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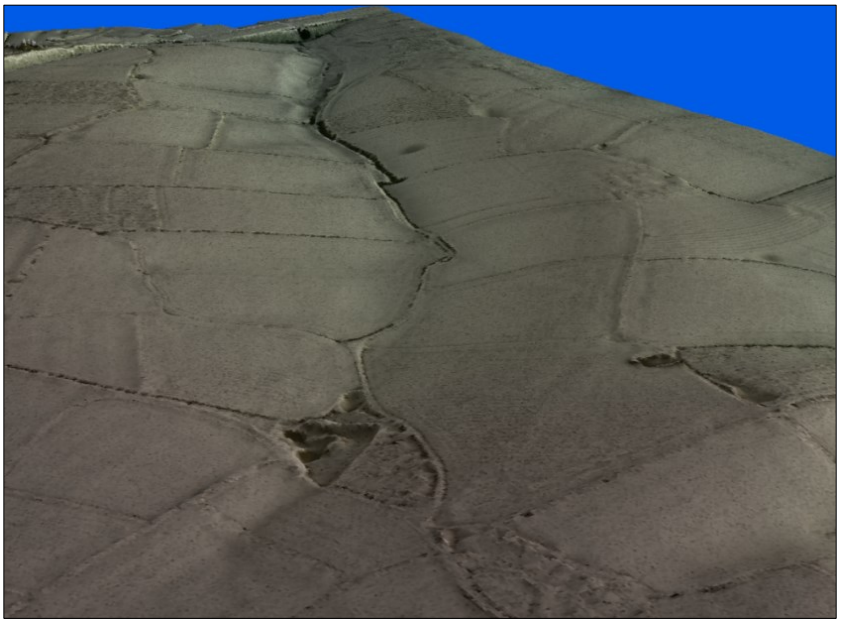

An Archaeological field evaluation at New Lubbesthorpe, Lubbesthorpe, Leicestershire

(SK 531 017)

M. Beamish and W. Jarvis

ULAS Report No 2016-004

An Archaeological Evaluation at New Lubbesthorpe, Leicestershire (SK 531 017)

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for:

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Accession Number: XA112.2011

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Matthew Beamish & Wayne Jarvis

Summary

An archaeological field evaluation by trial trenching and earthwork assessment by LiDAR analysis was carried out by University of Leicester Archaeological Services (ULAS) on land at New Lubbesthorpe, Leicestershire (SK 531 017), during December 2015, being part of a staged project to assess the impact on potential heritage assets from the New Lubbesthorpe development. The work was in advance of a proposed mixed use development. During this phase, 45 trenches were excavated targeting residential and infrastructure areas in the north of the proposed scheme. The majority of the proposed area proved negative during the current phase of works. Follow up trenching near Old Warren Farm and Hatt Spinney around two areas of prehistoric activity identified previously did not identify any further features. However in the west of the proposed site near to Beggars Lane a small amount of worked flint was recovered from stratified deposits, and evidence for burning was identified in the form of charcoal. Several linear features of uncertain date were also identified in the west area. As part of the assessment analysis of aerial LiDAR survey was undertaken over an area of known earthwork interpreted as a medieval fishpond.

The archive for this work will be deposited with Leicestershire Museums with accession number XA112.2011.

Introduction

University of Leicester Archaeological Services (ULAS) were commissioned by Mather Jamie Ltd. to carry out an archaeological field evaluation and LiDAR survey on land at New Lubbesthorpe, Leicestershire (SK 531 017). This archaeological work is in accordance with NPPF Section 12: Enhancing and Conserving the Historic Environment.

The site lies south of Leicester Forest East. The proposed site is a mixed use development. The report should be considered in conjunction with previous archaeological work undertaken for this development (Hunt 2008; Haddrell 2009; 2010; Jarvis 2011, 2015a, b,).

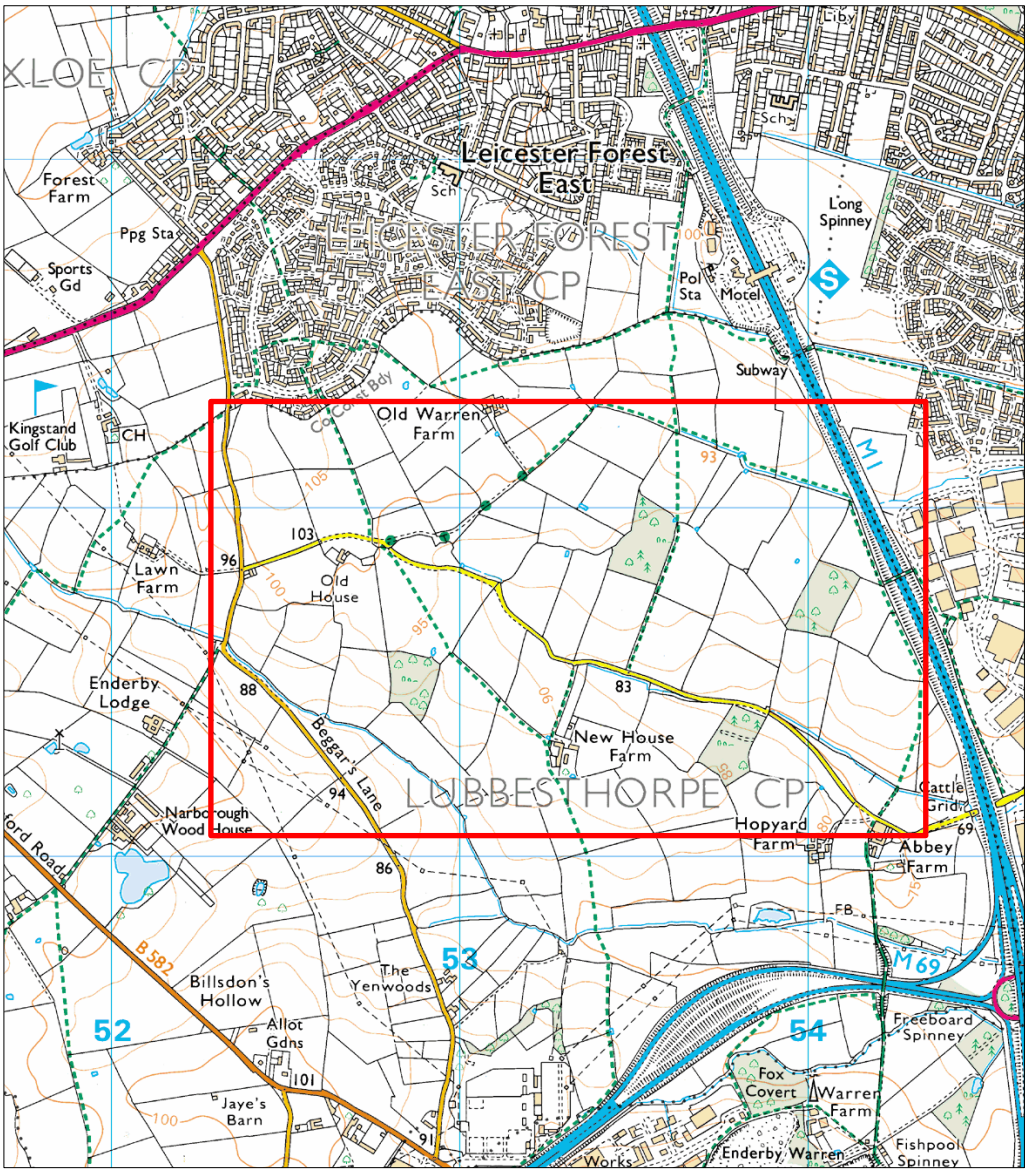

Figure 1: Site Location

Site Location, Details, Geology and Topography (Figure 1)

The proposed Phase 1 development area is located in the parish of Lubbesthorpe. The site is located south of Leicester Forest East, to the east and north of Beggars Lane, and straddling both sides of Lubbesthorpe Bridle Road (SK 531 017 centre). A provisional trench plan was agreed with the Leicestershire County Council (LCC) Principal Planning Archaeologist, although the size and position indicated on the provisional trench plan would be varied due to unforeseen site constraints or the presence of archaeological deposits.

The areas reported on here for evaluation purposes are a series of fields either side of Lubbesthorpe Bridle Road (Figure 2). These areas are

1: Proposed development areas Primary School/R2 Part 1 (SK 5285 0216),

2: Balancing Pond 4 (SK 5290 0187),

3: R8 Part 2, R10, R26 (SK 5253 0159),

4: R9, R11 road (SK 5304 0154),

5: R15 Part 5 (SK 5382 0197).

The site area is currently predominantly under grass, but with a few fields under arable crops, and is bordered on all sides by further agricultural land. The geology, according to the Ordnance Survey Geological Survey of Great Britain Sheet 156, is likely to consist of alluvium and river gravels overlying boulder clay and Mercia Mudstone, http://mapapps.bgs.ac.uk/geologyofbritain/home.html. The land falls north to south and varies between *c*.85m-101m OD.

Historical and Archaeological Background

An Archaeological Desk Based Assessment (Hunt 2008), geophysical surveys (Haddrell 2009; 2010), a Landscape Assessment (Clay and Courtenay 2011), and targeted trial trenching (Jarvis 2011: 2015a, b, c) have previously been prepared.

The Historic Environment Record (HER) for Leicestershire and Rutland shows that there are known archaeological sites within the application area itself. There are also several archaeological sites in the vicinity of the assessment area. The following details the sites within the assessment area and the more relevant sites in the vicinity.

Prehistoric

The HER identified four prehistoric sites within the assessment area. A Middle Bronze Age palstave was discovered at a site close to the north-west corner of the assessment area (**MLE6268**). To the south of this, close to the site of the Old House, is a ring ditch cropmark, which most likely denotes the site of a Bronze Age barrow (**MLE218**). Sherds of Iron Age pottery were found during fieldwalking close to Abbey Farm (**MLE7386**). Iron Age coins have been found around 1km to the south-west of Area 1 (**MLE8487**, **MLE9080** & **MLE9081**). North of Fishpool Spinney an assemblage of prehistoric flint tools were found, including a blade and scraper (**MLE7375**) with a further scatter nearby (**MLE7376**). To the south-east of Fishpool Spinney a scatter of flint tools dated to the Early Neolithic to Bronze Age have been discovered (**MLE7378**). Close by is a group of Bronze Age pottery that may suggest an occupation site (**MLE6259**). Excavations at Grove Park, which lay around 500m to the east of Area 2, have revealed a large Iron Age occupation site (Clay 1992; Meek, et al 2004; **MLE79, MLE112, MLE113**). Neolithic finds were also discovered during these excavations (**MLE7123**). Previous evaluation and mitigation work on site has identified a small Bronze Age cremation cemetery to the west of Old Warren Farm (Jarvis 2011, 2015a, b). A substantial Iron Age site was also identified in the south of the proposed site, adjacent to Leicester Lane, Enderby (ibid.).

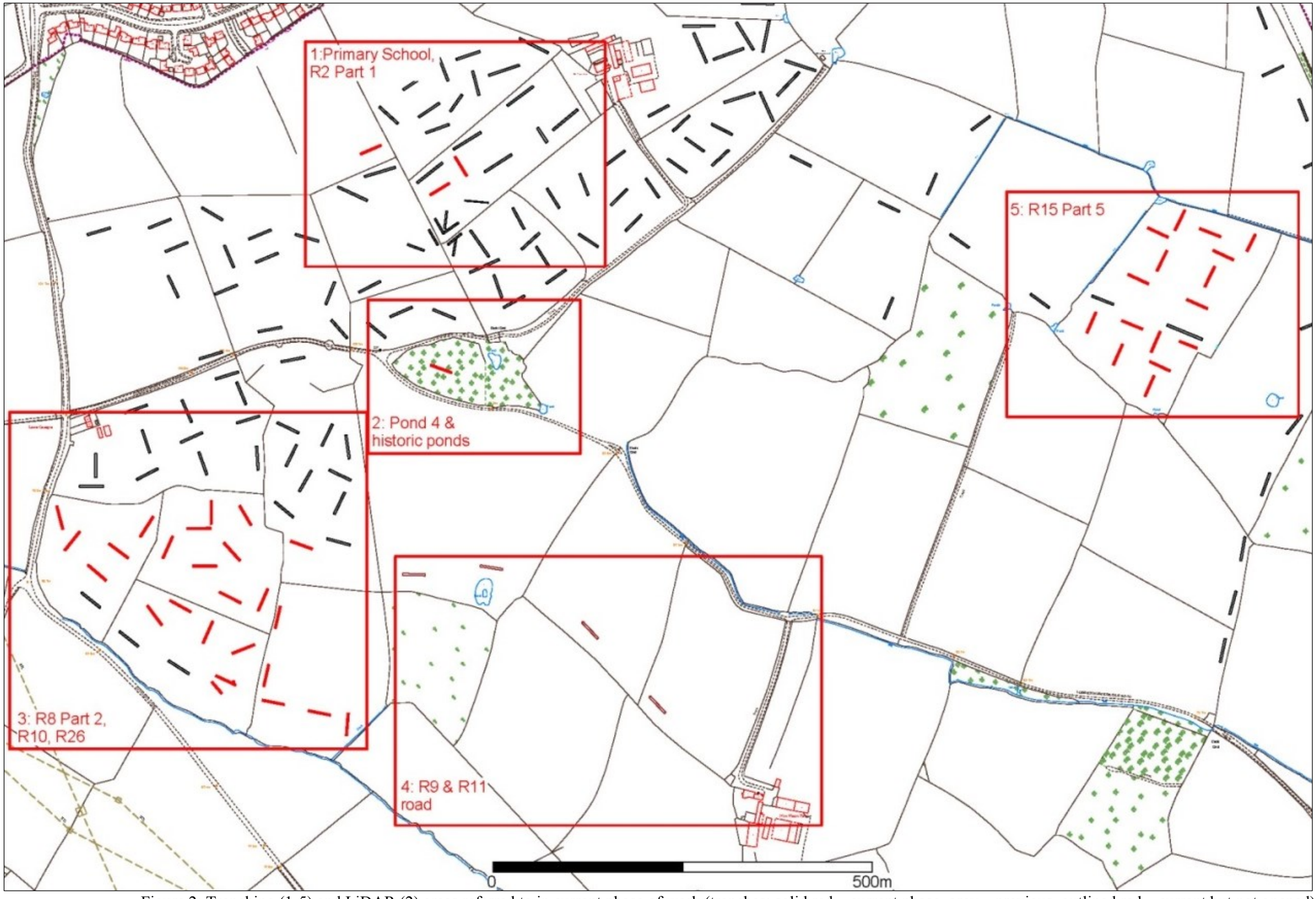

Figure 2: Trenching (1-5) and LiDAR (2) areas referred to in current phase of work (trenches: solid red – current phase, grey – previous, outlined red – current but not opened)

Roman

Inspection during a watching brief on a pipeline trench within the medieval earthworks at Abbey Farm revealed Roman pottery and other possible occupation evidence (**MLE219**) (Field Archaeology Section Leicestershire Museums 1975). There are also several sites dated to the Romano-British period (*c*. AD 43-410) to the west of the assessment area. These include a late Roman crossbow brooch found just to the west of Beggars Lane (**MLE7716**), a coin hoard found around 800m to the west of Beggars Lane (**MLE16619**) and a large number of artefacts such as brooches, coins and a mortared floor, suggesting a high status building (**MLE5979**; Gossip 1997). Further indication for Roman occupation in this area is in evidence (**MLE8347** & **MLE8488**). Roman pottery and tile are also known from the east side of the assessment area (**MLE223** & **MLE7717**). Close to Fishpool Spinney, fieldwalking has revealed pottery and kiln bars dated to the Romano-British period (**MLE84**). In the northern part of the area, close to the M69 a Romano-British key tumbler (lock) has been found (**MLE9797**). Several Roman coins and other metal artefacts have been found in the Grove Park area (**MLE7686** & **MLE7684**). Previous work on the current site identified a small amount of Roman material perhaps associated with quarrying (Jarvis 2011).

