

**Land north of White House Farm, Burbage,
Leicestershire –
Archaeological Desk-Based Assessment
Mather Jamie Ltd**

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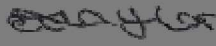
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Executive Summary

Ecus Ltd was commissioned by Mather Jamie Ltd in July 2019 to prepare an archaeological desk-based assessment to inform a planning application for residential development on land north of White Farm House in Burbage, Leicestershire (the Site).

To the north of the Site an area of prehistoric and Romano-British archaeology activity has been recently excavated. Therefore to inform this archaeological assessment and better understand the archaeological potential of the Site a geophysical survey was commissioned and undertaken by SUMO Geophysics Ltd in November 2019. This survey confirmed the extensive activity observed to the north of the Site does not continue into the Site and no anomalies of definite archaeological interest were identified. The presence of ridge and furrow anomalies in the eastern part of the Site confirms an agricultural use of the site in the past.

Development within the Site will impact upon remnant ridge and furrow earthworks identified within the Site. Recorded during geophysical survey, the remains are not considered to be of a level of significance that would warrant their preservation in situ.

This desk based assessment and geophysical survey provides a proportionate assessment to understand the archaeological potential of the Site so to inform and determine the planning application.

1. Introduction

1.1 Project Background

- 1.1.1 Ecus Ltd was commissioned by Mather Jamie Ltd in July 2019 to prepare an archaeological desk-based assessment to inform a planning application for residential development on land north of White Farm House, Burbage, Leicestershire (hereafter 'the Site'). The Site is situated at National Grid Co-ordinates 444245, 291867 (Figure 1).

1.2 The Site

- 1.2.1 Situated to the west of Workhouse Lane on the south eastern periphery of the village of Burbage, the Site comprises an agricultural field currently under pasture (Plate 1). The Site occupies an area of approximately 2 ha and is enclosed by vegetation and bounded to the north and north west by modern residential development beyond which lies the historic settlement core. Whitehouse Farm lies immediately adjacent to the southern boundary of the Site, and agricultural fields lie to the south and west of the Site. The Site is relatively gently slopes from approximately 110 m above Ordnance Datum (aOD) in the south west to approximately 117m aOD in the north east.



Plate 1. View across the Site towards the south west

- 1.2.2 The underlying geology of the Site is recorded as mudstone of the Mercia Mudstone Group, a sedimentary bedrock formed in the Triassic period, approximately 252 to 201 million years ago. The majority of the Site contains superficial deposits of sand and gravel, with diamicton in the north and south west (BGS 2020).

1.3 Aims and Objectives

- 1.3.1 The purpose of this Archaeological Desk-Based Assessment is to determine, as far as is reasonably possible from existing records and observations, an understanding of the archaeological resource within and surrounding the Site in order to formulate:

- an assessment of the potential for heritage assets to survive within the area of study;
- an assessment of the significance of the known or predicted heritage assets considering their interests; and
- strategies for further evaluation intrusive or non-intrusive, where the nature, extent or significance of the resource is not sufficiently well defined.

1.3.2 It should be noted that the scope of this report is confined to below-ground archaeological remains and does not address any potential impacts of the proposed redevelopment on surrounding designated heritage assets.

1.4 Regulatory and Policy Context

1.4.1 There is national legislation and guidance relating to the protection of, and development on, or near, important archaeological sites or historical buildings within planning regulations as defined under the provisions of the Town and Country Planning Act 1990. In addition, local authorities are responsible for the protection of the historic environment within the planning system. Further detail of the relevant, legislation, policy and guidance is provided in Appendix 1.

2. Methodology

2.1 Standards

2.1.1 This assessment is undertaken in accordance with:

- The Chartered Institute for Archaeologists' Standard and Guidance for historic environment desk based assessment (CIfA, 2017).
- Historic Environment (revised July 2019), published by the Ministry of Housing, Communities and Local Government, providing advice on enhancing and conserving the historic environment ; and
- Historic England's Historic Environment Good Practice Advice in Planning Notes (2015a-b, 2017); and
- Historic England Advice Note, Statements of Heritage Significance – Analysing Significance in Heritage Assets (2019).

2.2 Scope of Assessment

2.2.1 Baseline conditions are established through consideration of recorded heritage assets within a 1 km study area around the Site and desk-based review of existing sources of publicly accessible sources of primary and synthesised information, comprising:

- The Leicestershire Historic Environment Record (LHER), comprising a database of all recorded archaeological sites, find-spots, and archaeological events within the county;
- National heritage datasets including The National Heritage List for England (NHLE), Englands Places, PastScape, Viewfinder, National Record for Historic Environment Excavation Index, Parks and Gardens UK;
- LiDAR imagery available from the Environment Agency;
- Historic manuscripts and maps held at the Records Office for Leicestershire, Leicester and Rutland; and
- Relevant primary and secondary sources including published and unpublished archaeological reports relating to excavations and observations in the area around the site were studied.

2.2.2 A site visit was undertaken during July 2019 in order to assess the general character of the Site, to identify heritage assets not identified through desk-based review and assess possible factors which may affect the survival or condition of known or potential assets

2.2.3 A bibliography of documentary, archive, and cartographic sources consulted is included in the References section of this report.

2.3 Assumptions and Limitations

2.3.1 This report is compiled using secondary information derived from a variety of sources, only some have been directly examined. The assumption is made that this data as well as that derived from other secondary sources, is reasonably accurate. In addition, the records held by LHER represent a record of a wide range of information derived from historical sources and previous archaeological discoveries and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

2.3.2 Archival material relating to the Site and study area was consulted in person at the

Records Office for Leicestershire, Leicester and Rutland. Whilst there may be other material held in private collections, local repositories and the National Archives, it was not possible to view these as part of the assessment.

- 2.3.3 A Site visit was undertaken as part of this assessment to identify any potential archaeological remains. Access to the Site was restricted with views afforded from along Workhouse Lane to the east. Access was later afforded for the geophysical survey undertaken in November 2019 which permitted observations from the geophysical team.

2.4 Assessment of Significance

- 2.4.1 The National Planning Policy Framework recommends that, in determining applications, local planning authorities should require applicants to describe the significance of any heritage assets affected, including any contribution made by their setting (NPPF, 189).
- 2.4.2 The significance of heritage assets is defined in terms of their value to this and future generations because of their heritage interest, deriving not only from their physical presence, but also from their setting. This interest may be archaeological, architectural, artistic or historic (NPPF, Annex 2):
- **Archaeological interest:** derives from the presence or potential for evidence of past human activities worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
 - **Architectural interest:** derives from the architectural design, decoration or craftsmanship of a heritage asset. Architectural interest may also apply to nationally important examples of particular building types and techniques and significant plan forms.
 - **Artistic interest:** derives from interest in the design and general aesthetics of a place. It can arise from conscious design or fortuitously from the way the place has evolved. More specifically, architectural interest is an interest in the art or science of the design, construction, craftsmanship and decoration of buildings and structures of all types. Artistic interest is an interest in other human creative skill, like sculpture.
 - **Historic interest:** derives from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be illustrative or associative. Considers documentation, wider context, regional factors, and group value of the site.
- 2.4.3 The heritage interest of an asset's physical presence is assessed in terms of attributes identified in statutory criteria, general principles for selection (DCMS 2013 and 2018), selection guides published by Historic England, and regional research agendas.
- 2.4.4 The heritage interest of an asset's setting is assessed in accordance with Step 2 of Historic England's The Setting of Heritage Assets (2017), which considers the physical surroundings of the asset (including its relationship with other heritage assets); the way in which the asset is appreciated, and the asset's associations and patterns of use. Attributes of setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral (NPPF, Annex 2).
- 2.4.5 The overall significance of a heritage asset is the sum value of its interest, expressed within this report on a 6-point scale of Very High, High, Medium, Low, Negligible and Unknown using the criteria presented in Table 1.

2.4.6 The contribution of a given site or application area to an asset's significance is assessed in order to provide a basis for assessing the sensitivity of the heritage asset to change within that specific area. The criteria for this assessment are presented in Table 2.

Table 1: Criteria for determining the significance of heritage assets

Heritage Significance	Criteria
Very High	World Heritage Sites and the individual attributes that convey their Outstanding Universal Value, or non-designated heritage assets of demonstrable international heritage interest.
High	Scheduled Monuments, Listed Buildings (Grade I, II*, II), Conservation Areas, Registered Historic Parks and Gardens (Grade I, II*, II), Registered Battlefields, Protect Wreck Site, or non-designated heritage assets of demonstrable national importance due to their heritage interest.
Medium	Locally Listed Buildings and Landscapes, or non-designated heritage assets of demonstrable regional importance due to their heritage interest.
Low	Non-designated heritage assets of demonstrably limited heritage interest.
Negligible	Non-designated heritage asset of very limited heritage interest, typically due to poor preservation, survival or restricted contextual associations.
Unknown	The significance of the heritage asset cannot be ascertained from available evidence.

Table 2: Criteria for valuing the contribution of the Site to the significance of heritage assets

Contribution of Site	Criteria
High Contribution	The site possesses attributes that make a strong positive contribution to the understanding and/or appreciation of the interests that embodies its significance.
Medium Contribution	The site possesses attributes that make some positive contribution to the understanding and/or appreciation of the interests that embodies its significance.
Low Contribution	The site possesses attributes that make little positive contribution to the understanding and/or appreciation of the interests that embodies its significance.
Neutral Contribution	The site does not contribute to the understanding and/or appreciation of the interests that embodies its significance
Negative Contribution	A site detracts from the understanding and/or appreciation of the interests that define the significance of a heritage asset.

3. Historic Environment Baseline

3.1 Introduction

- 3.1.1 The following section identifies known heritage assets that may have the potential to receive effects from the proposed development, compiled from sources listed in Section 3.
- 3.1.2 National List entries are referenced by their NHLE entry number and LHER features are listed by their Heritage Asset (HA) number, detailed in Appendix 2 and depicted in Figure 3.

3.2 Historic Environment Character

- 3.2.1 The character of the landscape within the Site has been assessed as part of the Leicestershire, Leicester and Rutland Historic Landscape Characterisation (HLC) project (Leicestershire County Council 2010). The Historic Landscape Characterisation Project covers an area of 2,606 sq. km and takes in the modern county of Leicestershire (2,083 sq. km) and the unitary authorities of Leicester City (73 sq. km) and Rutland (450 sq. km). There are a total of twelve broad HLC profile types.
- 3.2.2 The Site is located within the type profile “Piecemeal Enclosure” within the broad characterisation of “Fields and Enclosed Lands”. The character of Piecemeal Enclosure is defined as field systems created out of the medieval open fields between farmers consolidating their holdings.
- 3.2.3 Fields and Enclosed Lands account for approximately 77% of the total area characterised across the whole of Leicestershire, Leicester and Rutland. The sub-category of Piecemeal Enclosure is considered to have an occasional occurrence across the Leicestershire, Leicester and Rutland landscape. Despite this, it accounts for the largest area in the Hinckley & Bosworth Borough as it encompasses just under 20% of the Fields and Enclosed Land category.
- 3.2.4 It is considered this profile type has a medium to high potential for the return of archaeological remains. The potential for below ground archaeology is dependent upon previous land use and the agricultural regimes employed on the land since enclosure. Where fields have remained in permanent pasture for a significant period, the potential is likely to be higher, with ridge and furrow potentially overlaying earlier buried remains (Leicestershire County Council 2010: 82).
- 3.2.5 The Site is an area of farmland currently used for pasture. Its eastern extent contains clear traces of ridge and furrow. The western, southern, eastern and the majority of the northern boundary has remained unchanged since the publication of the 1838 Tithe map thereby retained its historic hedgerow.

3.3 Previous archaeological investigations

- 3.3.1 Previous investigations has been carried out within the study area. These included assessments as well as a range of intrusive works, such as watching briefs, evaluations and excavations. All assessments recorded on the HER within the study area are illustrated on Figure 2, recorded in Appendix 2 and the results of these investigations are discussed in further detail in Section 3.6 below.

