilation, transfer and deposition of archaeological archives*. The Chartered Institute for Archaeologists, December 2014.
Foard, G. & Curry, A., 2013	*Bosworth 1485. A Battlefield Rediscovered* Oxbow. Oxford...
Gater, J. 2018	*Geophysical Survey Report, TIC-IT, MIRA, Higham on the Hill, Leicestershire. SUMO Report 12368.*
Gonzalez Rodriquez, M 2018	*An Archaeological Fieldwalking Survey for Land at MIRA-TICIT development proposal Higham on the Hill Parish and Witherley Parish, Leicestershire.* ULAS Report 2018-049
Hannon, N., Hyam, A., and Beamish M., 2014	*An Archaeological LiDAR study and Walkover Survey at Bradgate Park, Newtown Linford, Leicestershire.* ULAS Report 2014-076
Hunt, L. 2018	An archaeological desk-based assessment for the TIC-IT Project, MIRA, Higham-on-the-Hill, Leicestershire. (SP 37011 97102) ULAS Report 2018-29
Knight, D. et al. 2012	*East Midlands Heritage: An updated research agenda and strategy for the Historic Environment of the East Midlands.*
Lewis C., 2006	'The Medieval Period 850-1500' in N. J. Cooper (ed) 2006 185-216.
Vince C., 2006	'The Anglo-Saxon Period (c 400-850)' in N. J. Cooper (ed) 2006 161-184
Zakšek, K., Oštir, K. & Kokalj, Ž . 2011	Sky View Factor as a Relief Visualisation Technique. *Remote Sensing* 2011(3), 398 415.

11. Acknowledgements

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27/03/2018
Revised 18/4/2018

12. Appendix

LiDAR tiles processed for this report:

OBJECTID	FILENAME	TILENAME	DATE_FLOWN	PERCENT_CO	POLYGON_ID	RESOLUTION
120540	D0161103	SP3496	4- 6 Feb 2013	99.99	P_8705	1
120541	D0161104	SP3498	4- 6 Feb 2013	99.99	P_8704	1
120552	D0161115	SP3696	4- 6 Feb 2013	99.9	P_8705	1
120553	D0161116	SP3698	4- 6 Feb 2013	99.95	P_8704	1
120566	D0161129	SP3896	4- 6 Feb 2013	98.91	P_8704	1
120567	D0161130	SP3898	4- 6 Feb 2013	99.83	P_8704	1

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