Anglo-Saxon

Fieldwalking close to Abbey Farm has produced sherds of Early Anglo-Saxon pottery (*c*. AD 410-650), which may be evidence of a settlement site (**MLE233**); further pottery from the Late Saxon period (*c*. AD 850-1066) was found nearby (**MLE234**).

Medieval

The most significant site within the assessment area is the Scheduled Monument of Lubbesthorpe deserted medieval village (DMV;**MLE216** and SM30274). This monument includes the remains of the medieval settlement and part of the adjacent field systems at Abbey Farm. The remains consist of earthworks and other buried features. These features represent the gradual contraction in size of the medieval village and its eventual abandonment. Several building platforms in the shape of low sub-rectangular mounds are visible to the south of the Lubbesthorpe Bridle Road, along with boundaries and trackways. To the east and west of the settlement are the strips of heavy medieval ploughing known as ridge and furrow. These appear to run north to south and are divided into groups by larger parallel ditches. There are also up to five terraced rectilinear enclosures or paddocks to the immediate south of the stream, which were once visible on aerial photographs but have more recently been obscured by soil tipping. These deposits have also covered further building platforms and a pond.

Archaeological work to the north and north-east of Abbey Farm in advance of pipeline construction revealed evidence of medieval settlement in the form of stone building foundations and post-holes. The evaluations also yielded pottery dated to the 13th and 16th centuries (Jarrett 1982). Medieval material was also identified during the current project to the north of the Lubbesthorpe DMV (Jarvis 2011). A geophysical survey carried out in 2007 revealed evidence of further archaeological features including trackways, enclosures and a possible boundary ditch (**MLE16845** & **MLE16846**). Further anomalies were located south of Hopyard Farm, although these may be associated with the

construction of the M69 (**MLE16847**; Chester 2007). A large fishpond, most likely of medieval origin is located east of the Old House at SK 529 019 (**MLE222**). A fishpond is mentioned in this area in 1295 and in 1348. A few hundred metres to the west of this area is a medieval rabbit warren (**MLE221**), which is also a Scheduled Monument (**SM30239**). During stripping for the M69 a scatter of medieval pottery was found (**MLE6646**), with a lead seal matrix close by (**MLE9798**). The fishpond at Fishpool Spinney is believed to be medieval in date (**MLE82**). There is a medieval fishpond within The Park (Area 2), which was once associated with the Enderby Hall estate (**MLE105**).

Post-medieval

The substantial remains of a 16th century house, with its own chapel, survive at Abbey Farm (see above; **MLE227**). The site of the kiln used to fire the Tudor style bricks used to build Abbey Farm may have been located by fieldwalking in 1992 (Liddle 1992) and by geophysical survey in 2007 (Chester 2007; **MLE231**).

Archaeological Objectives

The archaeological evaluation and LiDAR survey had the potential to contribute to the following research aims.

The Iron Age and Roman Periods (Taylor 2006; Willis 2006; Knight et al 2012; English Heritage 2012)

There are known Iron Age and Roman sites within the vicinity, including enclosures and a Roman road. The evaluation may contribute to knowledge on Iron Age – Roman transitions in rural settlement, landscape and society. Artefacts may identify trade links and economy.

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

The evaluation may contribute towards research into the origins and development of medieval settlement, landscape and society. Environmental evidence could provide information on local environmental conditions as well as settlement activity, craft, industry and land use. Artefacts can assist in the development of a type series within the region and provide evidence for evidence for craft, industry and exchange across broad landscape areas. The evaluation 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.*

The main objectives of the evaluation were:

- To identify the presence/absence of any archaeological deposits.
- To establish the character, extent and date range for any archaeological deposits to be affected by the proposed ground works.
- To produce an archive and report of any results.

Within the stated project objectives, the principal aim of the evaluation is to establish the nature, extent, date, depth, significance and state of preservation of archaeological deposits

on the site in order to determine the potential impact upon them from the proposed development.

Trial trenching is an intrusive form of evaluation that will demonstrate the existence of earth-fast archaeological features that may exist within the area.

Methodology

All work followed the Chartered Institute for Archaeologists (CIfA) *Code of Conduct* (2014) in accordance with their *Standard and Guidance for Archaeological Field Evaluation* (2014). The archaeological work followed the *Written Scheme of Investigation for archaeological work* (WSI) prepared by ULAS.

Results

The evaluation consisted of 45 trenches detailed below and was carried out predominantly in December 2015. The LiDAR survey was undertaken in January 2015, with a site visit to confirm the features on the ground being undertaken on 25/01/16. The trenches, contexts, etc., are numbered consecutively following the sequence started during the 2011 evaluation (Jarvis 2011, 2015a, b). Cut numbers are recorded in square brackets, e.g. [166], while fills are in round brackets (167).

Evaluation Results

The trenches were located as proposed in the WSI where possible. Minor alterations were made to the location and alignments of trenches in R10 due to soil bunds from the adjacent groundworks to the north. An additional 20m trench (T232) was excavated to identify the spread of features nearby to T214. All other trenches were 30m long. The updated trench locations are shown in Figure 5. Trenches were excavated by a JCB type excavator with a ditching bucket under archaeological supervision. After excavation and recording the trenches were backfilled.

Area 1

Area 1 was the location of the proposed Primary school and R2 Part 1 was an area that was previously unavailable for trenching. The three trenches here were sited north of an area of archaeology consisting of a small cremation cemetery of middle Bronze Age date (Jarvis 2015a). The three additional trenches did not identify any further archaeology or unstratified artefacts.

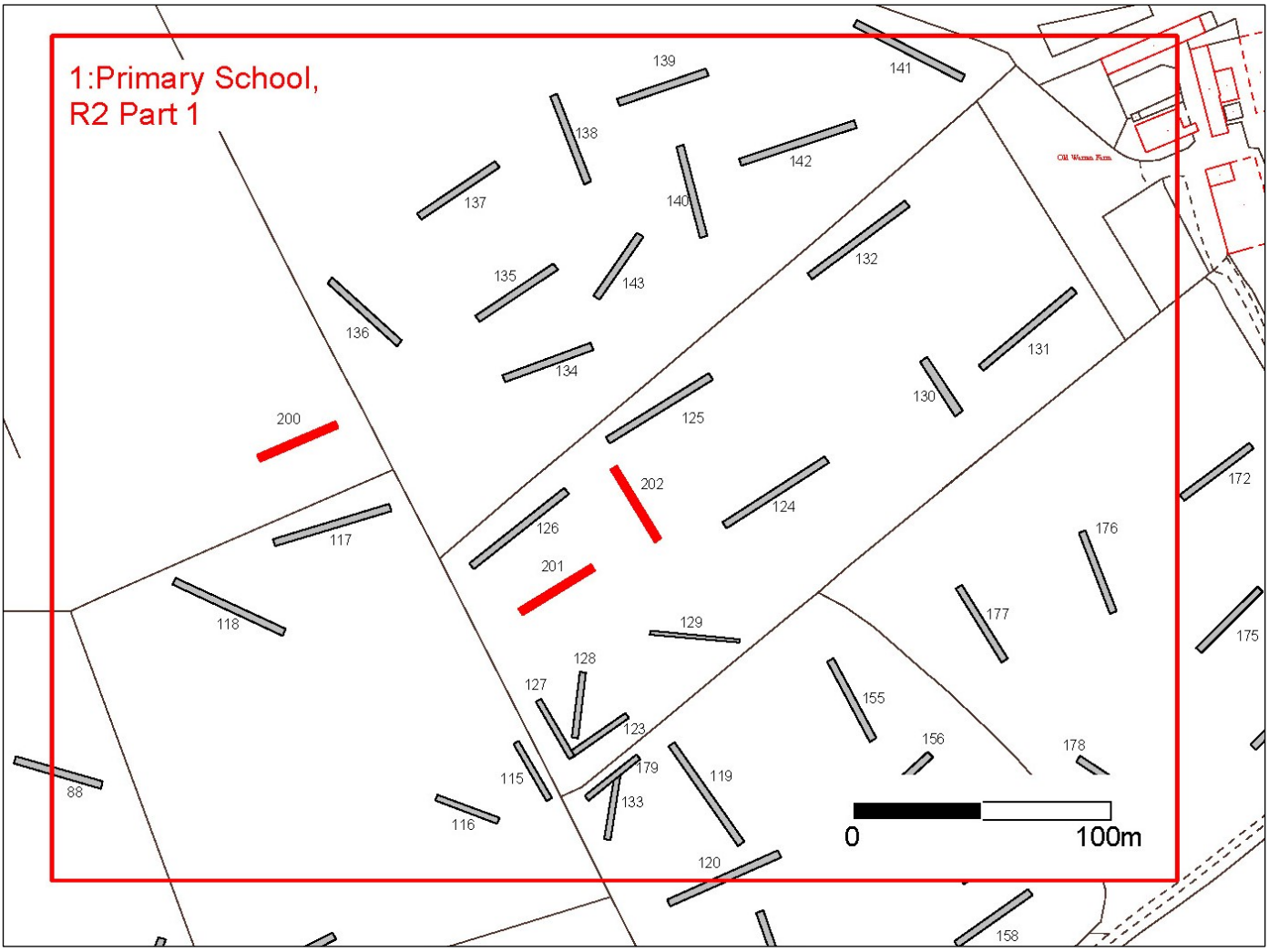

Figure 3: Area 1 trenches in current phase of fieldwork (red), in relation to previous work (grey)

Area 2

Area 2 consisted of evaluative trenching of the proposed balancing pond 'Pond 4' and a LiDAR study just to the east, of earthworks thought to be medieval fishponds (Figure 4).

The area of proposed Pond 4 is in woodland. The woodland is clearly of a recent date, with the floor of the area being very flat. This area was meadow until 20 years ago, when it was ploughed before being planted with saplings (Brian Griffiths, gamekeeper, pers. comm.). The tree cover has now been removed and trench T203 was excavated. This identified a standard sequence of topsoil, subsoil and natural. No features were exposed and no artefacts were recovered. The LiDAR survey is reported below (see below).

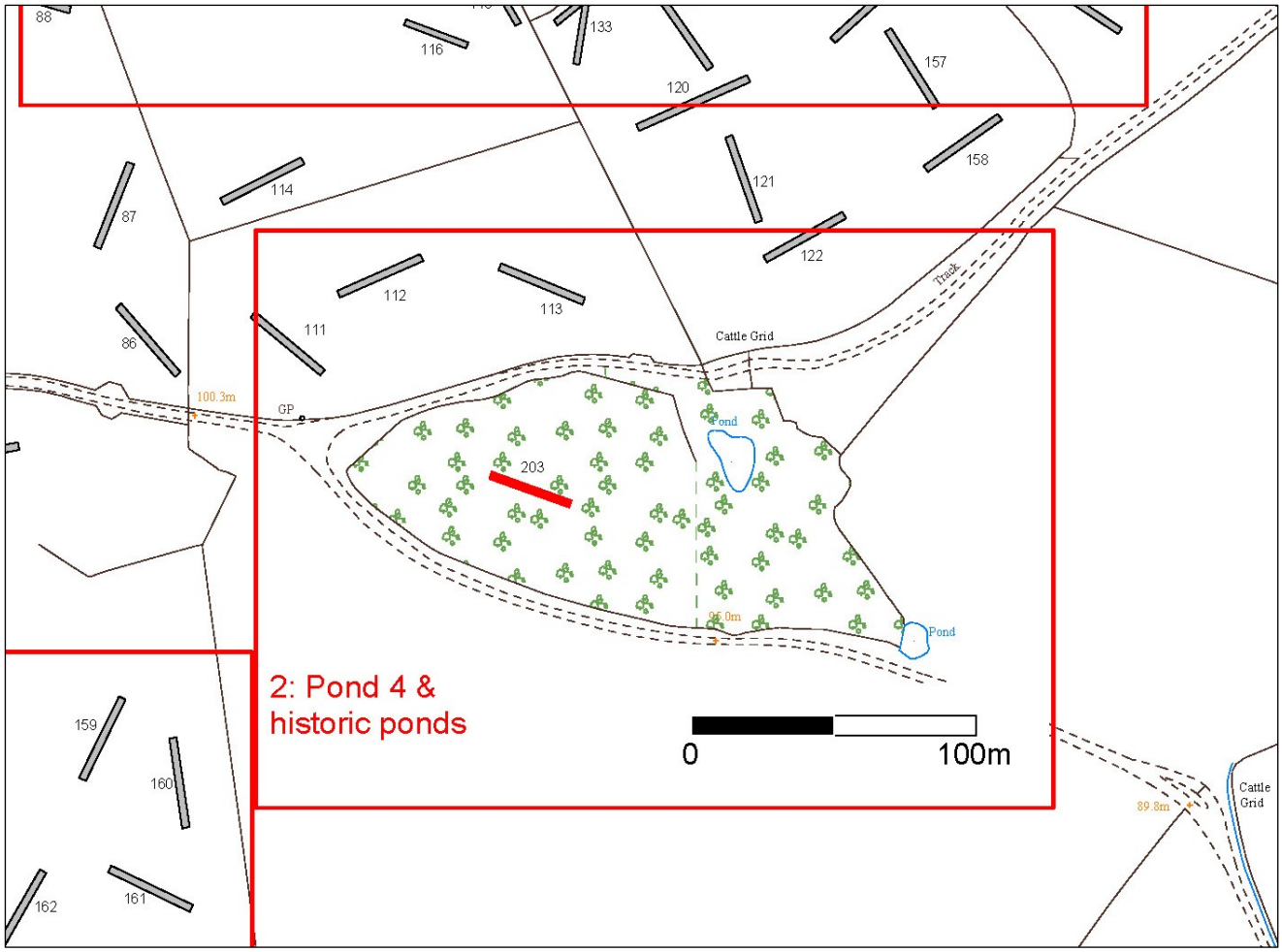

Figure 4: Area 2 Trench T203 in proposed balancing Pond 4 area, and historic ponds to east

Area 3

Area 3 consisted of the proposed residential areas R8 Part 2, R10 and R26 and incorporated Ponds 5, 7 and a proposed new pumping station and its access road (Figure 5). The majority of these trenches were negative. A single sherd of Roman pottery was recovered from the spoil of Trench T227. Six further unstratified Roman sherds have been recovered from Trenches T164 and T165 some 200m to the east (Jarvis 2015a), perhaps indicating some Roman activity in the environs. The closest features to these findspots are two linear features identified in Trench T208 in the current work (development area R8 Part 2).