3.4 Geophysical Survey

- 3.4.1 A geophysical survey was carried out within the Site as part of this assessment in November 2019 by SUMO Geophysics Ltd (Survey Report 16634). Magnetometry survey was carried out over 2 ha of the Site with sufficient access afforded.

- 3.4.2 The survey identified no anomalies of definite archaeological interest, although two curving linear features, which could be of archaeological, agricultural or natural origin, were recorded in the central southern extent of the Site. Evidence of previous agricultural activity was also recorded, with the remains of ridge and furrow present in the east and land drains possibly associated with the pond to the north and spring to the south. Several areas of magnetic disturbance were recorded throughout the Site although these are often characteristic of debris (brick/tile) in the topsoil which is commonly assigned a modern origin.
- 3.4.3 The survey report is attached as Appendix 3 with the results, outlined above, illustrated on Fig No: 03. The results of this investigation are discussed further below and in Section 4.

3.5 LiDAR Data

- 3.5.1 LiDAR data held and supplied by the Environment Agency for the Site was reviewed (Figure 4). The data provided is over five years old as the residential estate to the north of the Site had not yet been constructed on the data.
- 3.5.2 The LiDAR data illustrates surviving ridge and furrow within the eastern portion of the Site, discussed in further detail below, and the remains of former field boundaries altered throughout the twentieth century. Other linear features depicted in the Site are considered to represent modern drains as a result of their distinctive character and appearance. The majority of these features correspond with the geophysical survey results (see Appendix 3; Fig No: 03).

3.6 Archaeological and Historical Baseline

Palaeolithic to Bronze Age (1,000,000 to 700 BC)

- 3.6.1 Whilst evidence relating to the early prehistoric period within the study area is limited, the chance finds of three Palaeolithic handaxes, two choppers and several lithic implements are recorded approximately 1 km south of the Site (**HA1**).
- 3.6.2 As with the Palaeolithic period, evidence of later prehistoric activity is represented largely by flint findspots ranging in date from the Neolithic to the Bronze Age, the closest of which was recorded approximately 140m north west of the Site (**HA2 - HA4**).
- 3.6.3 The onset of the late Neolithic and early Bronze Age is often associated with the establishment of round barrows as the dominant monument type and changes in funerary practice, evidence of which has been recorded during the immediate environs north of the Site (**HA5**). Investigations undertaken by Trent and Peak Archaeology in this area in 2015 recorded a cremation cemetery dating to the middle Bronze Age. The cemetery consisted of twenty one pits comprising both urned and un-urned cremations.

Iron Age (800 BC to 43 AD)

- 3.6.4 The late Bronze Age to early Iron Age represents a period of increasing population growth, technological change and the development of socio-economic complexity. There is evidence within the study area that the landscape was exploited during this period with the immediate environs to the north continuing to be the focus of activity. Subject to several previous archaeological investigations, Iron Age activity is represented by the remains of a possible roundhouse ditch and posthole, suggesting settlement in the area (**HA6**; ULAS 2012 and 2014).
- 3.6.5 Further evidence of Iron Age occupation has been recorded in the study area, with the remains of a pit, posthole and gully approximately 700 m south west of the Site (**HA7**). Trial trenching immediately to the east of this area identified a further two enclosures with a number of linear features, artefactual evidence and human remains. Dating

evidence indicates a period of activity from the late Iron Age to first century AD (**HA8**).

- 3.6.6 Elsewhere the remains of a beehive quern, postulated to be of Iron Age or later date, are recorded approximately 910 m south of the Site (**HA9**).

Romano-British (43 AD to 410)

- 3.6.7 By the time of the Romano-British period the landscape is likely to have been largely agricultural, characterised by dispersed farmsteads, villas and small rural settlements. Major re-organisation of the countryside occurred throughout the first century BC to second century AD, possibly a consequence of the establishment of the Roman road network. Whilst no Roman roads are known to pass through the Site, the route of Watling Street, a Roman road running from Chester to Richborough, is recorded approximately 980 m south west of the Site (**HA10**; Liddle 2006: 1).
- 3.6.8 As with earlier periods, activity continued in the immediate environs north of the Site. Subject to several previous archaeological investigations from the late twentieth century onwards, this area has yielded both evidence of occupation (ditches, gullies and postholes), an agricultural site (field system/stuck enclosures) and extensive artefact assemblages including pottery, clay, animal bone, coins and two brooches (**HA11 to HA14**; ULAS 2012 and 2014; Allen *et al.*, 2015). Despite its close proximity to the farmstead, the recent geophysical survey undertaken within the Site did not record the presence of any such remains within the proposed development area and no evidence was noted during the site visit (SUMO Geophysics Ltd 2019).
- 3.6.9 The immediate environs to the north of the Site appear to have been the focus for settlement during this period, with artefactual evidence within the wider landscape limited to an unconfirmed report of a Roman mosaic approximately 460 m north of the Site (**HA14**). Supposedly discovered in this area in the 1970s no further evidence is known about this find.

Early Medieval (410 to 1066)

- 3.6.10 The archaeology of the early medieval period is of a much reduced character compared to the preceding period. Settlement of fifth to seventh century origin tends to be scattered and based on small hamlets/farmsteads, and as such it is not often that archaeological remains survive. From the seventh century onwards the historical record becomes clearer due to the presence of documentary sources.
- 3.6.11 There is no evidence of early medieval activity within the Site, and limited evidence within the study area comprises the chance finds of a square headed brooch and a sherd of pottery recorded during fieldwalking and metal detecting approximately 150 m north west of the Site (**HA16**). No further details are currently known about these finds.
- 3.6.12 Whilst the LHER records the historic settlement core of Burgage, as illustrated on Figure 3 (**HA15**), with origins in the early medieval period, there is currently no known artefactual evidence to support this.

Medieval (1066 to 1540)

- 3.6.13 Documentary sources first record Burgage in 1043 during the founding of the Abbey of St. Mary at Coventry. Following its foundation the abbey was endowed with approximately thirty manors, including the manor of Burgage (Hinckley and Bosworth Borough Council 2011: 2). Although the precise origins of settlement in the manor are unclear, it was established as a village by the publication of the Domesday Survey in 1086. Situated within the Hundred of Guthlaxton, it comprised twenty four households which equated to a quite large settlement of the time (Palmer and Powell-Smith 2016).
- 3.6.14 During the medieval period settlement is likely to have centred on the Grade II* Listed Parish Church of St Catherine (NHLE: 1295212) located approximately 770 m north of the Site. Evidence of medieval occupation has been recorded both in documentary

sources and artefactual evidence, with the remains of roof tiles and pits discovered during trial trenching approximately 590 m and 650 m north of the Site (**HA 19-20**). A fishpond postulated to be of medieval origin is also recorded approximately 750m north east of the Site (**HA18**).

- 3.6.15 Elsewhere evidence of medieval activity is represented by the chance find of a possible medieval copper alloy cauldron foot discovered during metal detecting approximately 150 m north west of the Site (**HA17**). No further details are known about this findspot or its discovery.

Ridge and Furrow

- 3.6.16 As illustrated on Figure 3 the Site lies outside of the known historic settlement core and formed part of a wider landscape utilised for agricultural activity. During this period a greater emphasis was placed on cultivated crops leading to the establishment of the rotational open three field agricultural system with its characteristic strips of ridge and furrow. This cultivation within open fields became the typical arable system across much of the landscape.
- 3.6.17 The earthworks comprise a series of higher 'ridges' separated by lower 'furrows' created over time through ploughing with oxen teams (plough horses were introduced from around the thirteenth century), with the plough gradually pushing up central ridges at intervals of around 8 m. Oxen teams required a wide turning circle which in turn led to a distinctive long reverse 'S'-shaped layout of the earthworks (Rackham 1986). Ridge and furrow also can have post-medieval origins, although it is often narrower (around 4 m or so), longer and set out in straight lines with improvements to irrigation and drainage (Historic England 2018).



Plate 2: View across the Site towards the ridge and furrow

- 3.6.18 LiDAR imagery available for the Site identifies large areas of surviving ridge and furrow both within the locality and eastern portion of the Site (Figure 4). The presence of such features was also recorded during the Site visit (Plate 1 and 2), recent geophysical survey undertaken in 2019 (Appendix 3, Fig No: 3) and on Google Earth imagery available for the area. The earthworks are high and comprise ridges surviving in

reasonable although somewhat eroded condition. Broadly parallel and approximately 7 m wide, they are likely to be of medieval origin. The orientation of the ridge and furrow (north east to south west) supports this theory, aligning with the road to the east.

- 3.6.19 No surviving earthworks were noted elsewhere in the proposed development area during the geophysical survey or are visible on LiDAR and Google Earth imagery available for the Site.
- 3.6.20 The earthworks are not scheduled or otherwise protected. They are in a fair state of preservation and part of a wider landscape within which ridge and furrow remains extant and well preserved.

Post Medieval (1540 to 1901)

- 3.6.21 During the post-medieval period Burbage was subject to limited expansion southward with most development occurring within the original medieval core. The majority of heritage assets recorded on the LHER dating from this period are associated with settlement activity (**HA23 to HA29, HA30 to HA32 and HA34**) and two turnpiked roads are recorded crossing the study area (**HA21 to HA22**).
- 3.6.22 During this period the immediate surrounds of Burbage continued to be utilised for agricultural purposes and the LHER records associated features including farms (**HA36**), houses (**HA33**) and field drains (**HA35**).
- 3.6.23 The Site is likely to have continued to have comprised part of the agricultural landscape to the south, supported by cartographic sources from the mid-nineteenth century onwards. As illustrated on the 1838 Parish of Burbage Tithe Map (Figure 5), the Site formed part of the agricultural land of Burbage west of Workhouse Lane. Recorded as 'Hangings', the Site was in use as pasture land held by George Hickinbottom and owned by John Smith. Whilst White House Farm is recorded immediately adjacent to the southern boundary of the Site, there is no known function or historical relationship as it was held under a different ownership (Reverent Joseph Cohan) and occupier (John Goode).

Twentieth century and twenty first century (1901 to present)

- 3.6.24 As with the post-medieval period evidence of activity recorded on the LHER is largely associated with occupational activity and the continued development of Burbage (**HA37 to HA38**).
- 3.6.25 During the late nineteenth and early twentieth century Burbage continued to expand and the surrounding agricultural landscape appears to have been subject to field boundary alterations with the subdivision of land to create new field parcels. As illustrated on the 1903 Ordnance Survey Map the divisions of the Site had been adjusted, with an internal field boundary in the western extent of the Site (Figure 5).
- 3.6.26 Throughout the twentieth century, the Site continued to comprise an agricultural field under pasture, and subsequent Ordnance Survey Maps indicate limited change with the existing external field boundaries established by 1925 (Figure 5).
- 3.6.27 Subject to further field boundary alteration, the existing character and appearance of the Site, and its external field boundaries, was established in the mid to late twentieth century and subsequent Ordnance Survey Maps and Google Earth imagery available indicate that it continued to be utilised for agricultural purposes until present day.
- 3.6.28 Throughout the twentieth and twenty first century Burbage has been subject to several programmes of expansion, notably with those immediately to the north of the Site extending built form southwards from the historic core.

Undated

- 3.6.29 Within the study area, the LHER records three records for which a date has not been

attributable, including a ring ditch approximately 50 m north west (**HA39**) and gully and ditch approximately 270 m north west of the Site (**HA40**). Visible as a cropmark on aerial photographs and Google Earth imagery for the area, the ring ditch is postulated to be of prehistoric origin.