Further features were identified in Area 3, in T214 (proposed footprint of Pond 7) and in trench T217 (R10). To the south of T214 a further trench T232 was therefore excavated also within the footprint of Pond 7; this trench was negative.

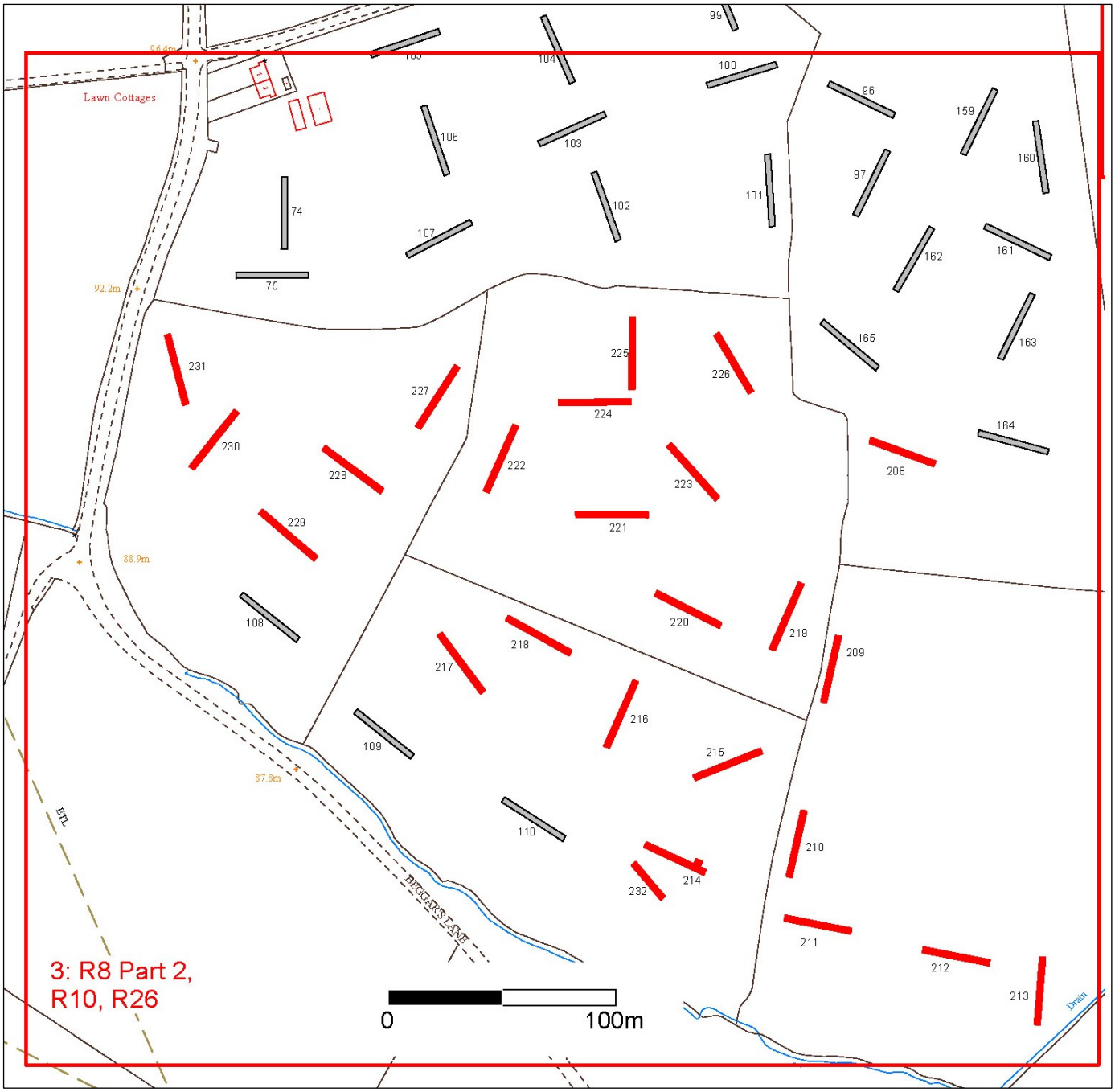

Figure 5: Area 3 trenches in current phase of fieldwork (red)

Trench T208

Two undated linear features were exposed in Trench T208 (Figure 6). These linear features were running perpendicular to each other and were perhaps unrelated. Linear feature [223] at the west end of the trench was 1m wide and 0.25m deep, with a single clean fill (224) (Figure 8). The smaller linear feature [221] to the east was 0.58m wide and 0.24m deep also with one single sterile fill (222) (Figure 7). Neither feature produced any

finds, but may possibly be related to the few finds of Roman pottery from the environs (see above).

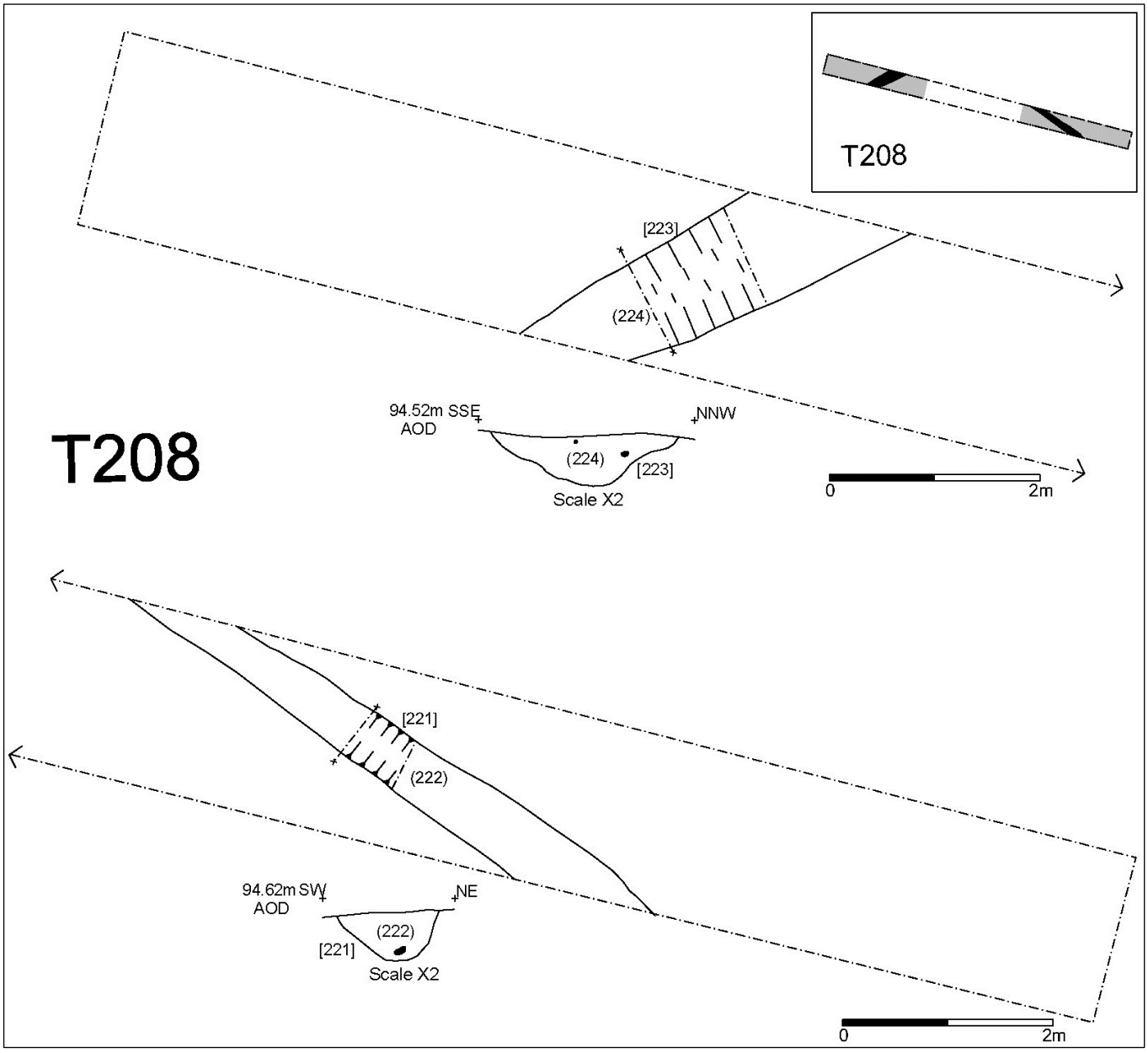

Figure 6: Trench T208, undated linear features

Figure 7: Trench T208, linear feature [221]

Figure 8: Trench T208, linear feature [223]

Trench T214

In Trench T214 a series of features were identified, and although somewhat irregular in plan they contained struck flint and charcoal and had convincing profiles. The fills have been affected by seasonal waterlogging and were very grey in appearance. The trench is sited only slightly upslope from a stream course and alluvial deposits have been identified previously in this area (Jarvis 2015a). At least three of the features [225] [227] and [229] were probable pits. Feature [225] measured 1.1m across by 0.65m wide and with a depth of 0.24m (Figure 11). The single fill (226) did not produce any dating evidence. Feature [227] measured 1.9m across by 1m and with a depth of 0.43m. The fill (228) was a charcoal-rich silty clay from which worked flint was recovered. Feature [229] measured 1.3m by 0.85m and with a depth of 0.48m (Figure 11). The lowest fills were re-deposited natural substratum, while above this were two further fills (231) and (230) which were relatively sterile. The upper fill (230) included worked flint. Features (250) (251) and (252) were exposed after a short extension to Trench T214 was stripped continuing to the north of the trench features. These were not excavated but are most likely related features (Figure 12). Feature (250) was quite stony and probably a post-hole, and measured 0.51m across. Feature (251) may have been a recut into feature [227], measured 0.8m across, and contained larger stone fragments. In the north of the trench extension a further feature was exposed context (252). In plan this measured 0.66m in length and 0.3m wide, and was probably the butt-end of a gully. The assemblage of flint from these features and from unstratified levels in the trench probably includes some early and later lithic material, all of which is fresh in appearance. It is possible that there is Palaeolithic/Mesolithic material residual in later features, and the features could be of a late Neolithic/Bronze Age date (see below). Unfortunately no pottery was recovered from the evaluative work. The features contained some charcoal and assessment of samples taken with a potential for recovery of charred material indicates that there is suitable material for radiocarbon dating (see below).

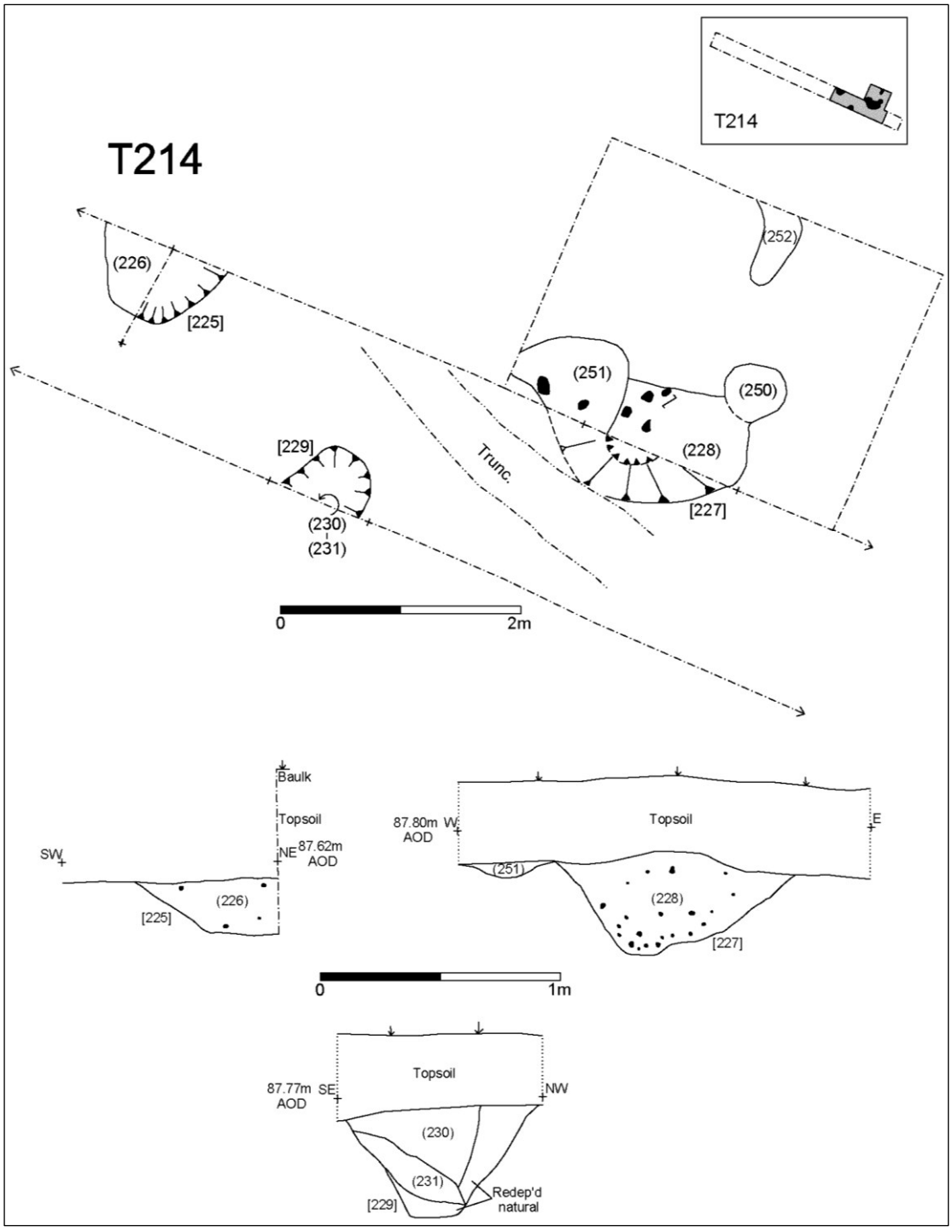

Figure 9: Trench T214, features

Figure 10: Trench T214, feature [225]

Figure 11: Trench T214, feature (230) [229]

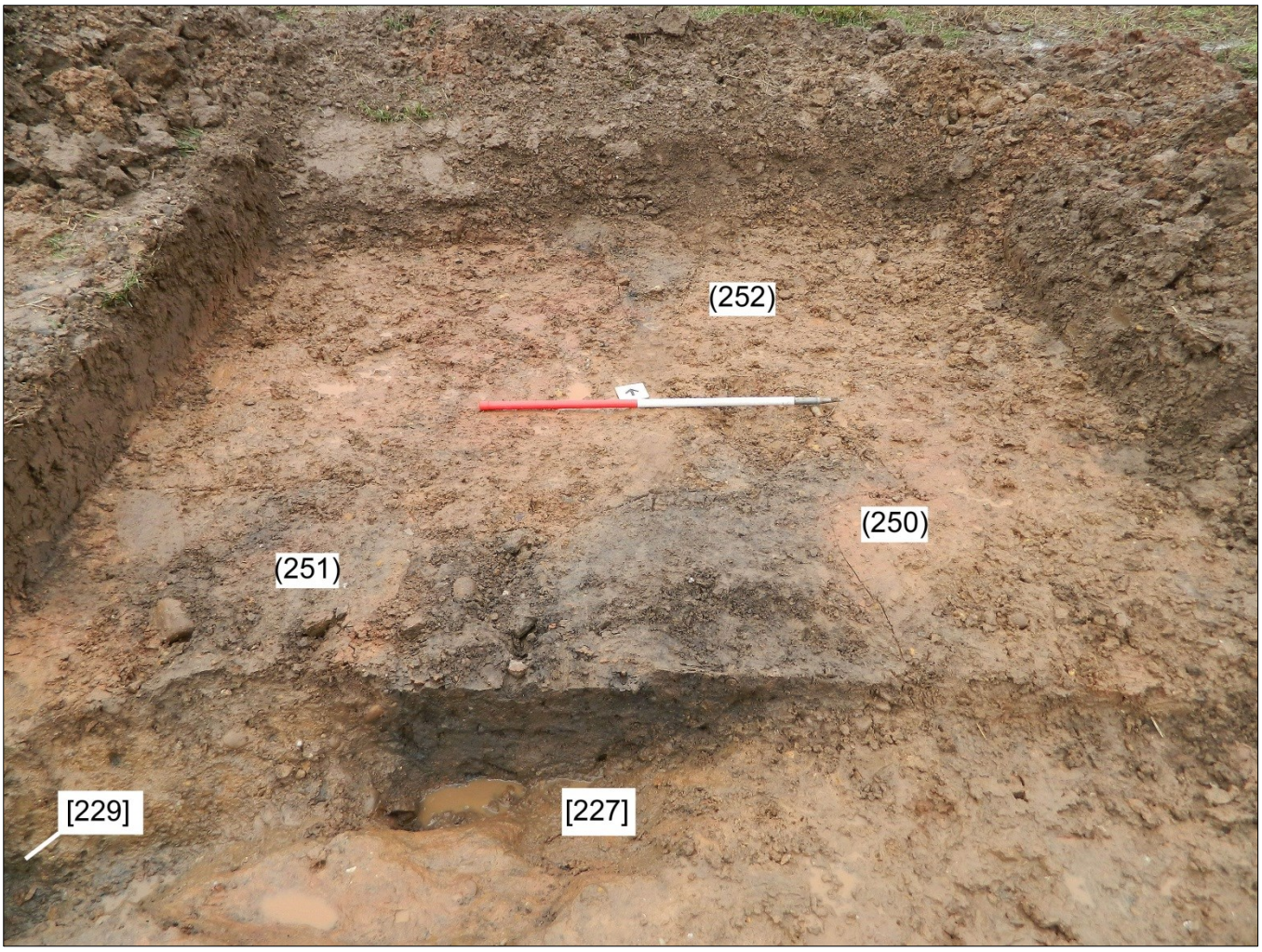

Figure 12: Trench T214, features exposed and extension

Trench T217

Several features were exposed in Trench T217. Two almost parallel linear features [244]/[246] and [248] were observed at the south end of the trench (

Figure 13). These were 2.8m apart and on a north-north-east to south-south-west alignment. Ditch [244] measured 1.07m wide and 0.47m deep (Figure 14). Two fills were observed (245) and an upper fill (247) the latter appearing to be a recut [246]. Fill (245) was a (leached) light grey silty-clay with a concentration of charcoal at the base. Fill (247) also had frequent small charcoal fragments throughout a dark brown sandy clay matrix. Gully [248] measured 0.58m wide by 0.18m deep, and had a single fill (249) (Figure 15). Fill (249) was a sterile grey brown silty-clay.

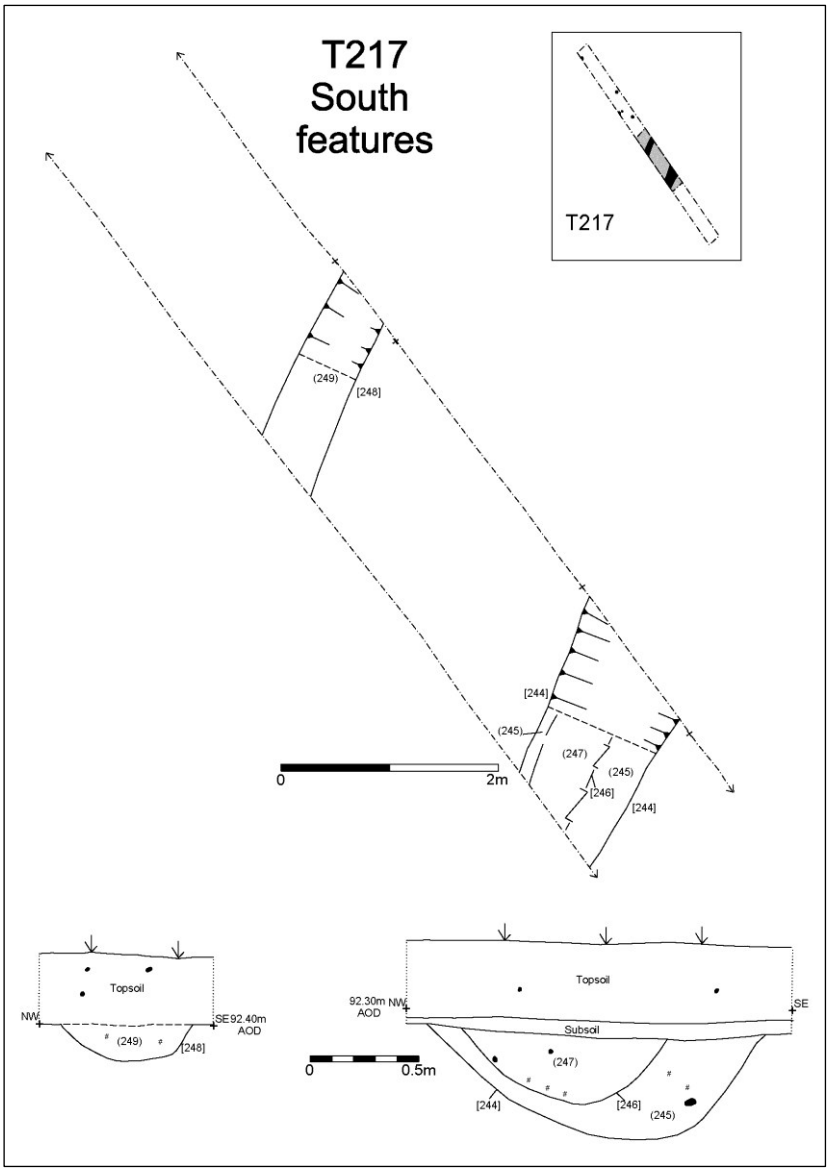

Figure 13: T217 South end

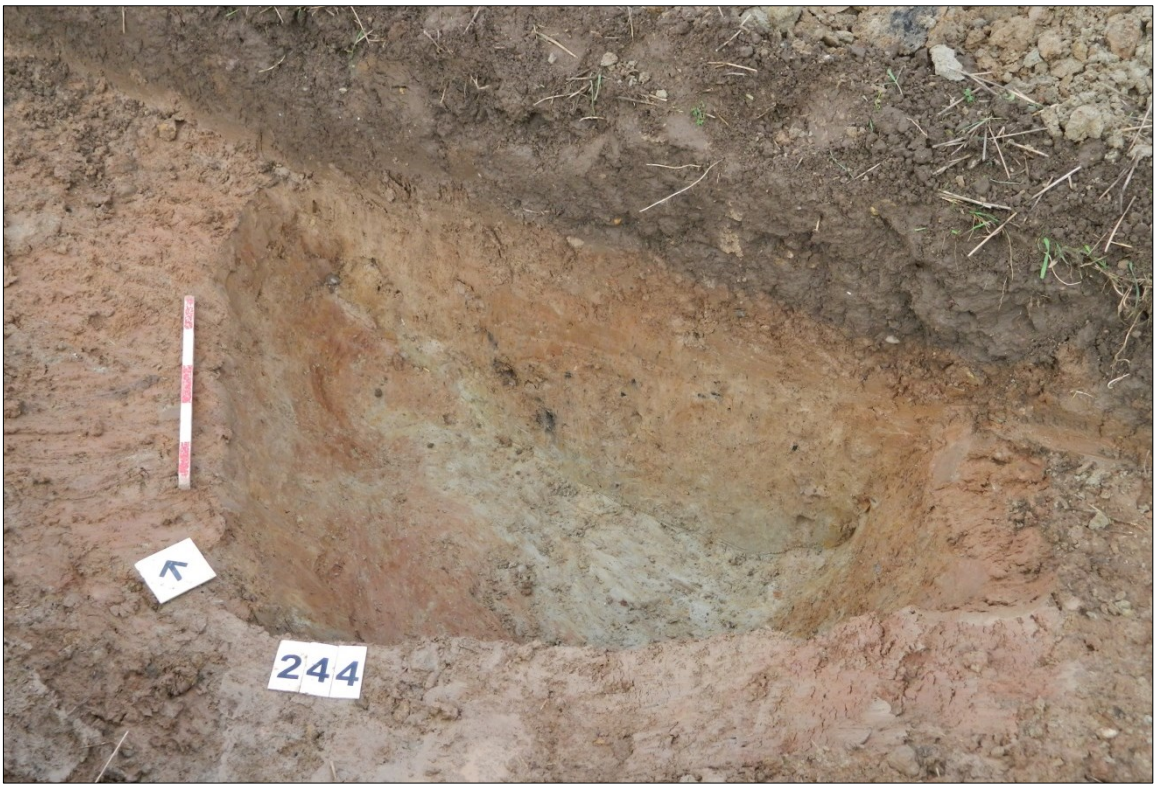

Figure 14: T217 Linear feature [244]

Figure 15: T217 Linear feature [248]

Further north in T217 five small features were examined, [234] [236] [238] [240] and [242] (Figure 16 - Figure 17). The features were similar in form, circular, mostly steep-sided, measuring between 0.16-0.3m in diameter and with a depth of between 0.07-0.15m. They may be small post-holes, or possibly agricultural in origin. Only one of these produced any finds, a single small flint flake recovered from (237) [236], although charcoal was observed in this and the other somewhat silty fills, with fill (235) being very charcoal-rich.