3.7 Summary of Previous Impacts

- 3.7.1 A review of the available data indicates that the Site is likely to have compromised part of an agricultural landscape from the medieval period onwards. The truncated character of the ridge and furrow that is present in the eastern end of the site suggests levelling of the ground surface which may have impacted on buried remains. As the Site is not considered to have been subject to modern development, there is likely to have been a limited impact on archaeological remains that may survive within the Site.
- 3.7.2 Any pre-existing impacts to any potential buried archaeological remains would chiefly result from agricultural practices, including ploughing which may have caused damage to the upper horizons of any potential buried remains situated beneath the topsoil layer. This is likely to be the case with regard to the surviving ridge and furrow extant in the eastern corner of the Site. In addition to the above, the recent geophysical survey recorded a level of disturbance possibly associated with modern activity.

3.8 Summary of Heritage Constraints

- 3.8.1 The assessment undertaken above has identified that no designated archaeological remains are located within the Site; no designated archaeological remains will therefore be adversely physically affected by development within the Site.

Significance of known archaeological remains

- 3.8.2 Both the Site visit, LiDAR imagery and the recent geophysical survey identified the presence of ridge and furrow within the eastern extent of the Site. Postulated to be of medieval origin, the potential for any further remains associated with agricultural activity cannot be discounted.
- 3.8.3 Historic England recognises that ridge and furrow earthworks provide intelligibility of historic farming methods and how the landscape would have looked, and such earthworks can certainly contribute to the historic character of the landscape (Hall, 2001; Historic England 2018). The earthworks within the eastern extent of the Site are visible when standing in the field, although have been subject to erosion. Consequently they do not comprise highly prominent features within the surrounding landscape. Whilst they do retain a level of evidential and historical value, they do not have strong historic associations and cannot be experienced in conjunction with the medieval settlement remains. This is particularly a result of the later twenty first century development to the north, resulting in changes in the historic agricultural landscape and loss of ridge and furrow in the wider landscape.
- 3.8.4 In terms of heritage significance, the earthworks within the Site are of a level of value that comprises a 'heritage asset' as defined by the NPPF, i.e. they have 'a degree of significance meriting consideration in planning decisions, because of its heritage interest'. Unless it is of exceptional quality, or with particular historical associations such as settlements, ridge and furrow earthworks would not typically be considered a heritage asset of 'high' significance. Consequently, those within the Site comprise non-designated heritage assets, of low heritage significance.

Significance of potential archaeological remains

- 3.8.5 Based on the results of the recent geophysical survey undertaken on Site in November 2019, the potential for unidentified remains of prehistoric or Roman date to be present within the proposed development area is considered limited as no evidence of any substantial or significant features (i.e. funerary features or settlement remains) was

clearly identifiable.

- 3.8.6 Continuing to form part of an agricultural landscape from the post-medieval period, there is considered to be the high potential for post-medieval and modern activity relating to such activities. Supported by anomalies recorded during the recent geophysical survey, any remains associated with this would be of low significance.

Hedgerows along historic boundaries

- 3.8.7 Historic mapping from 1838 (Figure 5) illustrates that the field boundaries surrounding the Site, of which the east and south, were established by this date. As such, the hedges on these boundaries of the Site would be classified as 'important' within the archaeological and historical criteria of the Hedgerow Regulations 1997 (Appendix A). 'Important' hedgerows do not comprise designated heritage assets, and do not confer a specific level of heritage significance. Rather, the Regulations are a notification mechanism by which sufficient notice of removal must be given to the local authority.

4. Statement of Impact

4.1 Introduction

- 4.1.1 This section sets out a brief description of the scheme and provides an assessment of impact with regard to historic environment constraints.

4.2 Scheme Proposal

- 4.2.1 The Site is proposed for residential development with associated services, landscaping, car parking and access. At the time of completion of this assessment the specific construction methods were unknown.

4.3 Assessment of Proposal

- 4.3.1 Any direct physical impact to archaeological remains within the Site, if/where present, would primarily result from groundworks associated with construction. On-site activities which are likely to affect the archaeological resource could comprise the following:
- Pre-construction impacts associated with demolition and ground investigation works;
 - Construction ground works, including stripping and excavation associated with the foundations;
 - Ground reduction/landscaping; and
 - Excavation of new service trenches and drainage (including soakaways), as required.
- 4.3.2 Development within the Site would impact upon the identified ridge and furrow. Although of sufficient heritage significance to comprise a 'heritage asset', and to merit consideration in planning decisions, this assessment has concluded that the earthworks are not of a level of value that would require preservation in situ. Exceptionally well-preserved examples might be considered to require this, especially should they form part of an intelligible 'historic landscape'. This is not the case in respect of the earthworks within the Site.
- 4.3.3 The above mentioned ground works and excavations in relation to the proposed development could also result in the disturbance to, or loss of, any buried archaeological features that may be present within their footprint, resulting in the total or partial loss of significance of these assets. The extent of the impact would be dependent on the type and depth of the proposed excavations, and on the level of survival of archaeological deposits which is at present unknown. Any adverse effects on buried archaeological resource would be permanent and irreversible in nature.
- 4.3.4 The proposed development would result in change to the Historic Landscape Character of the Site, which is likely to have comprised agricultural land from the medieval period onwards. Whilst the proposed development would introduce new built elements within the Site, its immediate environs have been subject to extensive reorganisation during the twentieth and twenty first century. As such it is considered that any impacts on the Historic Landscape Character type as a whole would be very minor and localised in nature.
- 4.3.5 It is currently understood that the majority of the 'important' hedgerows are (under the criteria for archaeology and history of the 1997 Hedgerow Regulations) likely to be retained. Removal of elements of these hedgerows, if required for access, would be acceptable in heritage terms.

5. Discussion

5.1 Summary

- 5.1.1 This assessment has utilised a range of sources, in line with industry guidance, to identify known and potential heritage assets of archaeological interest within the Site which could be affected by the proposed development. Any effects of this development upon the significance of the buried archaeological resource will be a material consideration in the determination of the planning application.
- 5.1.2 Although the potential for any stray finds to be encountered cannot be discounted, based on the results of the geophysical survey, the archaeological potential is considered to be very limited.
- 5.1.3 During the medieval period the Site formed part of the agricultural landscape, with associated evidence recorded both during the geophysical survey and on LiDAR imagery available for the Site. Development within the Site will impact upon remnant ridge and furrow earthworks. Although of sufficient heritage significance to comprise heritage assets, and to merit consideration in planning decisions, the earthworks are not of a level of significance that would warrant their preservation *in situ*.
- 5.1.4 This desk based assessment and geophysical survey provides a proportionate assessment in line with NPPF to understand the archaeological potential of the Site so to inform and determine the planning application.

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6.2 Cartographic Sources (viewed at Leicestershire Records Office)

1838	Parish of Burbage Tithe Map
1903	Ordnance Survey Map, 1:2,500 scale
1925	Ordnance Survey Map, 1:2,500 scale

1938 Ordnance Survey Map, 1:2,500 scale

Subsequent Ordnance Survey maps viewed at: www.old-maps.co.uk and
www.promap.co.uk.

Appendix 1: Regulatory and Policy Context

6.3 Introduction

- 6.3.1 There is national legislation and guidance relating to the protection of, and development on, or near, important archaeological sites or historical buildings within planning regulations as defined under the provisions of the Town and Country Planning Act 1990. In addition, local authorities are responsible for the protection of the historic environment within the planning system. The following policies are considered to be of relevance to the Site and the proposed scheme.

6.4 Historic Buildings and Ancient Monuments Act 1953

- 6.4.1 Historic England is enabled by the Historic Buildings and Ancient Monuments Act 1953 (as amended by the National Heritage Act 1983) to maintain a register of parks, gardens and battlefield sites which appear to Historic England to be of special historic interest. Registration in this way makes the effect of proposed development on the sites and their settings a material consideration. Historic England are a statutory consultee in relation to works affecting Grade I/II* Registered Parks and Gardens.

6.5 Ancient Monuments and Archaeological Areas Act 1979

- 6.5.1 Scheduled Monuments and Areas of Archaeological Interest are afforded statutory protection under the Ancient Monuments and Archaeological Areas Act 1979 (as Amended) and the consent of the Secretary of State (Department for Digital, Culture, Media and Sport), as advised by Historic England, is required for any works.

6.6 Planning (Listed Buildings and Conservation Areas) Act 1990

- 6.6.1 Works affecting Listed Buildings or structures and Conservation Areas are subject to additional planning controls administered by LPAs under the Planning (Listed Buildings and Conservation Areas) Act 1990. In considering development which affects a Listed Building or its setting, the LPA shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses (Section 66). In considering Conservation Areas the planning authority has a general duty to give special attention to the desirability of preserving or enhancing the character or appearance of that area (Section 72).
- 6.6.2 The statutory criteria for listing are the special architectural or historic interest of a building. Buildings on the list are graded to reflect their relative architectural and historic interest (DCMS, 2010a, para 7, page 4):
- Grade I: Buildings of exceptional interest;
 - Grade II*: Particularly important buildings of more than special interest;
 - Grade II: Buildings of special interest which warrant every effort being made to preserve them.
- 6.6.3 Historic England is a statutory consultee in relation to works affecting Grade I/II* Listed Buildings.

6.7 Hedgerow Regulations 1997

- 6.7.1 Under the Hedgerow Regulations 1997, as amended by The Hedgerows (England) (Amendment) Regulations 2002, hedgerows are deemed to be historically important if they are over 30 years old and either: incorporate, or are associated with, a scheduled archaeological feature or site; marks the boundary of a pre-1600 estate or manor recorded at the relevant date in a Sites and Monuments Record; or form an integral

part of a pre-1845 field system.

- 6.7.2 Para 5a may determine that a hedgerow is important regardless of the current completeness of the historic field system. A hedgerow so recorded would still be important if it is now the only remaining part of the pre-1845 field system.

6.8 National Planning Policy Framework

- 6.8.1 Section 16 of the National Planning Policy Framework (NPPF) sets out the Government's current planning policy in relation to conserving and enhancing the historic environment. The key requirements are summarised below.
- 6.8.2 Applicants are required to provide proportionate information on the significance of designated and non-designated heritage assets affected by the proposals and an impact assessment of the proposed development on that significance. This should be in the form of a desk-based assessment and, where necessary, a field evaluation (NPPF, 189).
- 6.8.3 LPAs are required to take into account the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation; the wider social, cultural, economic and environmental benefits that conservation of the historic environment can bring; the desirability of new development making a positive contribution to local character and distinctiveness; and opportunities to draw on the contribution made by the historic environment to the character of a place (NPPF, 185/192).
- 6.8.4 In determining planning applications, great weight should be given to the conservation of designated heritage assets - World Heritage Sites, Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks and Gardens, Registered Battlefields or Conservation Areas designated under the relevant legislation (NPPF, 193/194).
- 6.8.5 In weighing applications that affect directly or indirectly the significance of a non-designated heritage asset, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset (NPPF, 197).
- 6.8.6 LPAs should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their significance and the impact, and to make this evidence publicly accessible and any archives deposited with a local museum or other public depository (NPPF, 199).

6.9 Local Plan

- 6.9.1 The Site lies within the administrative boundary of Hinckley and Bosworth Borough Council. Development is controlled by the existing Local Plan 2006 to 2026 which is formed of the Local Development Scheme, Development Plan Documents, Supplementary Planning Documents and Evidence Base Documents. The Development Plan Documents comprise the Core Strategy, Site Allocations and Development Management Policies, Hinckley Town Centre Area Action Plan and Early Shilton and Barwell Area Action Plan.
- 6.9.2 Adopted in December 2009 Core Strategy policies relevant to this assessment comprise:
- Spatial Objective 10: Natural Environment and Cultural Assets; and
 - Policy 4: Development in Burgage.¹

¹ Reviewed April 2020.

- 6.9.3 A new local plan is currently being prepared although no details regarding specific policies were available at the time of preparing this DBA.
- 6.9.4 A Village Design Statement was adopted for Burgage in 2006 and a Neighbourhood Plan is currently under production, with a hearing required to assist in the examination held in March 2020.
- 6.9.5 Other relevant Hinckley and Bosworth Borough Council planning documents to this assessment include:
- Good Design Guide Supplementary Planning Document 2019; and
 - Heritage Strategy 2018-2023.