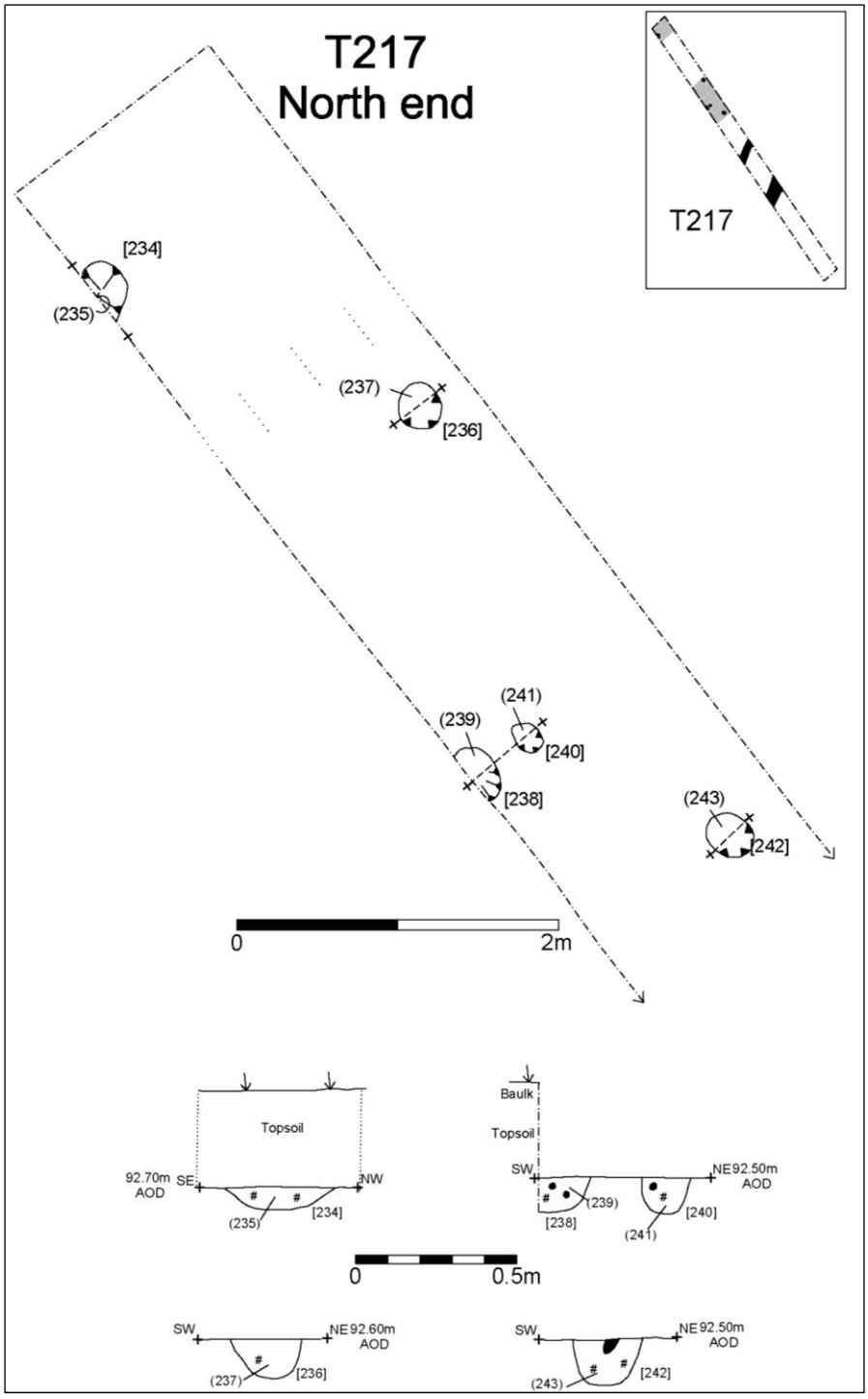

Figure 16: T217 North end

Figure 17: T217 ?Post-holes [238] and [240]

Area 4

Area 4 consisted of a proposed new roadline east from Area 3 and towards New House Farm (Figure 18). These fields were still tenanted and had a crop, and could not be excavated during the current phase of evaluation.

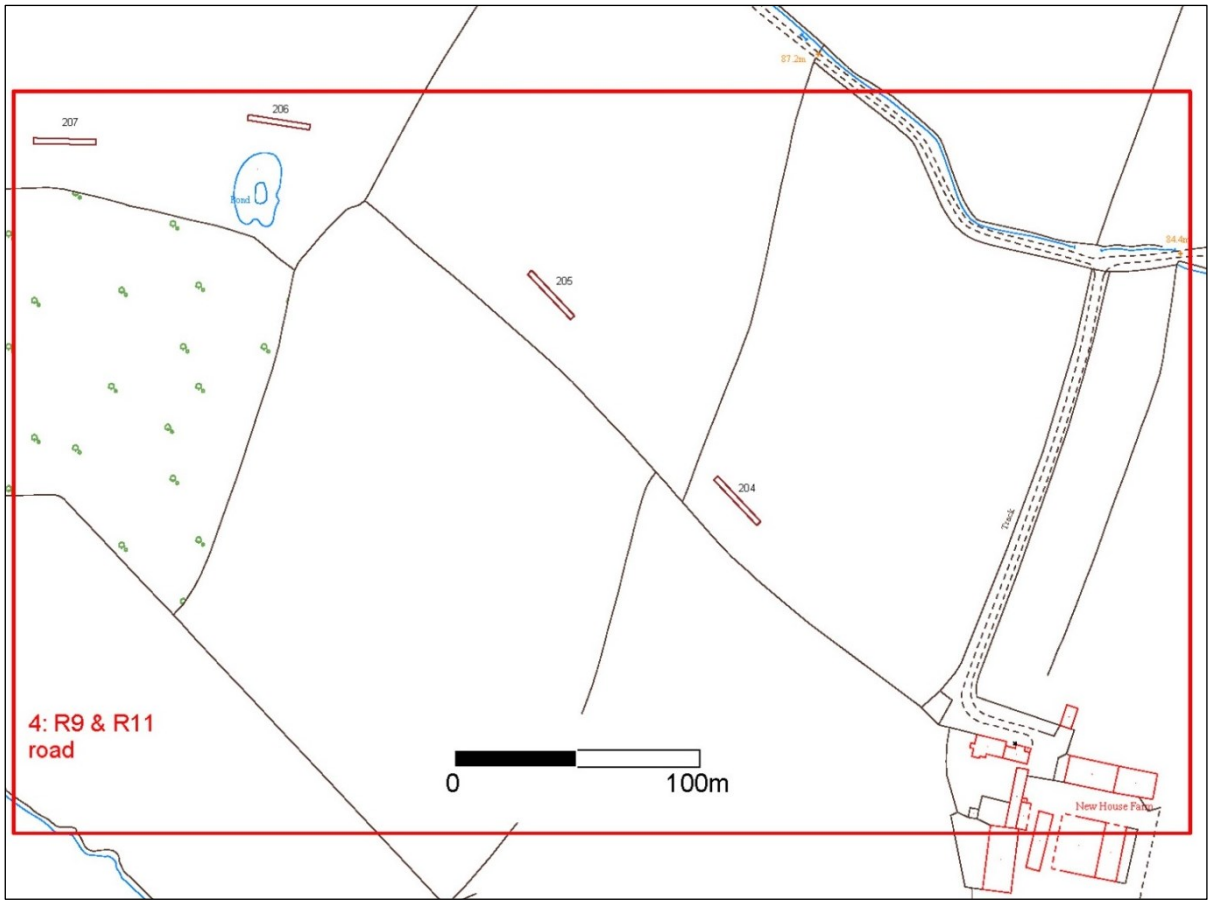

Figure 18: Area 4 proposed trenches (not excavated) in R9 and R11 road

Area 5

Area 5 consisted of the proposed residential area R15 Part 5 (Figure 19). The roadline through R15 Part 5 has previously been trenched (T182 and T183 on Figure 19) and identified several features with some prehistoric material (Jarvis 2015b). Sixteen further trenches were opened in this field, but these did not identify any further archaeology and only a few finds of worked flint were recovered. This indicates that the extent of the prehistoric activity previously identified is very limited in extent, and the features are quite isolated.

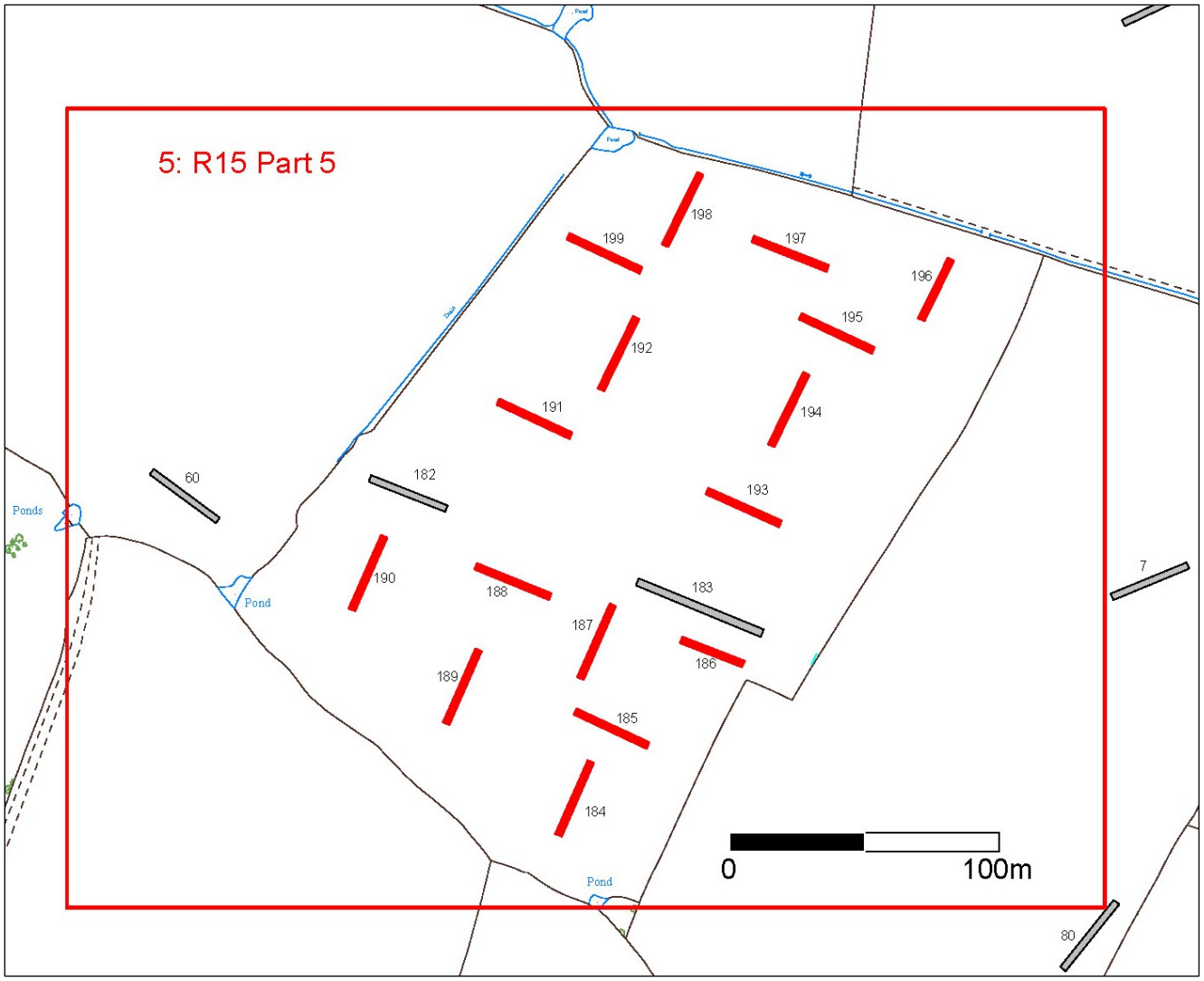

Figure 19: Area 5 trenches in current phase of fieldwork (red), and previous trenches in grey (T182 and T183 with archaeology)

LiDAR Survey by *M. Beamish*

Introduction

Archaeological earthwork survey by aerial LiDAR study for land adjacent to the Old House, Lubbesthorpe, Leicestershire (SK 5290 0187) was undertaken. The assessment was part of a staged archaeological programme in advance of mixed use development.

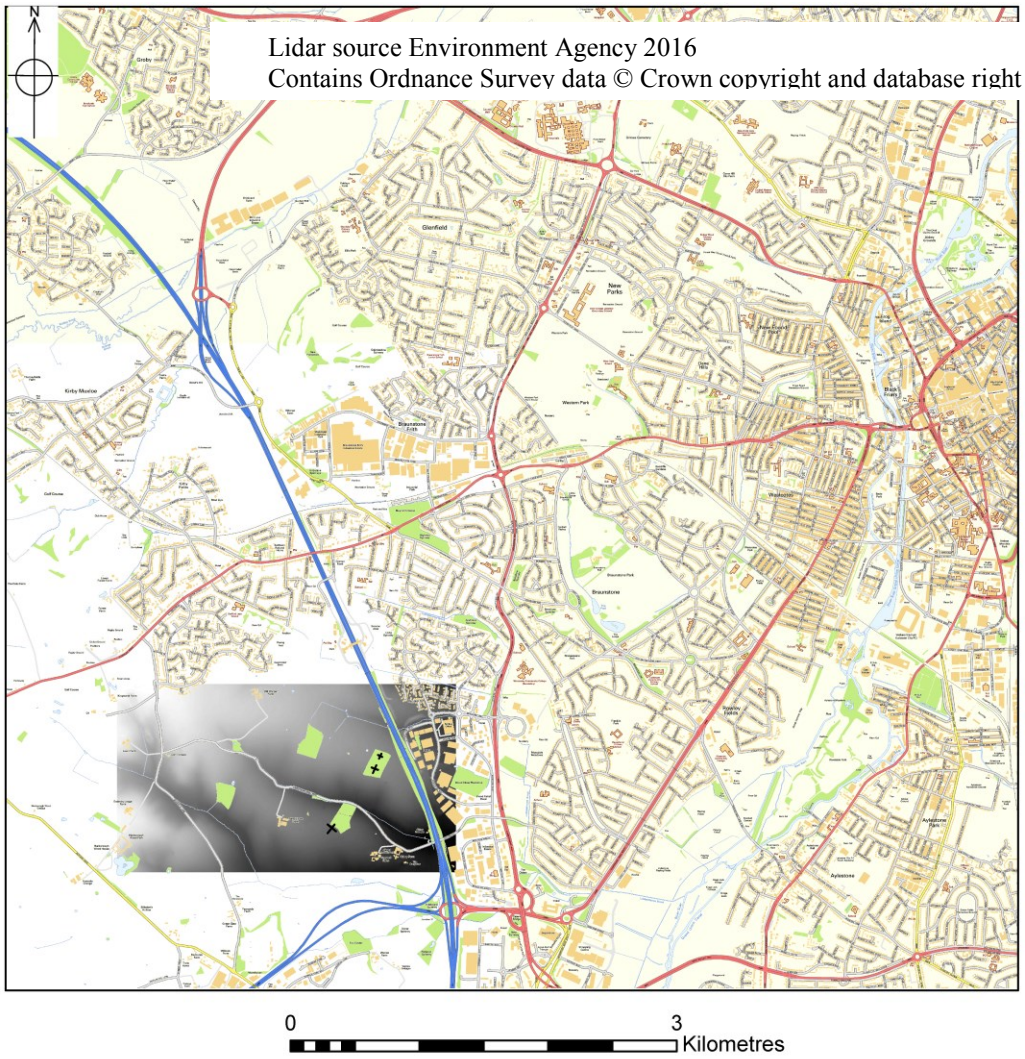

Figure 20: 2014 1m LiDAR elevation data processed for this assessment in relation local area

Aim of the Survey

A fishpond (MLE222) is recorded on the Historic Environment Record (see p.1, Figure 23). The earthwork was surveyed and published as part of the Leicestershire Medieval Earthworks series (Hartley 1989, 58 & 65), and the survey plan is reproduced below (Figure 21). The earthworks were described as "a large embanked fish pond, now dry" (*ibid*., 58).

The overall aim of the LiDAR survey was to accurately record the location and extent of these earthwork features, specifically remains interpreted as those of a medieval fish pond (MLE222). The earthworks have survived in woodland to the east of Beggars Lane at SK 52870 01505. LiDAR study would also enable the placing of the earthworks in a topographic context that may allow further interpretation. LiDAR also facilitates the accurate mapping of earthwork features within a geographic coordinate system and can refine existing records which have been based upon ground based recording systems used in conjunction with aerial photographs.

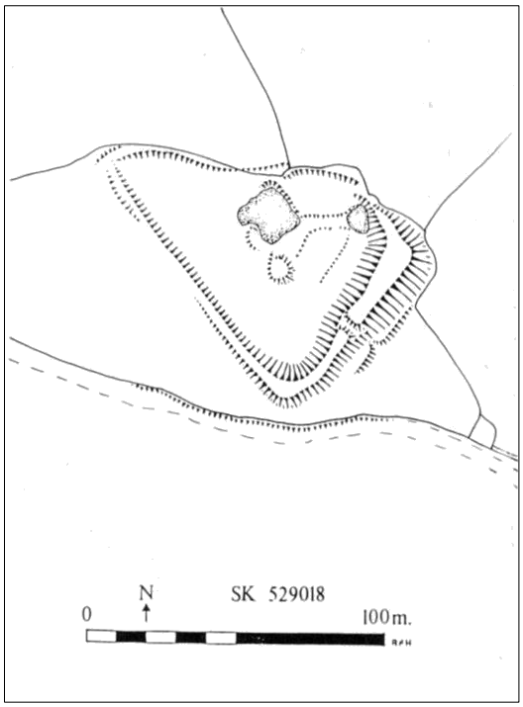

Figure 21: Earthwork survey of Fishpond (MLE222) (after Hartley 1989, 69)

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=SK50).

The LiDAR data had been collected in 2014: details of the data source are as yet not available from the Environment Agency. The data was acquired in DTM format that has been filtered to remove obstructions such as buildings and vegetation 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.

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 4322. 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).

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 '16558_Lubbesthorpe.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.'DTM315451') and saved to '16558_Lubbesthorpe.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. 'Lubbesthorpe_1mDTM_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. Profile drawings were exported to CAD software for reproduction at consistent scales.

Water Level

Water levels within the earthwork were simulated by creating flat shapefile polygons of an area slightly larger than the known earthwork with height values at 93.5, 94, 94.5 and 95m AOD. These shapes were incorporated into the 3d viewer (ArcScene) and rendered above the earthworks to help illustrate how the pond may have functioned.

Existing Survey

The previously published survey of the feature (Hartley 1989) was imported into the GIS. The image was georeferenced using map layers and is reproduced in conjunction with the LiDAR data below (Figure 23). Images were processed in standard raster image and CAD packages.

Results

There is good broad agreement between the hachure survey, and the LiDAR data. The plan-form is in the shape of a right-angled triangle 110m long by 78m wide. The most substantial earthwork is a bank in the south-east which is 68m long, 25m wide and up to 1.5m high (Figure 26, Figure 27 Profiles C& D, Figure 37). The bank is broken towards the south-west end.

The western edge of the pond is clearly defined and 103m in length. A bank can barely be detected on the western lip of the pond (e.g. Figure 26, Figure 27 Profile B, Figure 34-Figure 36). It is not possible to state if this bank was ever more substantial but as the pond is clear along its western edge as a negative feature, it is probable that the feature was for the most part dug out with the excavated material used in the substantial south-eastern bank. The feature appears to extend a depression in the landscape to the north, although there is no indication that this was a live watercourse (Figure 33).

An internal bank can be interpreted with confidence from the LiDAR data (Figure 26, Figure 27 Profile C). Hartley shows a number of internal features consisting of small mounds, and gullies or channels which are probably related to the use and management of the pond. The site visit confirmed that there are a series of internal earthworks, with water-filled and embanked areas (Figure 39-Figure 40, Figure 42). More detailed interpretation of the internal structures would require detailed on-site survey.

The fishpond lies over the 95m AOD contour (Figure 24) at the head of a gentle valley that runs south-east toward the village earthworks of Lubbesthorpe where the valley is more clearly defined (

Figure 30; SM1017213, MLE216, MLE227). Three small ponds survive on the margins of the fishpond, and these are mapped on the 1st and later editions of the Ordnance Survey (e.g. Figure 22).

A stream is shown on some of the Ordnance Survey maps, rising either just below the eastern most pond on the fishpond's margin (Figure 22, 1957), or 250m further to the south-east (Figure 27, 1886). The stream eventually joins the River Soar in Aylestone, to the west of King's Lock (SK 56581 00804) some 4km to the east-south-east.

Modelling of water levels (Figure 28) show that on the basis of the existing earthworks, the water level was probably between 94 and 94.5m. The northern part of the pond was probably always dry: a water level at 95m would have been well above the southern earthwork but would not have reached the northern corner. At between 94.5 and 94m the internal earthworks become increasingly exposed while at 93.5m only the deepest part of the pond are filled.

Given the wooded nature of the area, and the presence of standing water in areas of the earthwork, much of the filtered LiDAR data will have been interpolated. Therefore the interpretation of this data can only be tentative.

Discussion

Fishponds may be fed by different means (e.g. spring, stream, and river) and these will impact upon the water management features (e.g. bypass channels, leats and sluices) required for a successful pond (Chambers & Gray 1988 p116). Similarly the stocking system used will also be manifest in the complexity of earthworks – different ponds needed for breeding, rearing young, fattening of bred stock or introduced river fish, and stews for storing fish ready to be eaten.

There is no clear indication that the Lubbesthorpe pond was filled by a stream flowing into the pond, and it is assumed that the pond was fed by a spring: the smaller ponds on the fishpond's margins still hold water. Interpretation of the LiDAR shade plots indicates that the pond was constructed immediately adjacent with and downslope from a natural depression in the landscape (Figure 26, Figure 27 Profile A, Figure 33). Evaluation trench T113 which was opened in this area did not produce palaeo-environmental material and there was no indication of a substantial wet or marshy feature in this area (Jarvis 2015a).

The break in the substantial south-eastern bank may well represent a channel or sluice (Figure 38). A mechanism for controlling the water-level or for emptying the pond was necessary although it has been noted that an opening in a fishpond's dam, weakens the structure (cf. Figure 29).

There is no sign of internal ridge and furrow as has been identified in some ponds and interpreted as showing that some ponds were included in a wider rotation system of land-use (English Heritage 2011, p4). Some ridge and furrow is suggested to the south, north-east and west of the fishpond (Figure 25), though this is much plough eroded and not visible to the naked eye. The land to the immediate west of the pond has been ploughed within living memory (W. Jarvis pers. comm.).

The modelling of water levels does indicate that much of the northern area of the feature would never have held water.

Development Impact

The current proposals include the construction of a pond on the west side of the earthwork feature: this development will have a direct impact upon the western side of the existing feature (Figure 31).

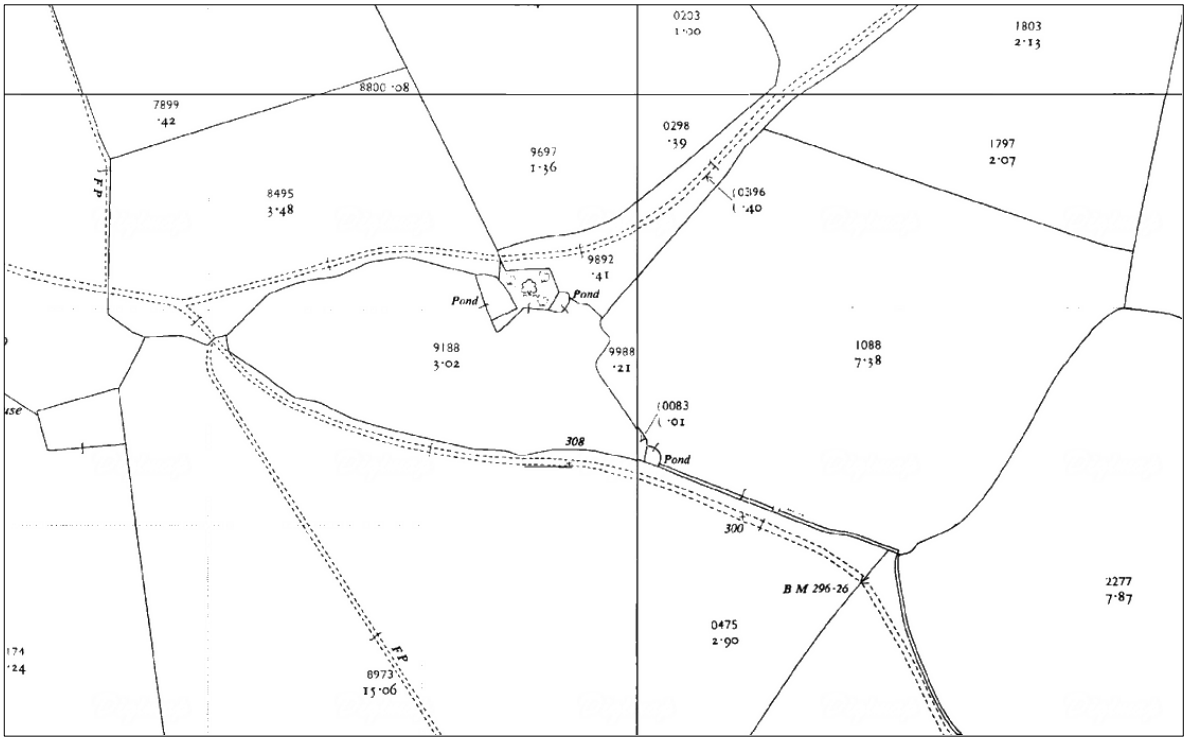

Figure 22: Ordnance Survey 1:2500, 1957, Extract from Sheet SK5201, showing three ponds on the perimeter of the fishpond earthwork. These features were recorded on the 1st edition mapping, but not annotated.

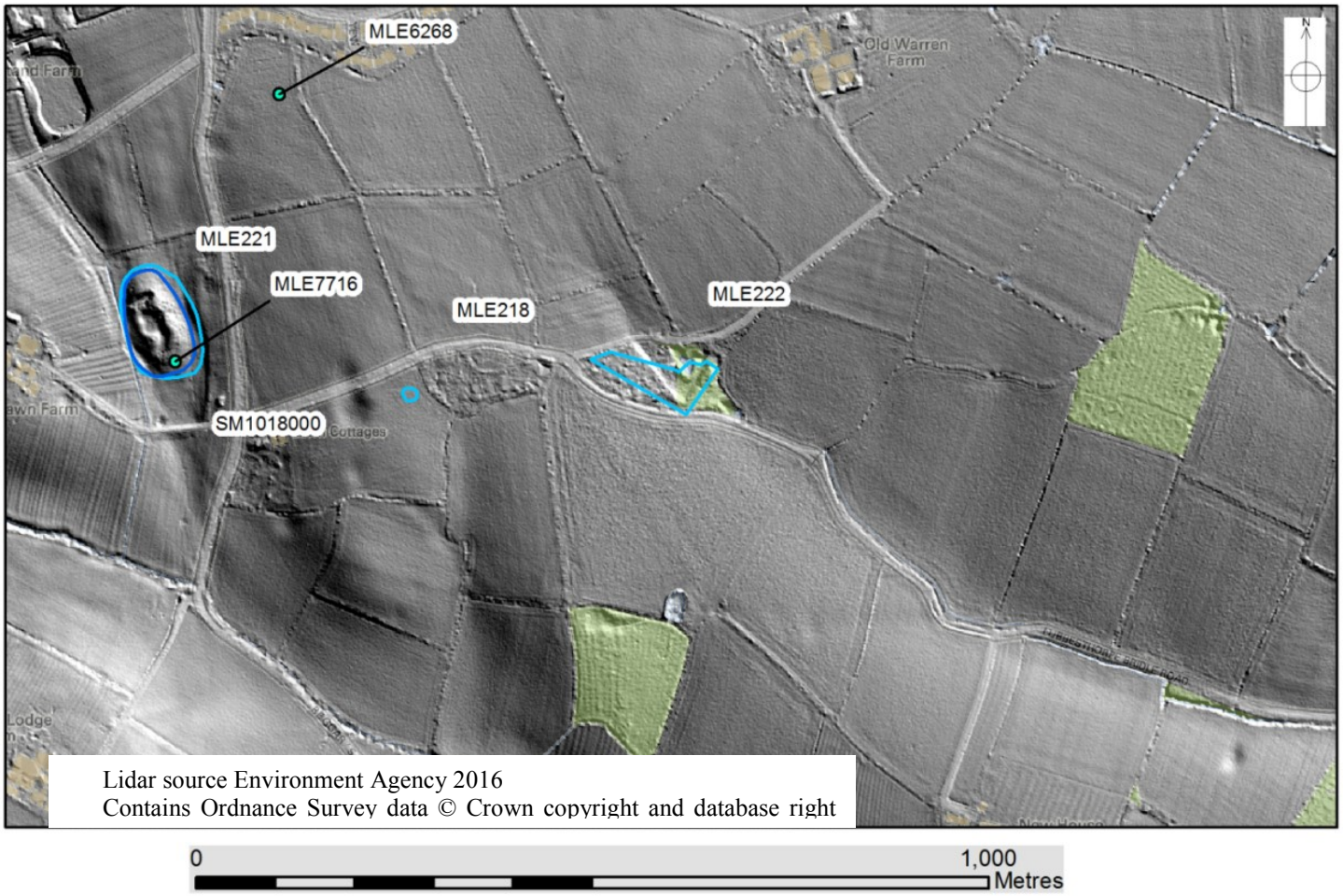

Figure 23: Hillshade from North-east, 30^{o} elevation with X 2 vertical exaggeration, (DTM045302) with Scheduled Monuments (dark blue), HER assets (light blue), and Ordnance Survey mapping.