Appendix 2: Gazetteers

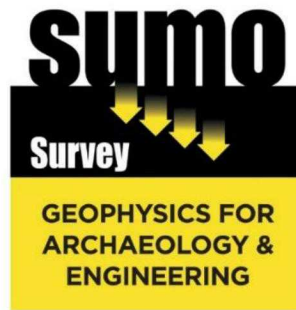
Gazetteer of Heritage Assets

HA	Period	Name	LHER Ref.	Easting	Northing
1	Prehistoric	Palaeolithic finds from east of Hinckley Island Hotel	MLE6056	444318	290745
2	Prehistoric	Neolithic arrowhead from east of Fields Farm	MLE7235	445040	291551
3	Prehistoric	Prehistoric flint, Britannia Road	MLE18737	444082	291984
4	Prehistoric	Neolithic/Bronze Age flint from area round Canberra Way	MLE21173	443383	291757
5	Prehistoric	Bronze Age cremation cemetery, west of Workhouse Lane	MLE23172	444272	291989
6	Prehistoric	Iron Age enclosure west of Workhouse Lane	MLE21696	444229	291988
7	Prehistoric	Iron Age enclosure north of Hinckley Island Hotel	MLE23421	443933	290998
8	Prehistoric; Romano-British	Late Iron Age/Roman site, east of Hinckley Island Hotel	MLE23422	444104	290909
9	Prehistoric; Romano-British	Iron Age/Roman quern from Burbage House Lake	MLE9028	444568	290922
10	Romano-British	Watling Street Roman Road	MLE1388	443460	287342
11	Romano-British	Roman site west of White House Farm	MLE2846	443967	291938
12	Romano-British	Roman agricultural site, Britannia Road, Burbage	MLE18736	444072	291985
13	Romano-British	Possible Roman field system north-west of White House Farm	MLE20670	444203	291967
14	Romano-British	Possible Roman mosaic, Horsepool	MLE7936	444281	292443
15	Early Medieval	Historic settlement core of Burbage	MLE2848	444273	292691
16	Early Medieval	Anglo-Saxon finds from west of White House Farm	MLE6181	443975	291889

HA	Period	Name	LHER Ref.	Easting	Northing
17	Medieval	Medieval cauldron foot from west of White House Farm	MLE6788	443984	291848
18	Medieval	Fishpond, Manor House	MLE2843	444456	292730
19	Medieval	Medieval finds, Moat House, New Road	MLE19843	444138	292542
20	Medieval	Medieval/post-medieval pits, west/south-west of Cedar Lawn	MLE23506	444239	292664
21	Post-medieval	Turnpike Road, Hinckley to Lutterworth to Welford Field	MLE20924	452143	287532
22	Post-medieval	Turnpike Road, Hinckley to Rugby	MLE21283	442687	292507
23	Post-medieval	Post-medieval remains at 23, Lutterworth Road	MLE10461	444302	292216
24	Post-medieval	The Croft, 23-25, Church Street	MLE2830	444281	292483
25	Post-medieval	Wesleyan Day School, Windsor Street	MLE18024	444128	292353
26	Post-medieval	Methodist Church, Windsor Street	MLE18023	444132	292369
27	Post-medieval	Site of Moat House, New Road	MLE19842	444192	292569
28	Post-medieval	70, Church Street, Burbage	MLE16814	444272	292673
29	Post-medieval	Outbuilding south of Cedar Lawns, 78, Church Street	MLE24131	444259	292669
30	Post-medieval	Post-medieval gardens, Rectory Garden	MLE2832	444143	292553
31	Post-medieval	Post-medieval remains, Burbage Hall	MLE10568	444446	292709
32	Post-medieval	Parish workhouse, Workhouse Lane	MLE21323	444297	292062
33	Post-medieval	Site of cruck house, Burbage	MLE23880	444000	292000
34	Post-medieval	Possible windmill site, Millers Lash	MLE17960	443799	292799

HA	Period	Name	LHER Ref.	Easting	Northing
35	Post-medieval	Field drain in field east of Stretton Pines	MLE21464	443277	291488
36	Post-medieval	Burbage House, Lutterworth Road	MLE23424	444668	291171
37	20th Century	Burbage war memorial, Church Street	MLE22596	444278	292569
38	20th Century	Site of hosiery factory, Hinckley Road, Burbage	MLE24267	444199	292777
39	Uncertain	Ring ditch, Britannia Recreation Ground	MLE20838	444052	291845
40	Uncertain	Undated ditches south of Bullfurlong Lane	MLE22160 ELE8900	443832	291810
-	-	Geophysical Survey, Coventry Road, Burbage	ELE9920	443840	291984

Appendix 3: Geophysical Survey Report, SUMO Geophysics Ltd 2019



GEOPHYSICAL SURVEY REPORT

Land at Whitehouse Farm, Burbage, Leicestershire

Client

ECUS Ltd

For

Mather Jamie Ltd

Survey Report

16334

Date

November 2019



Survey Report 16334: Land at Whitehouse Farm, Burbage, Leicestershire

Survey dates 1st November 2019

Field co-ordinator Liz Topping Bsc Msc

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Report Date 7th November 2019

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3	SUMMARY OF RESULTS	2
4	INTRODUCTION	2
5	RESULTS	3
6	DATA APPRAISAL & CONFIDENCE ASSESSMENT	3
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Appendix A	Technical Information: Magnetometer Survey Methods, Processing and Presentation
Appendix B	Technical Information: Magnetic Theory

Figure 01	NTS	Site Location
Figure 02	1:1200	Magnetometer Survey Greyscale Plot
Figure 03	1:1200	Magnetometer Survey Interpretation
Figure 04	1:1200	Magnetometer Survey [Minimally Processed] Greyscale Plot

Detailed magnetic survey (magnetometry) was chosen as the most efficient and effective method of locating the type of archaeological anomalies which might be expected at this site.

Bartington Grad 601-2 **Traverse Interval 1.0m** **Sample Interval 0.25m**

3 SUMMARY OF RESULTS

- 3.1 The survey at Whitehouse farm has identified no anomalies of definite archaeological interest, though there are two curving trends of uncertain provenance; they could be archaeological, natural, or agricultural. The presence of ridge and furrow anomalies in the results confirms an agricultural use of the site in the past. Responses indicative of field drains run through the west of the site.

4 INTRODUCTION

- 4.1 **SUMO Geophysics Ltd** were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by **ECUS Ltd** on behalf of **Mather Jamie Ltd**.

4.2 Site details

NGR / Postcode	SP442918 / LE10 2HE
Location	The site is situated west of Workhouse Lane on the southern edge of Burbage and occupies a field currently used for pasture. The site is bound by a modern residential estate to the north, Workhouse Lane to the east, Whitehouse Farm and associated fields to the south and agricultural fields to the west.
HER	Leicestershire and Rutland HER
District	Hinckley and Bosworth
Parish	Burbage Civil Parish
Topography	Flat, with some undulating/uneven ground.
Current Land Use	Pasture
Geology (BGS 2019)	Bedrock: Mercia Mudstone Group. Superficial: West: Wolston Sand and Gravel / East: Oadby Member – Diamicton.
Soils (CU 2019)	Soilscape 8: Slightly acid loamy and clayey soils with impeded drainage.
Archaeology (ECUS 2019)	Previous archaeological investigations have shown evidence of prehistoric occupation within close proximity to the survey area. In the fields immediately north of the Site boundary a cluster of Bronze Age pits, including urned cremations suggested the presence of a Bronze Age cremation cemetery, and there was also a curvilinear enclosure of possible Iron Age date. Romano-British evidence has also been discovered in the form of linear boundary ditches, potential stock enclosures as well as finds including pottery, fired clay and animal bones. The eastern extent of the site contains clear traces of ridge and furrow due to prolonged ploughing in the medieval and possibly post-medieval periods.
Survey Methods	Magnetometer survey (fluxgate gradiometer)
Study Area	2 ha

4.3 Aims and Objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

5 RESULTS

5.1 ***Probable Archaeology/ Possible Archaeology***

- 5.1.1 No magnetic responses have been recorded that could be interpreted as being of archaeological interest.

5.2 ***Uncertain***

- 5.2.1 Two poorly curvilinear responses are visible in the data, but they lack the clarity and morphology of anomalies usually associated with archaeological features; they could be the result of agricultural or natural effects. They are simply highlighted because of the high density of archaeological features in the adjacent fields.

5.3 ***Agricultural – Ploughing / Land Drains***

- 5.3.1 Parallel broad, widely spaced linear anomalies were detected in the east of the survey area, indicating a past ridge and furrow agricultural regime.
- 5.3.2 Other linear responses bisecting the survey area have been categorised as land drains, which could be associated with the pond to the north of the site boundary and the spring to the south.

5.4 ***Ferrous / Magnetic Disturbance***

- 5.4.1 Ferrous responses close to boundaries are due to adjacent fences and gates. A couple of manhole covers in the west of the survey area produced a ferrous response. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