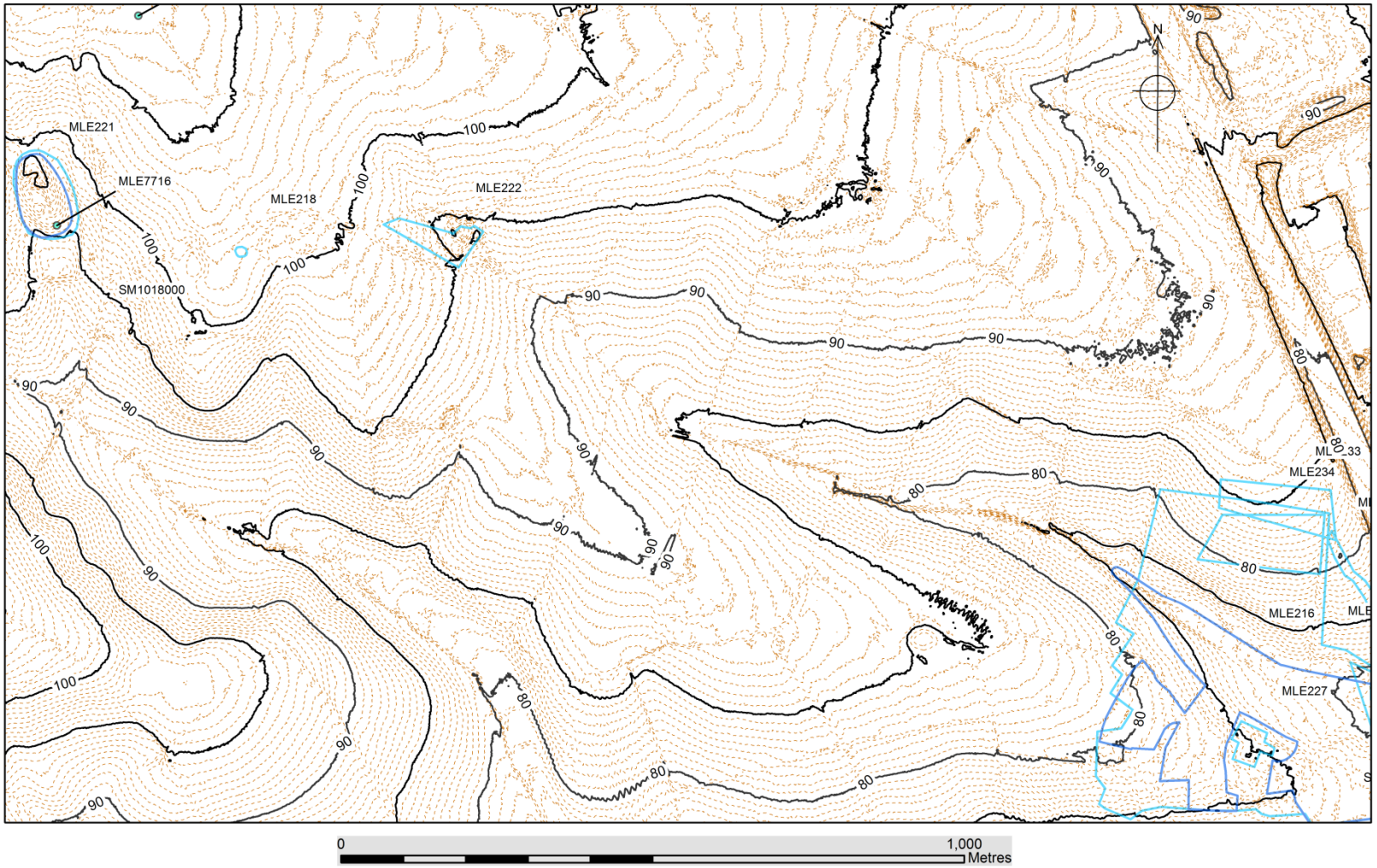

Figure 24: HER and Scheduled Monuments in relation to contours at 0.5m interval generated from 1m LiDAR DTM data.

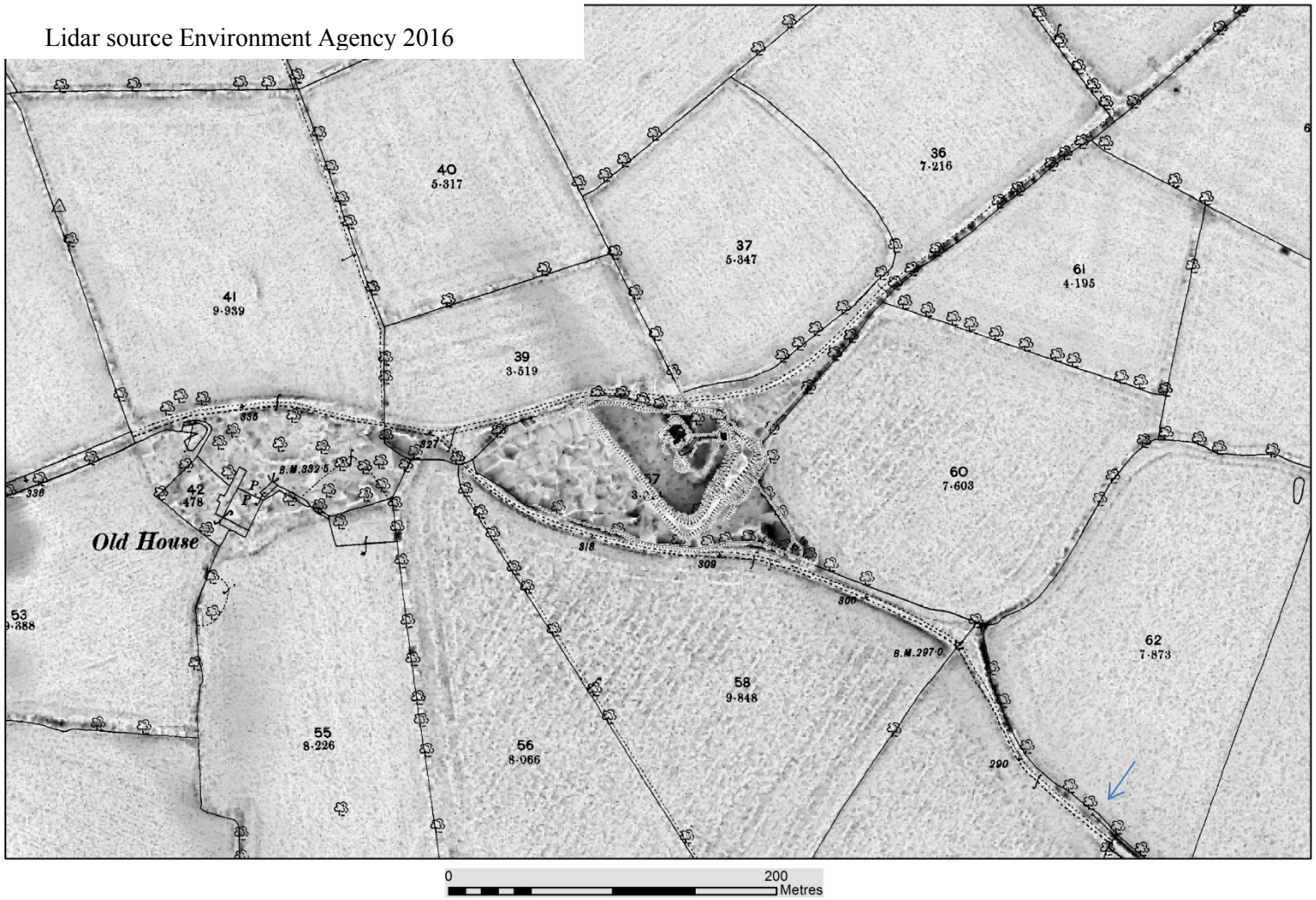

Figure 25: RVT positive openness analysis of the 1m DTM LiDAR data, with Hartley's earthwork survey, and 1st edition Ordnance survey County Series mapping 1:2500, 1886. Rising stream is arrowed in south-west. Possible ridge and furrow visible to immediate north-west, south and east of the fishpond.

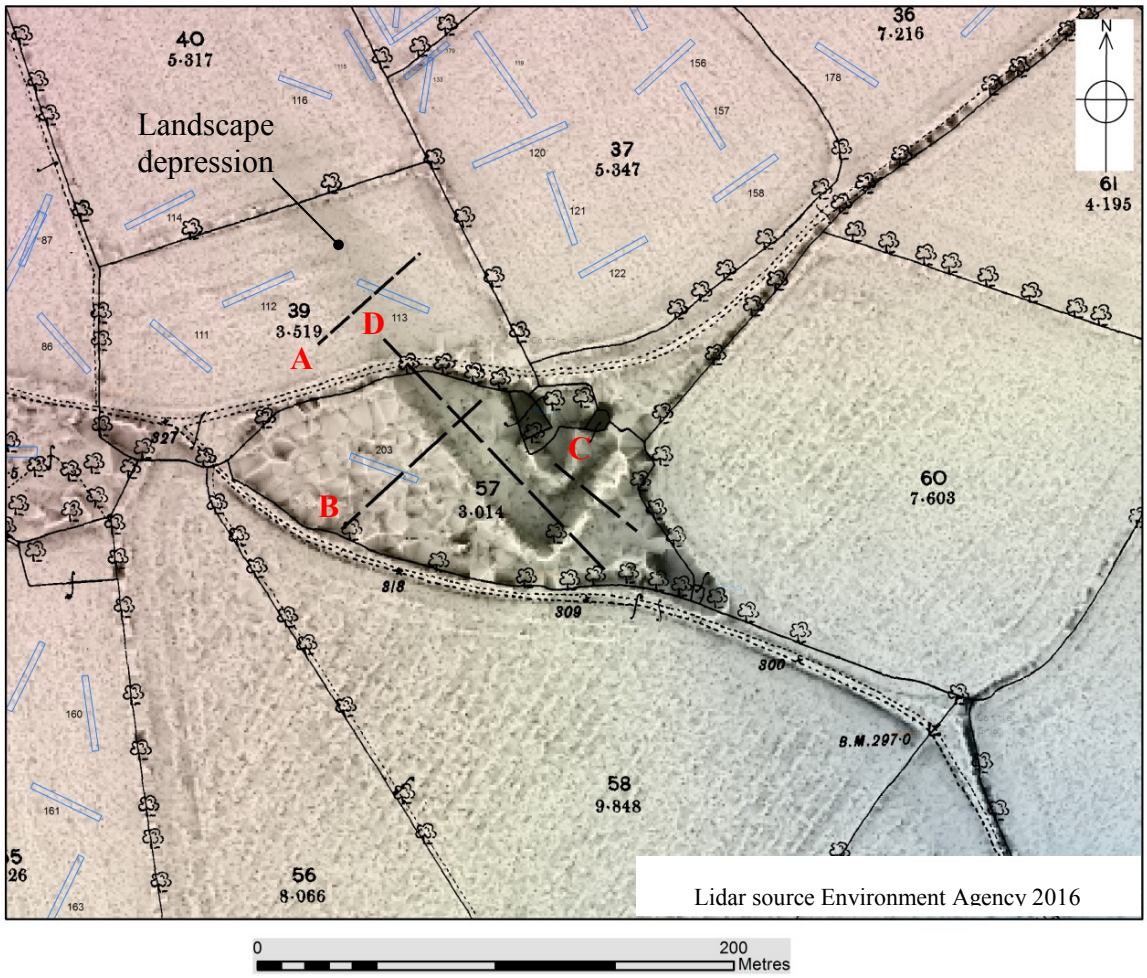

Figure 26: RVT Positive Openness of DTM 1m LiDAR data, overlying colour shaded DTM, showing locations of profiles A-D and shallow depression in landscape to north of fish pond, and location of evaluation trenches.