6 DATA APPRAISAL & CONFIDENCE ASSESSMENT

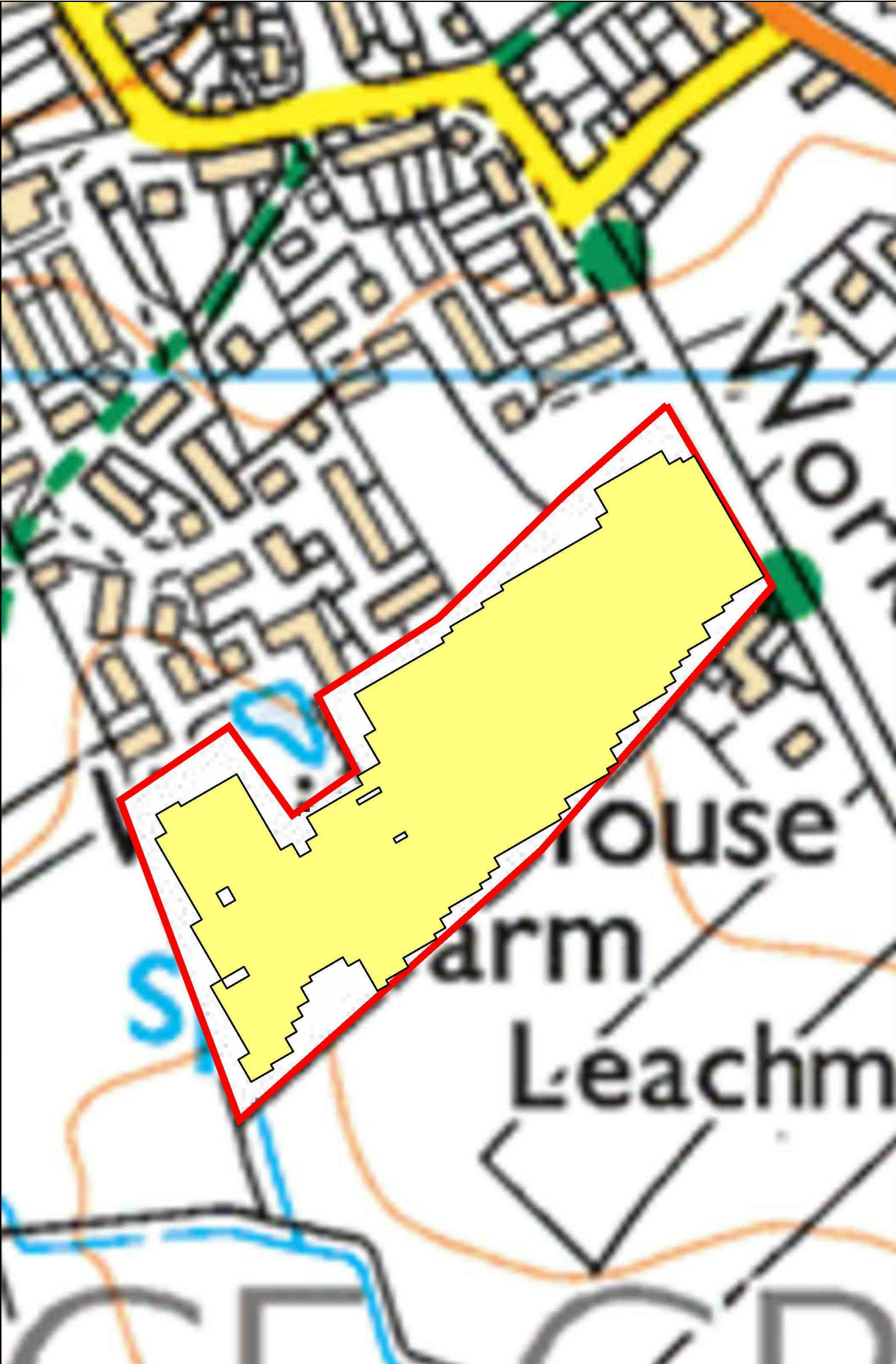
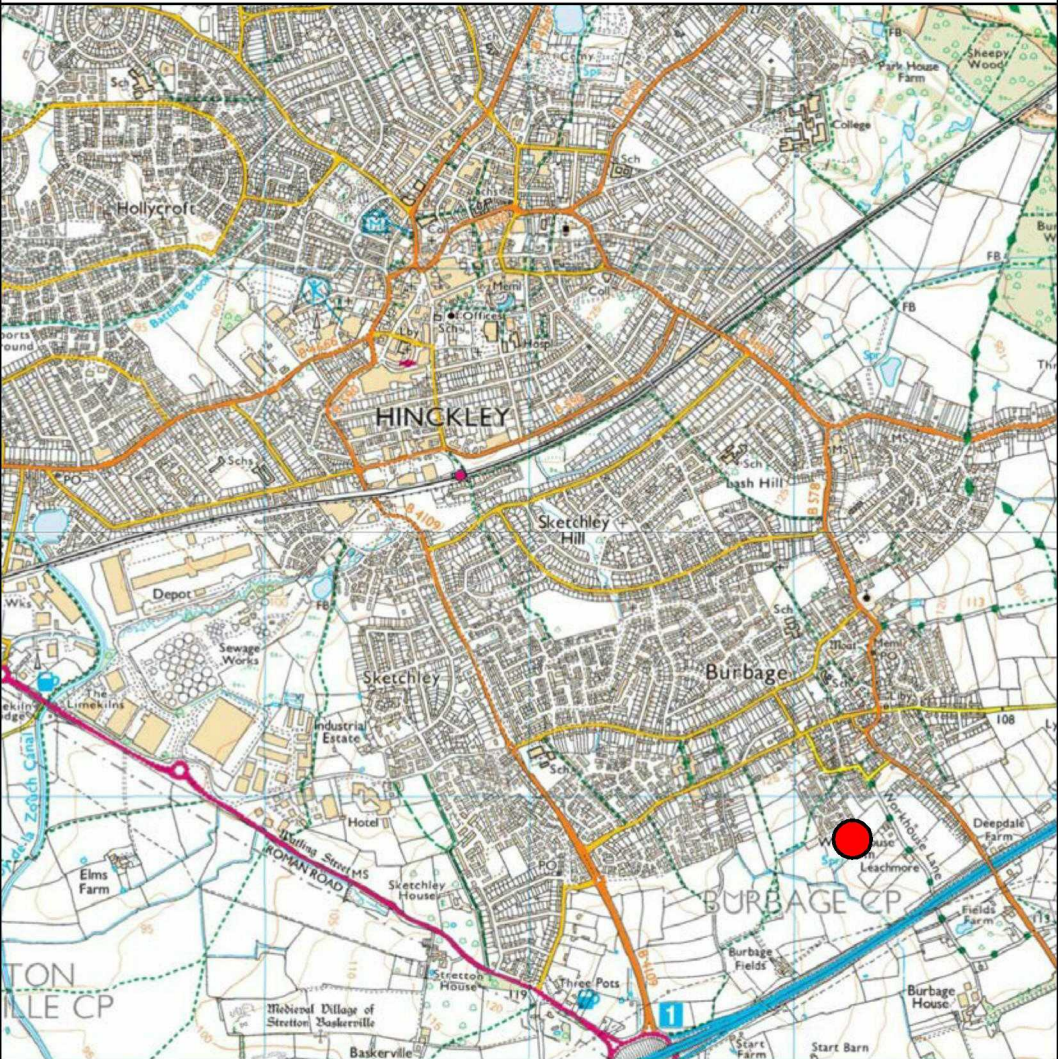
- 6.1 Historic England guidelines (EH 2008) Table 4 states that the typical magnetic response on the local soils / geology is variable. The results from this survey indicate the presence of ridge and furrow ploughing; as a consequence, there is no *a priori* reason why archaeological features would not have been detected, if present.

7 CONCLUSION

- 7.1 The results of the survey show two curvilinear responses in the data which could be of interest but agricultural or natural causes are equally plausible; therefore the responses have been classified as uncertain. Past ridge and furrow ploughing as well as land drains are also present in the data.

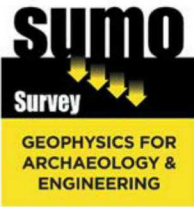
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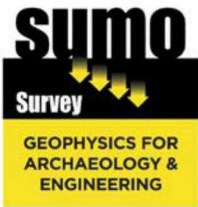
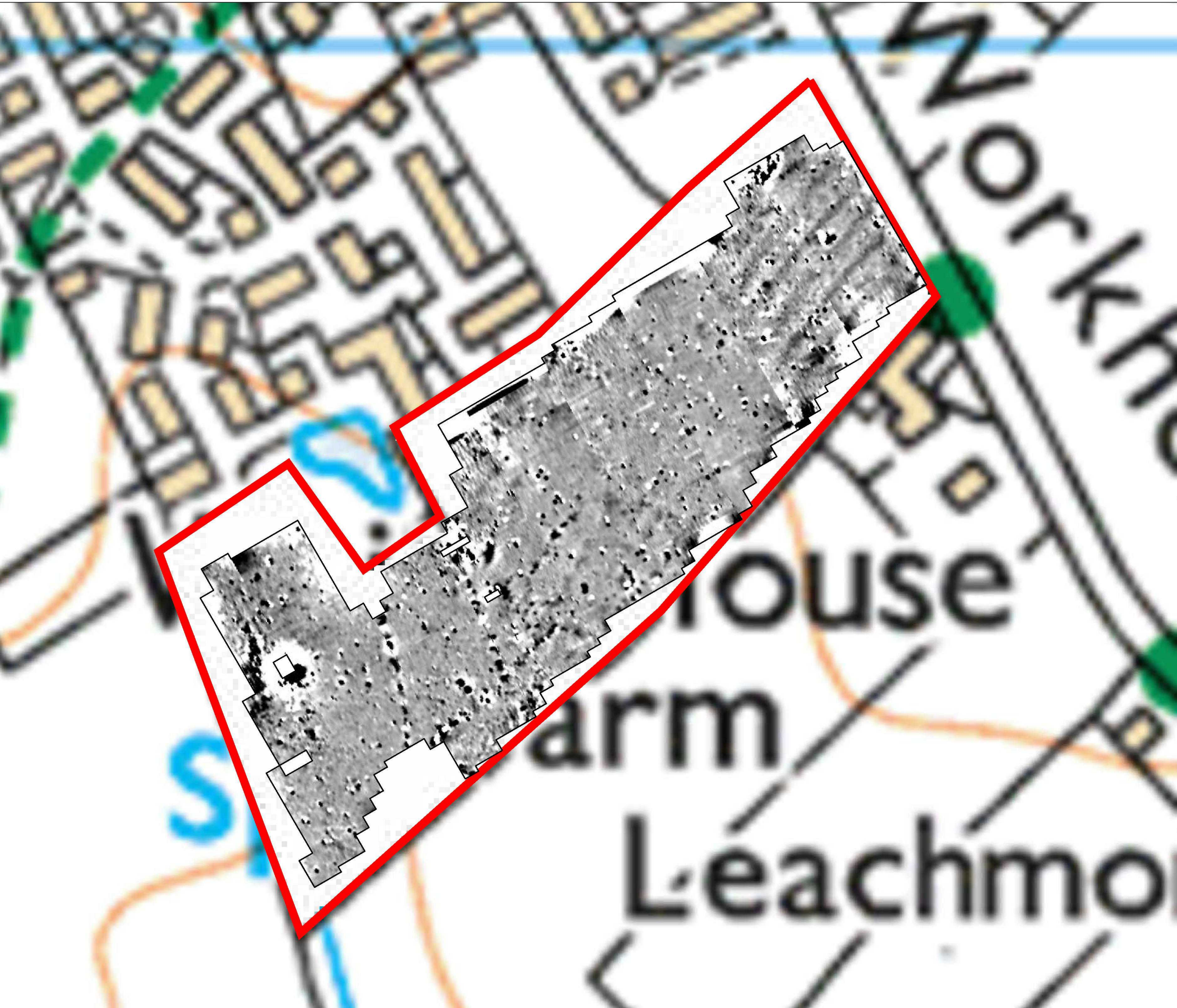


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	Site Location
	Magnetometer Survey



Title:	Site Location	
Client:	ECUS Ltd	
Project:	16334 Land at Whitehouse Farm, Burbage, Leicestershire	
not to scale		Fig No: 01



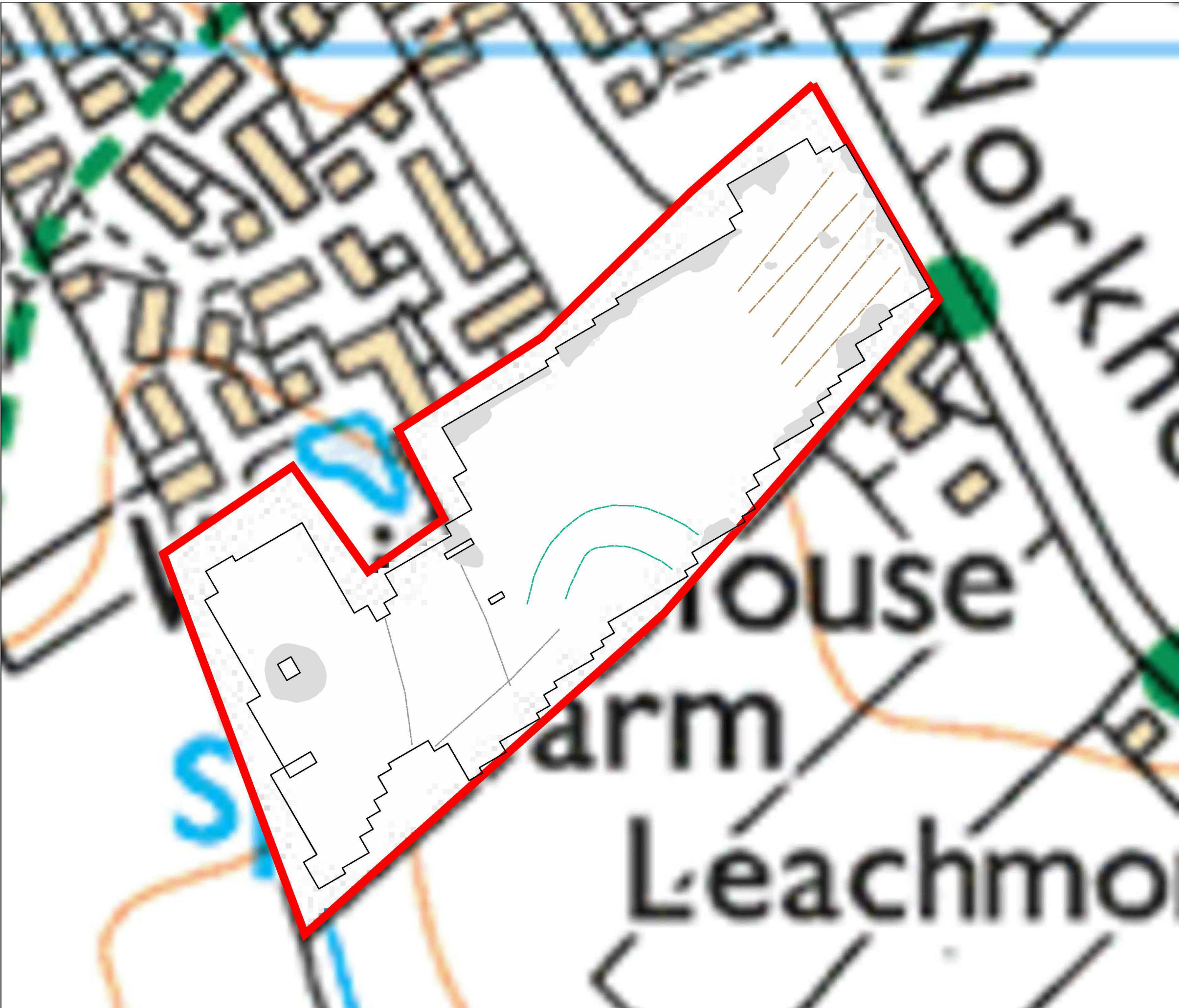
Title: Magnetometer Survey Greyscale Plot

Client: ECUS Ltd





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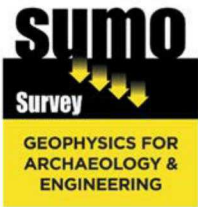
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Fig No: 02

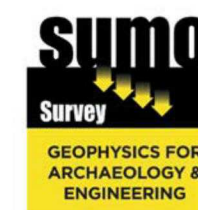
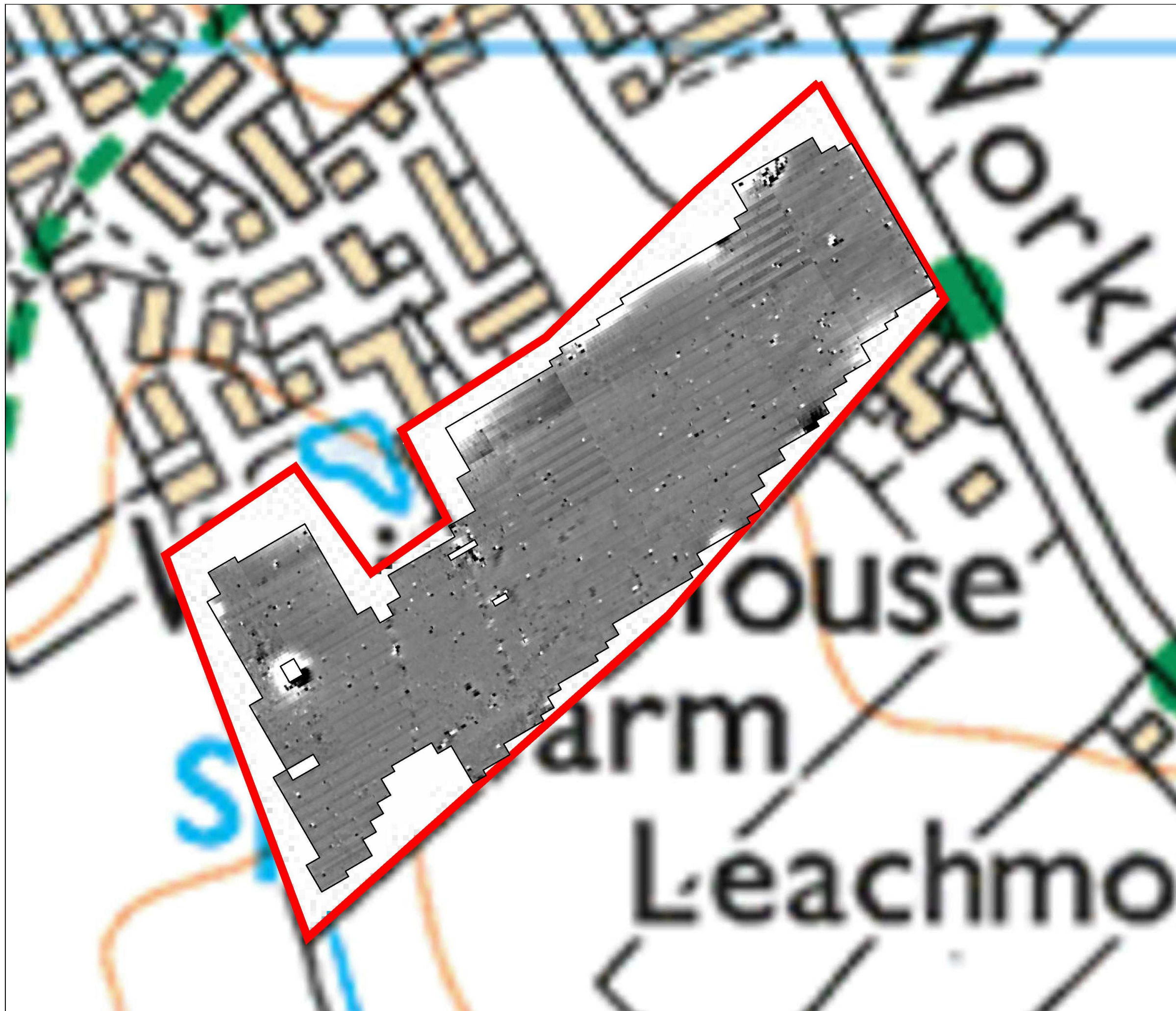


KEY

	Uncertain (Trend)
	Ridge and Furrow
	Drain
	Ferrous



Title: Magnetometer Survey Interpretation	
Client: ECUS Ltd	
Project: 16334 Land at Whitehouse Farm, Burbage, Leicestershire	
Scale: 0 metres 60 1:1200 @ A3	Fig No: 03



Title: Magnetometer Survey [Minimally Processed]
Greyscale Plot

Client: ECUS Ltd

Project: 16334 Land at Whitehouse Farm, Burbage,
Leicestershire

Scale: 0 metres 60
1:1200 @ A3

Fig No:
04

Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

Instrumentation: **Bartington Grad 601-2**

Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean	This process sets the background mean of each traverse within each grid to zero.
Traverse	The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.
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Presentation of results and interpretation

The presentation of the results includes a 'minimally processed data' and a 'processed data' greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the 'Interpretation' drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given specific categories, such as: Abbey Wall or Roman Road. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: Probable, or Possible Archaeology. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification Possible.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall*, etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

<i>Archaeology / Probable Archaeology</i>	This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
<i>Possible Archaeology</i>	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
<i>Industrial / Burnt-Fired</i>	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
<i>Former Field Boundary (probable & possible)</i>	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
<i>Ridge & Furrow</i>	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity.
<i>Agriculture (ploughing)</i>	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
<i>Land Drain</i>	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
<i>Natural</i>	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
<i>Magnetic Disturbance</i>	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present.
<i>Service</i>	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
<i>Ferrous</i>	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
<i>Uncertain Origin</i>	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of <i>Possible Archaeology / Natural</i> or (in the case of linear responses) <i>Possible Archaeology / Agriculture</i> ; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

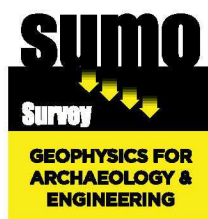
Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns; material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried feature. The difference between the two sensors will relate to the strength of a magnetic field created by this feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

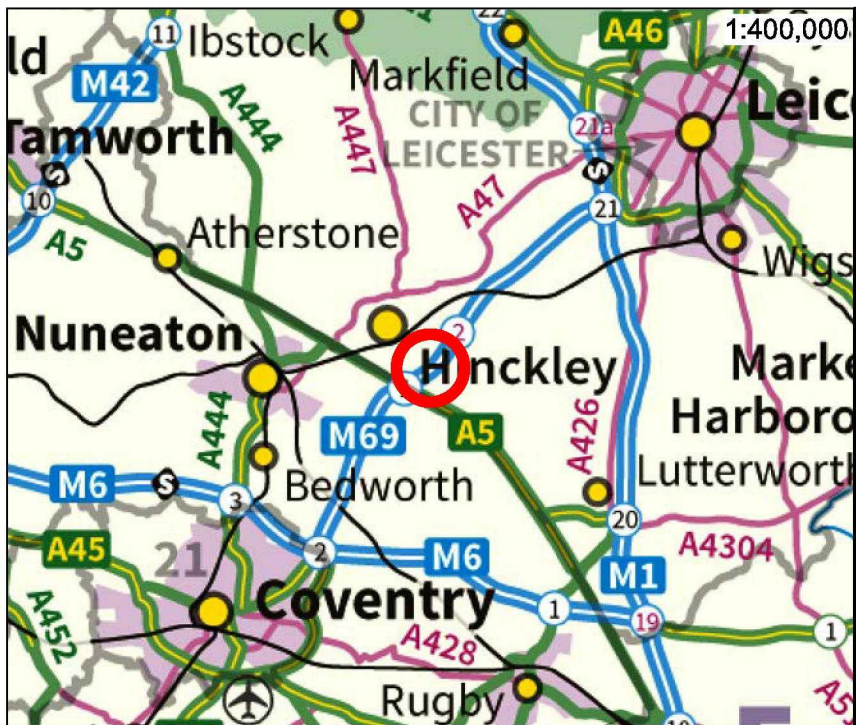
Factors affecting the magnetic survey may include soil type, local geology, previous human activity and disturbance from modern services.



- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

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Figures



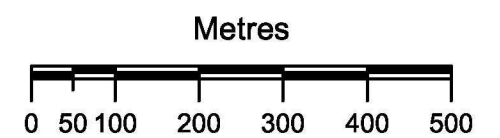
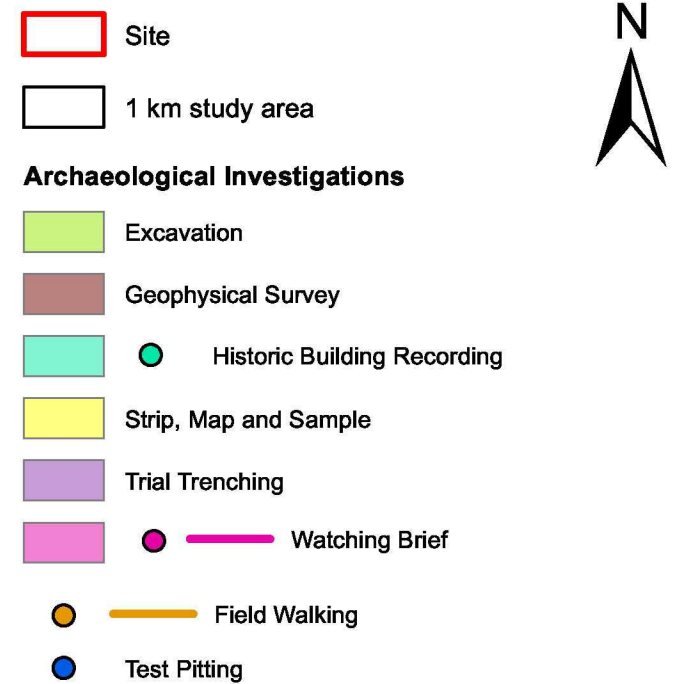
 Site

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Land north of White Farm House,
Burbage - Archaeological
Desk-Based Assessment

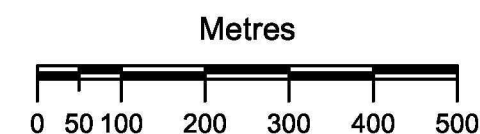
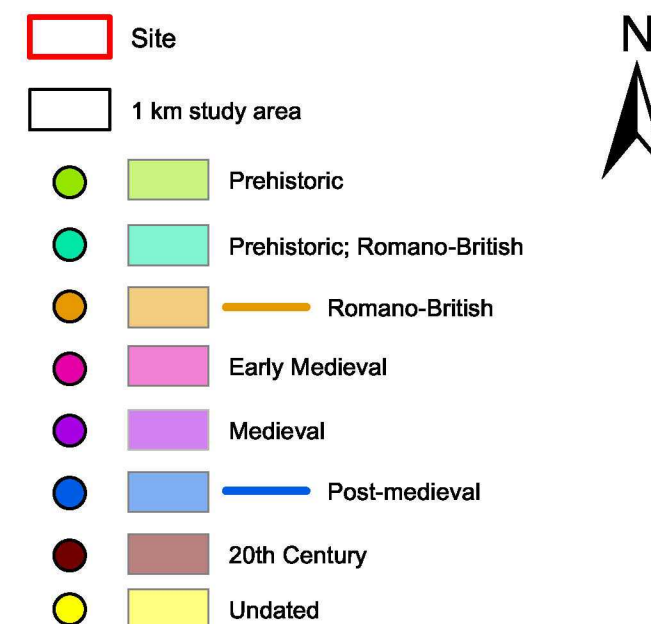
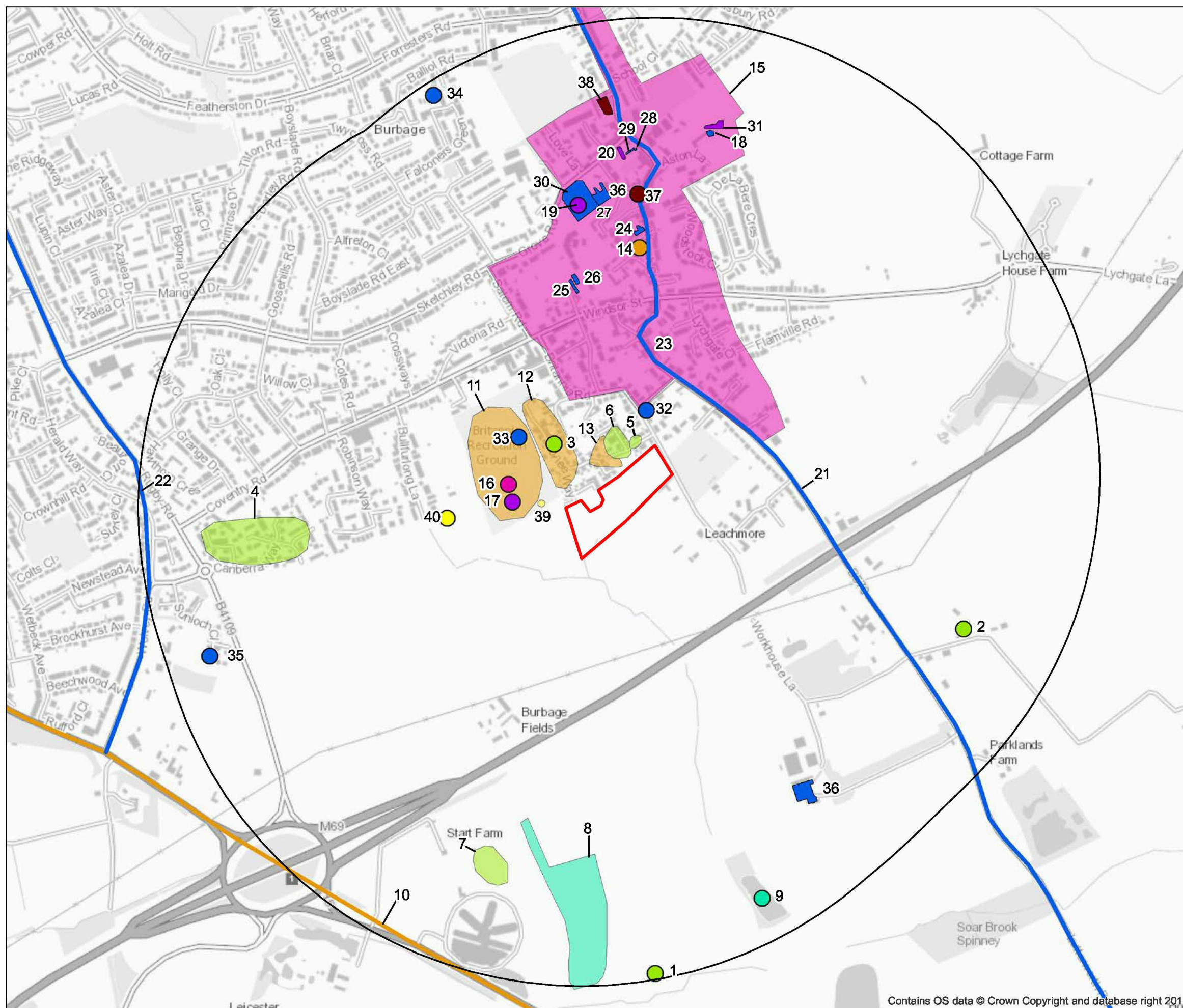
Figure 1: Site Location

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Land north of White Farm House, Burbage -
Archaeological Desk-Based Assessment
Figure 2: Previous archaeological investigations within a 1 km study area

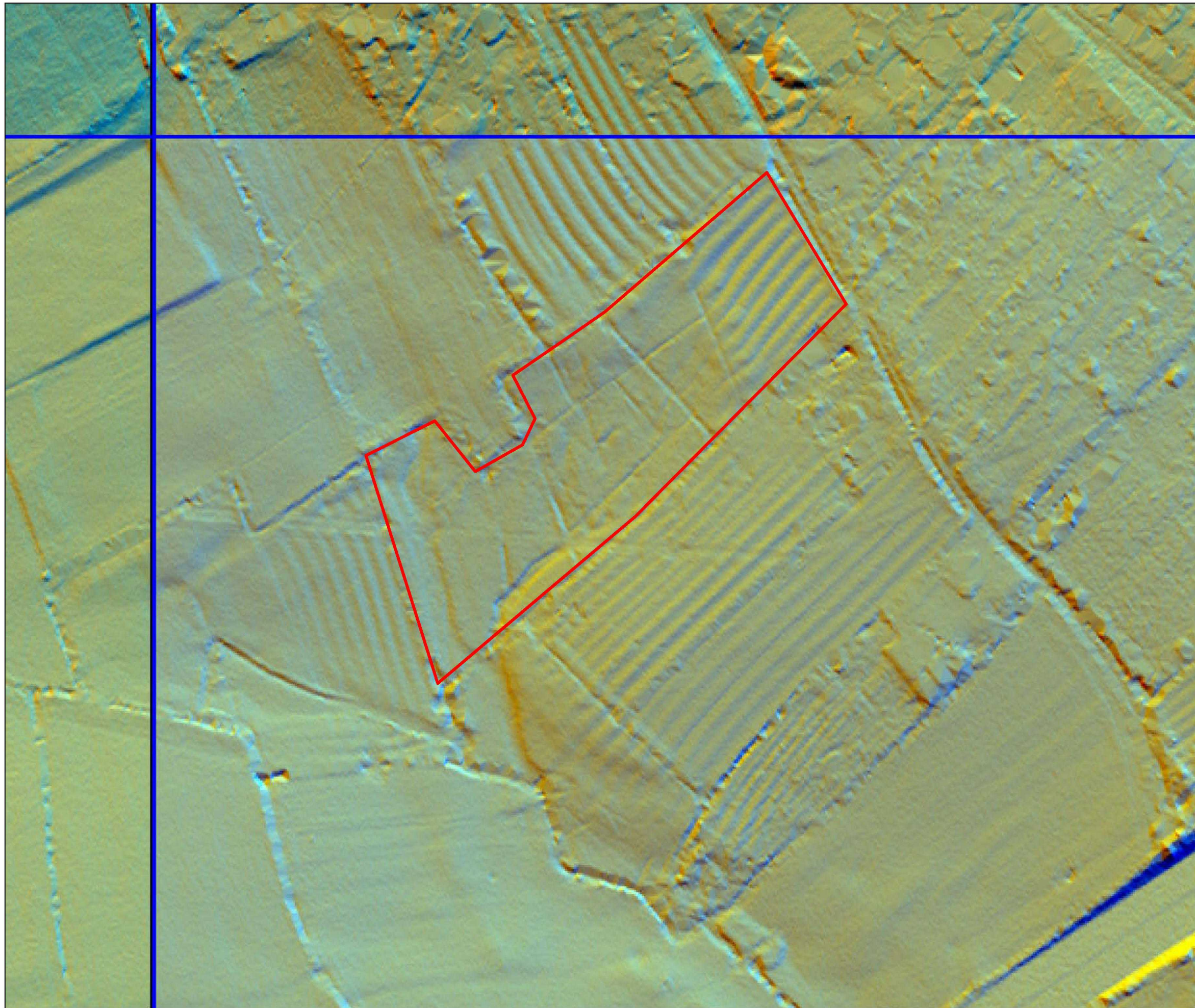
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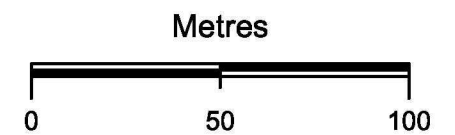
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Figure 3: Non-designated heritage assets within a 1 km study area

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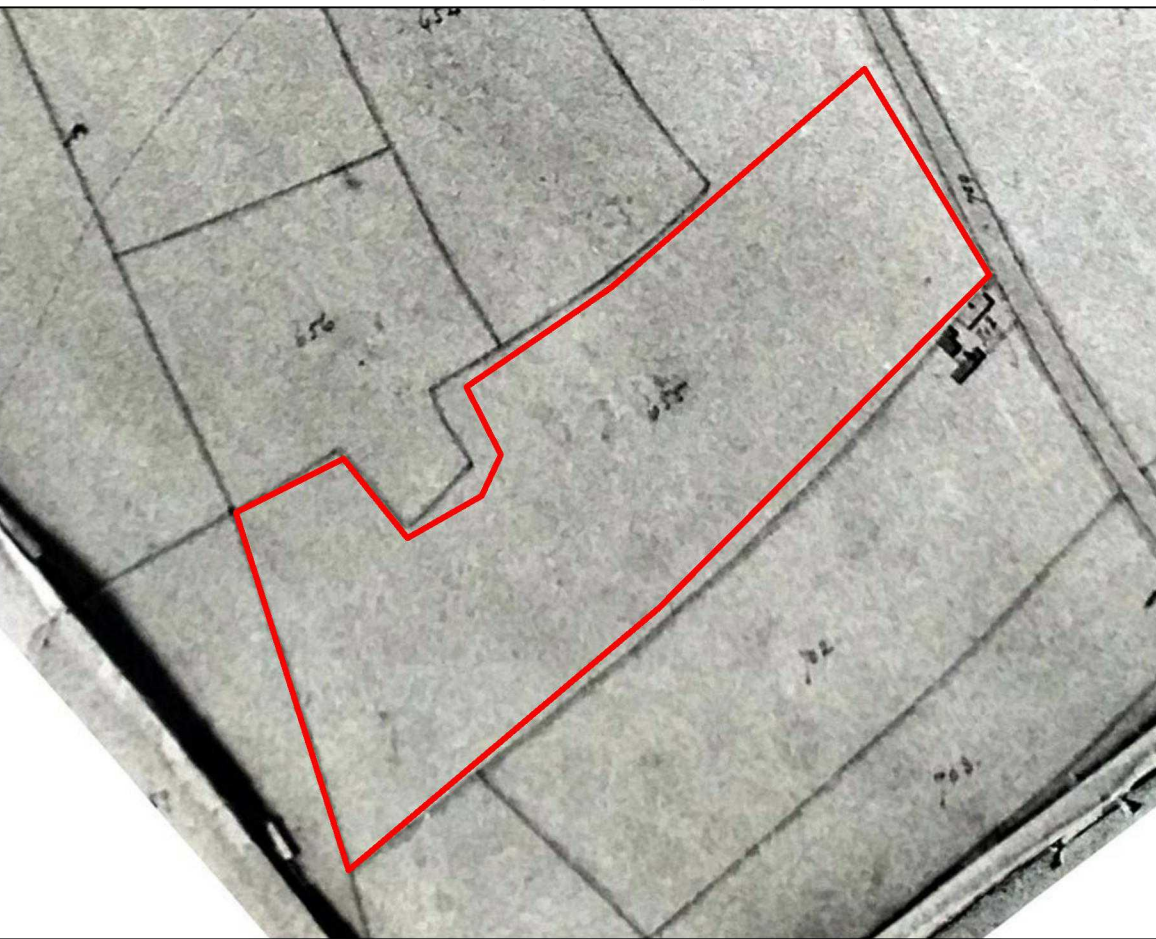
 Site



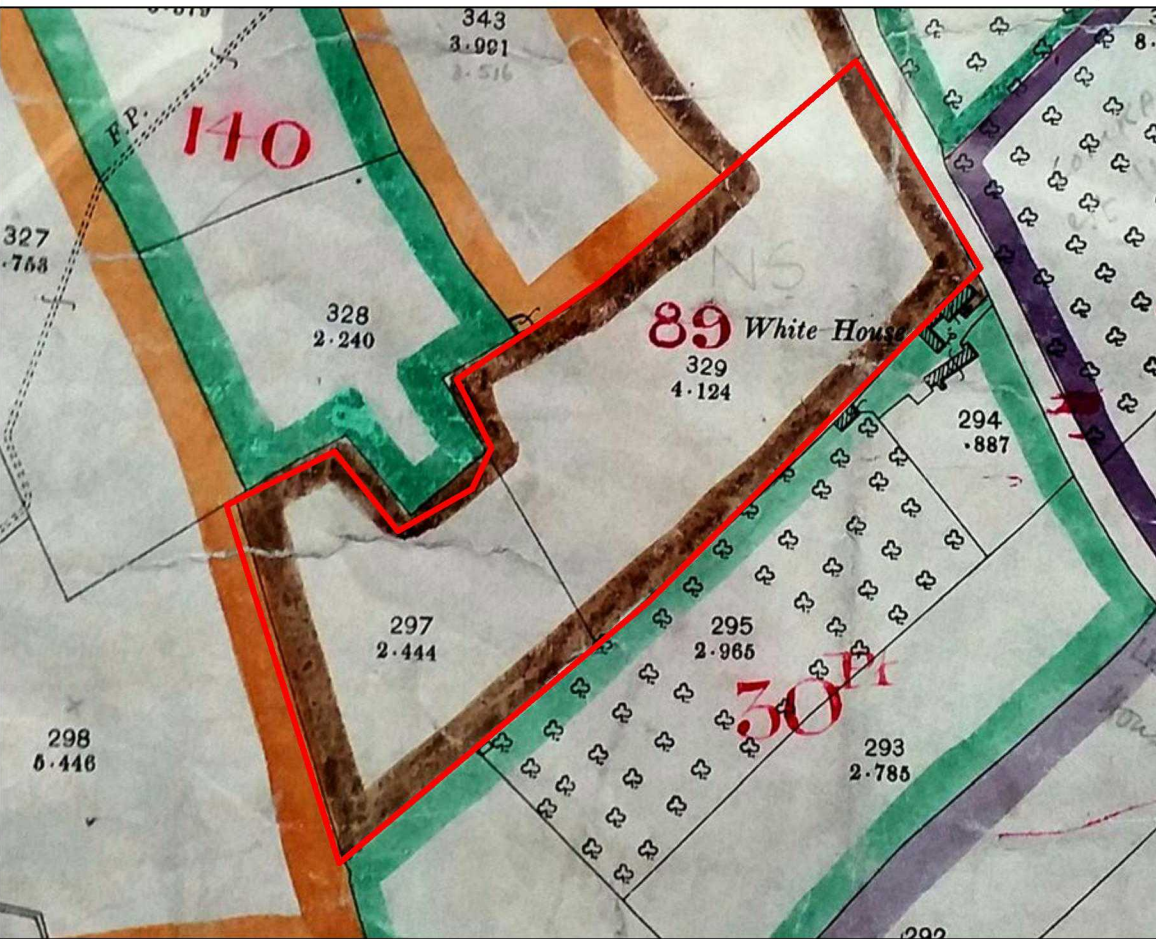
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Figure 4: LiDAR Visualisation
(Data accessible via the Environment
Agency)

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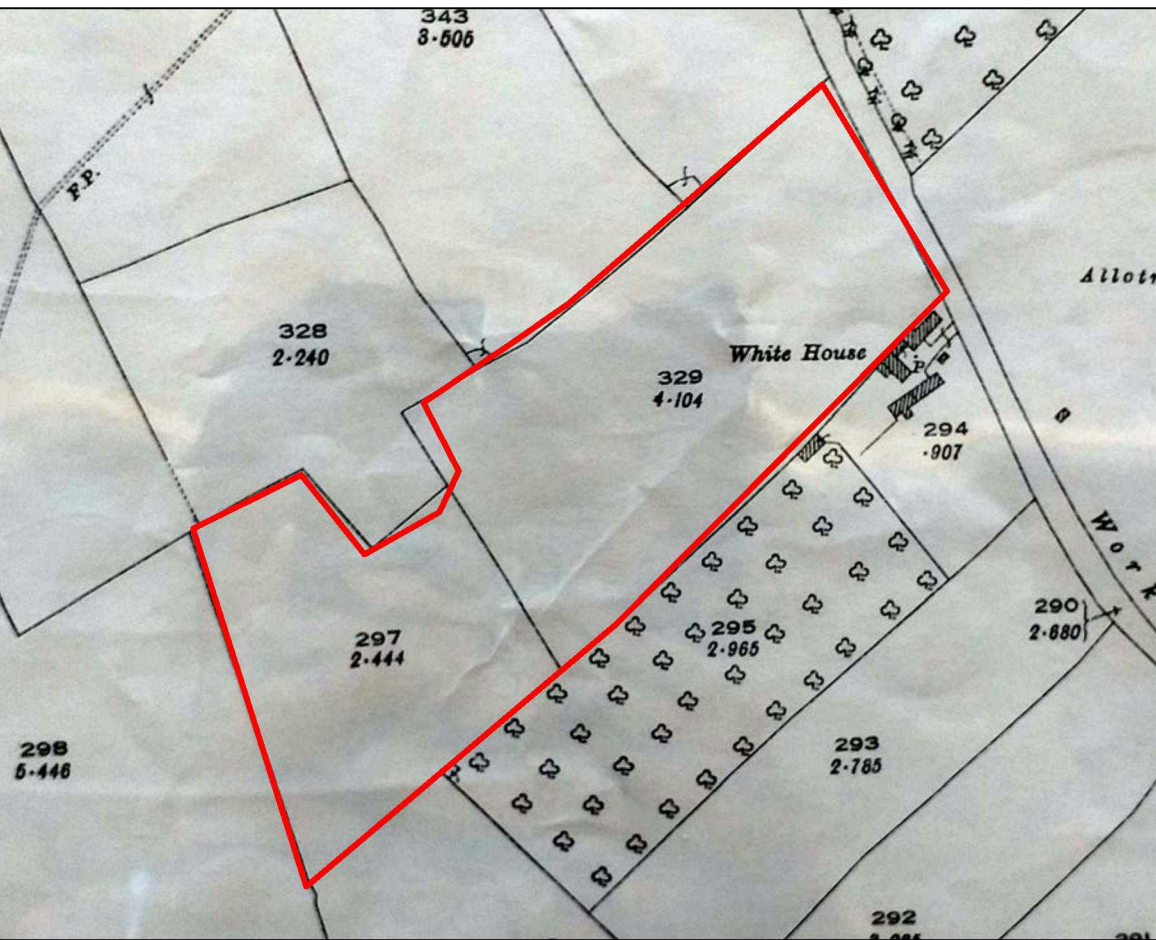
Extract from the 1838 Parish Tithe Map of Burbage 1:2,500



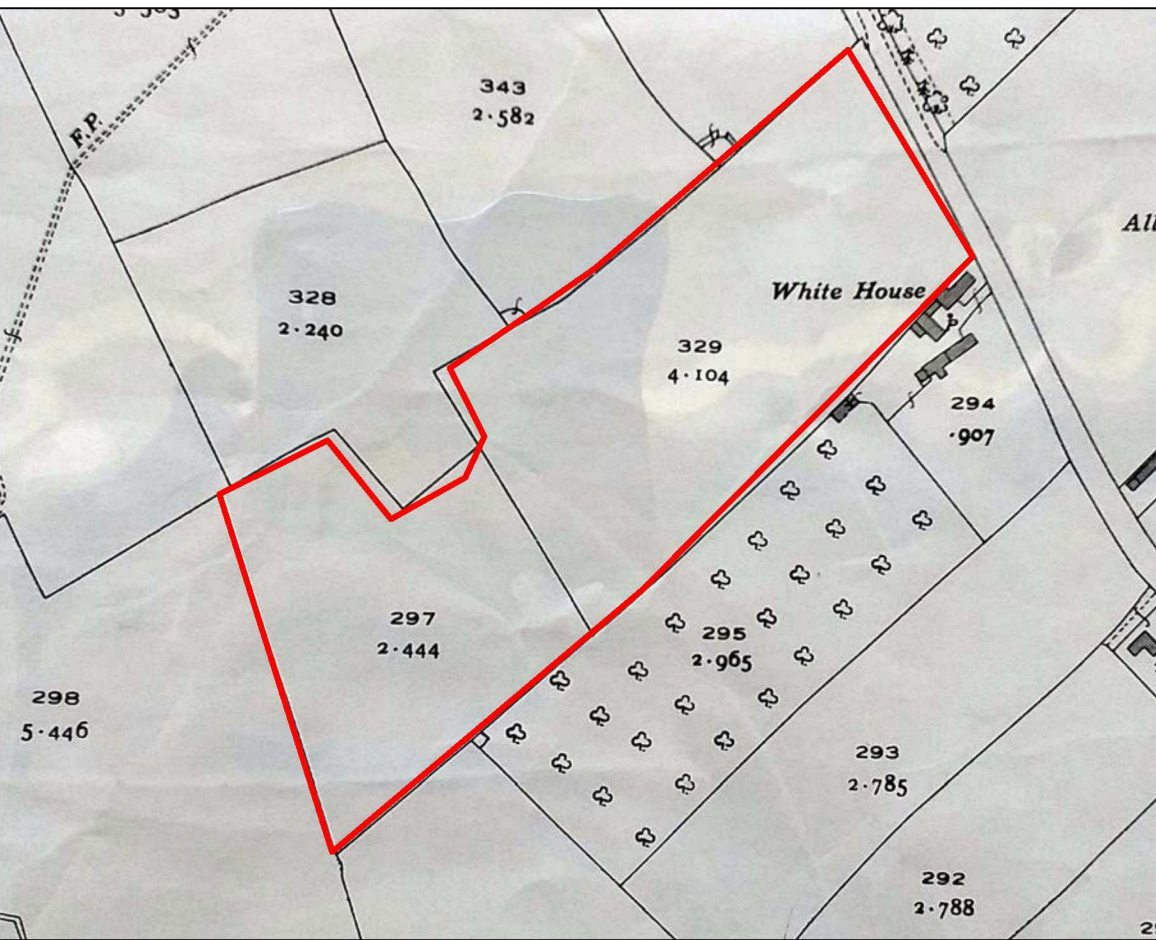
Leicestershire Sheet XLII.12 1903 1:2,500



Leicestershire Sheet XLII.12 1925 1:2,500



Leicestershire Sheet XLII.12 1938 1:2,500



Site



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**Figure 5: Historic cartographic evidence
(1838, 1903, 1925 & 1938)**

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