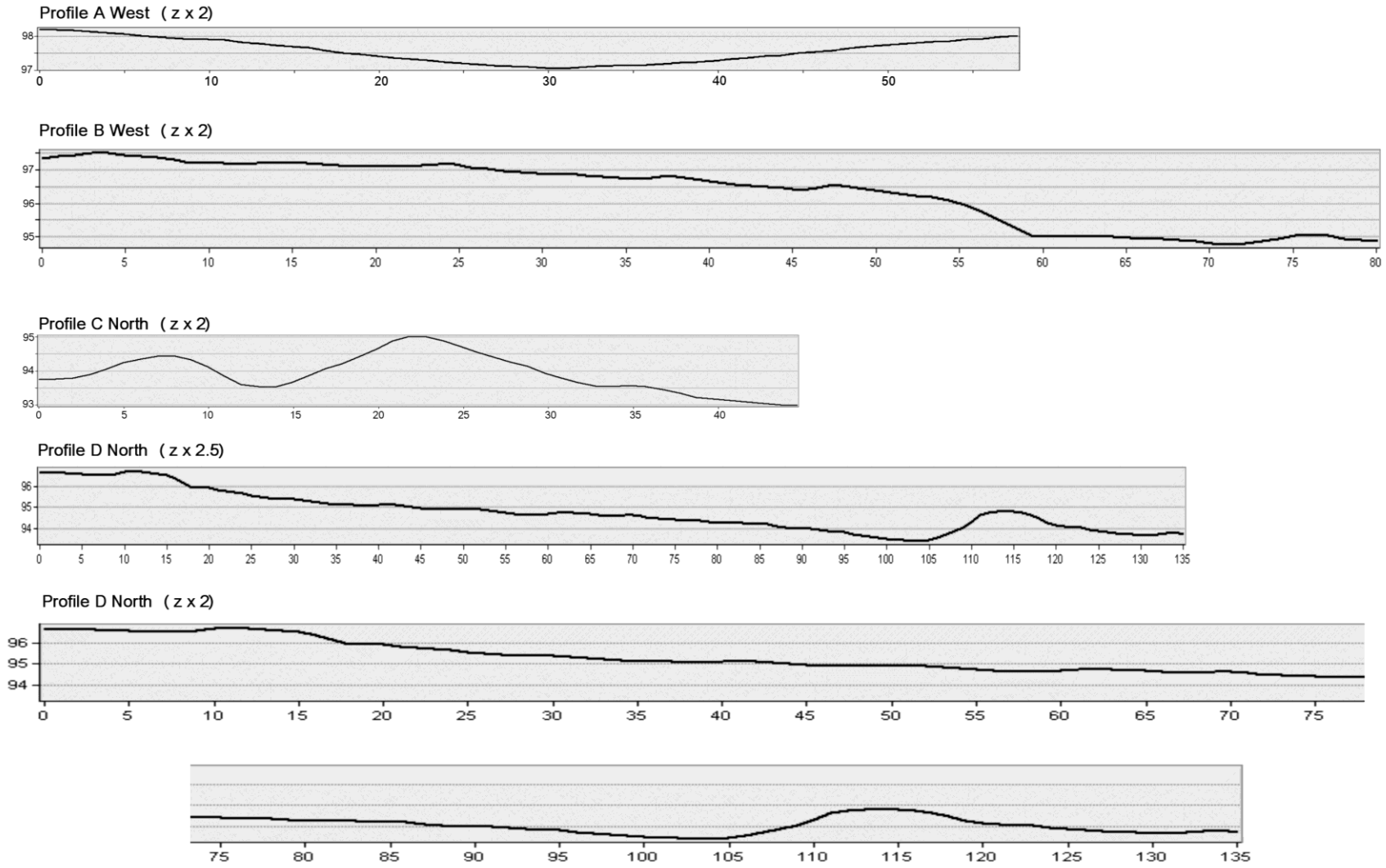

Figure 27: Profiles A-D across Fishpond earthworks derived from LiDAR DTM data. All units (m., heights AOD).

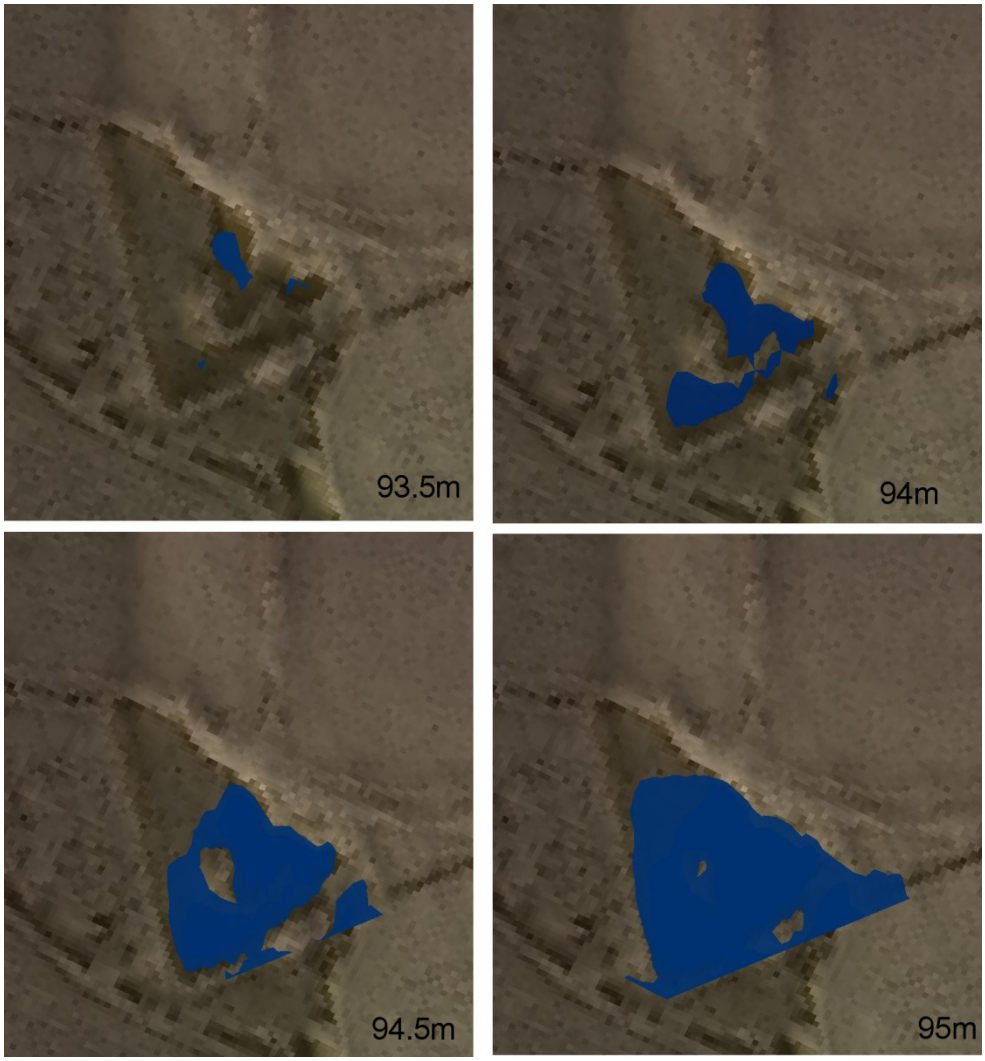

Figure 28: Water levels modelled at 93.5, 94, 94.5 and 95m AOD.

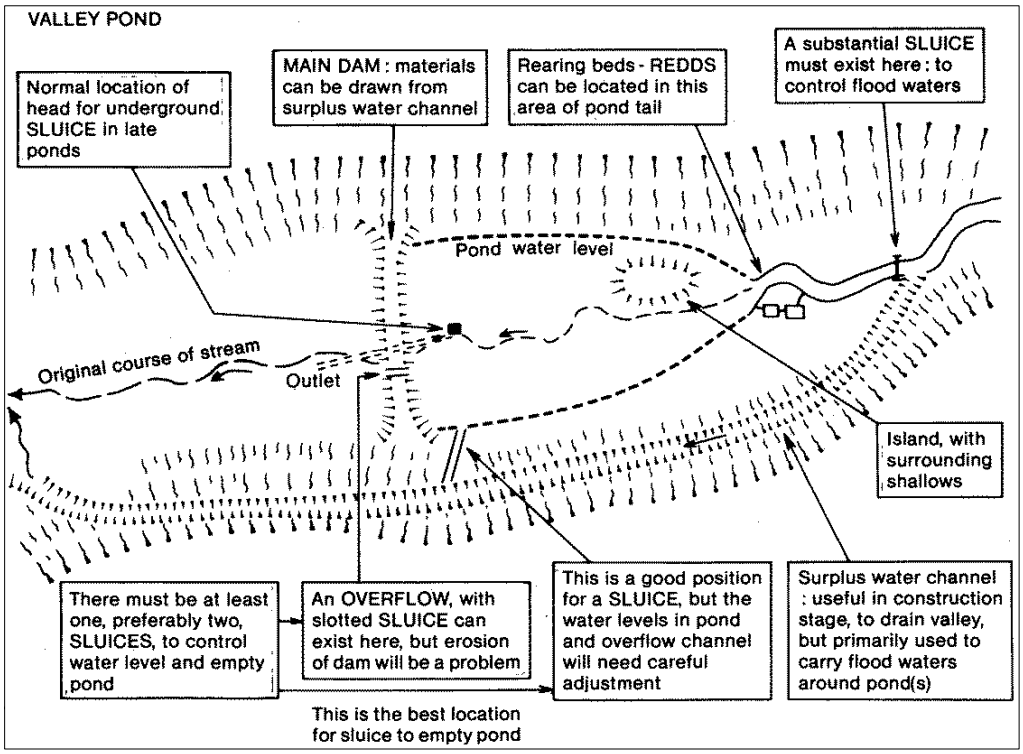

Figure 29: Schematic drawing of typical medieval fishpond in a valley location (after Roberts, 1988 p12)

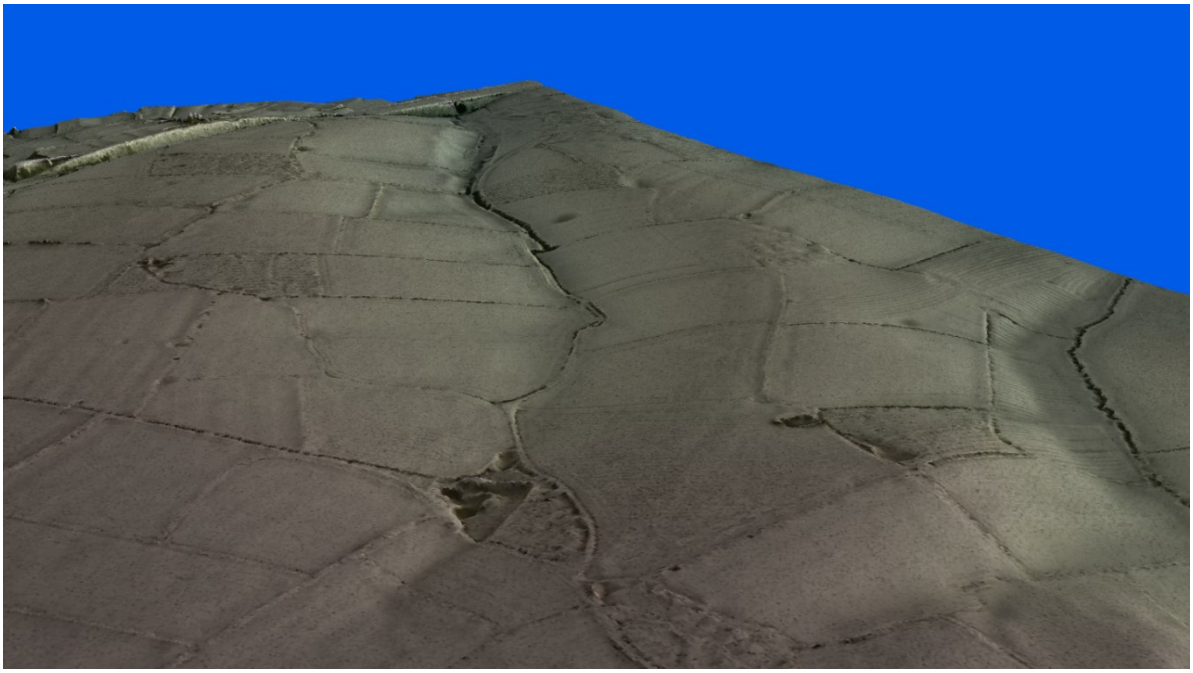

Figure 30: Visualisation using 1m DTM LiDAR data, of MLE222 Fish Pond site from the north-west, with village earthworks of Lubbesthorpe in distance adjacent to the more incised stream valley. The embanked motorway can be identied at the top of the image. The gentle topography has been enhanced X 4 to show the detail.

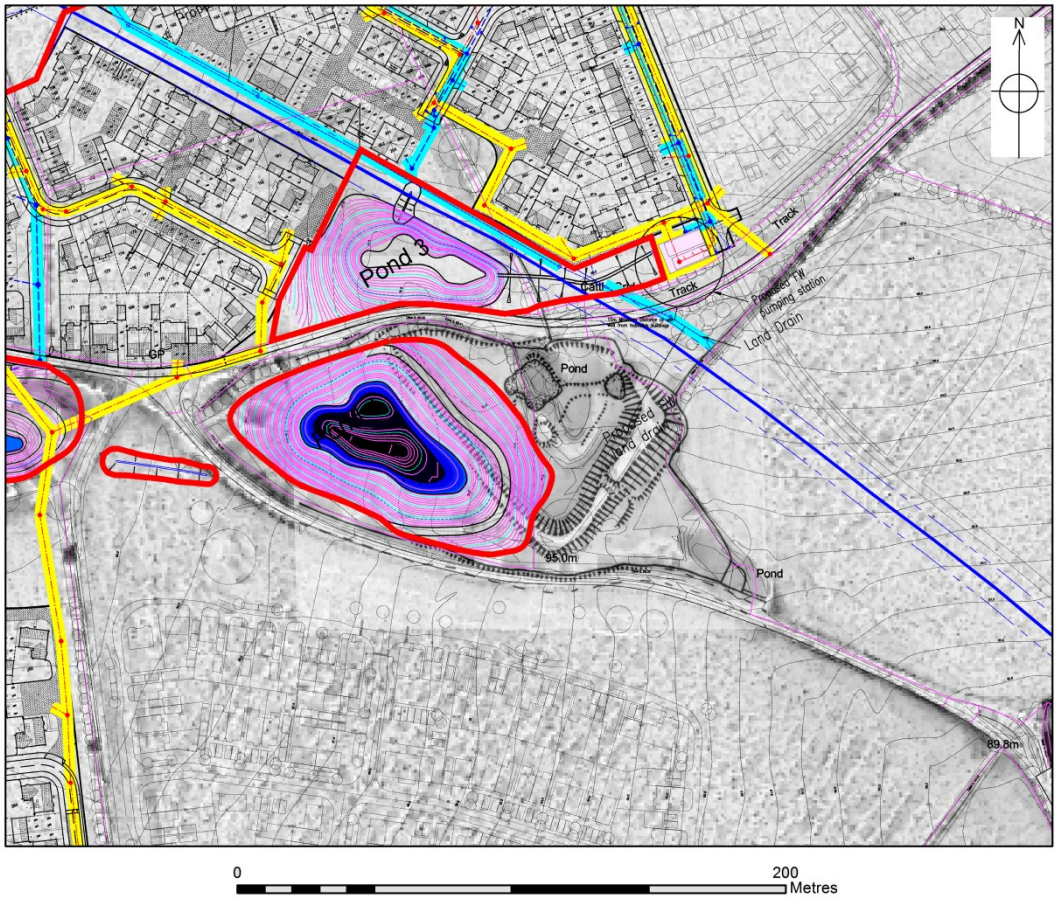

Figure 31: Development proposal with Positive Openness shade plot and Hartley's survey

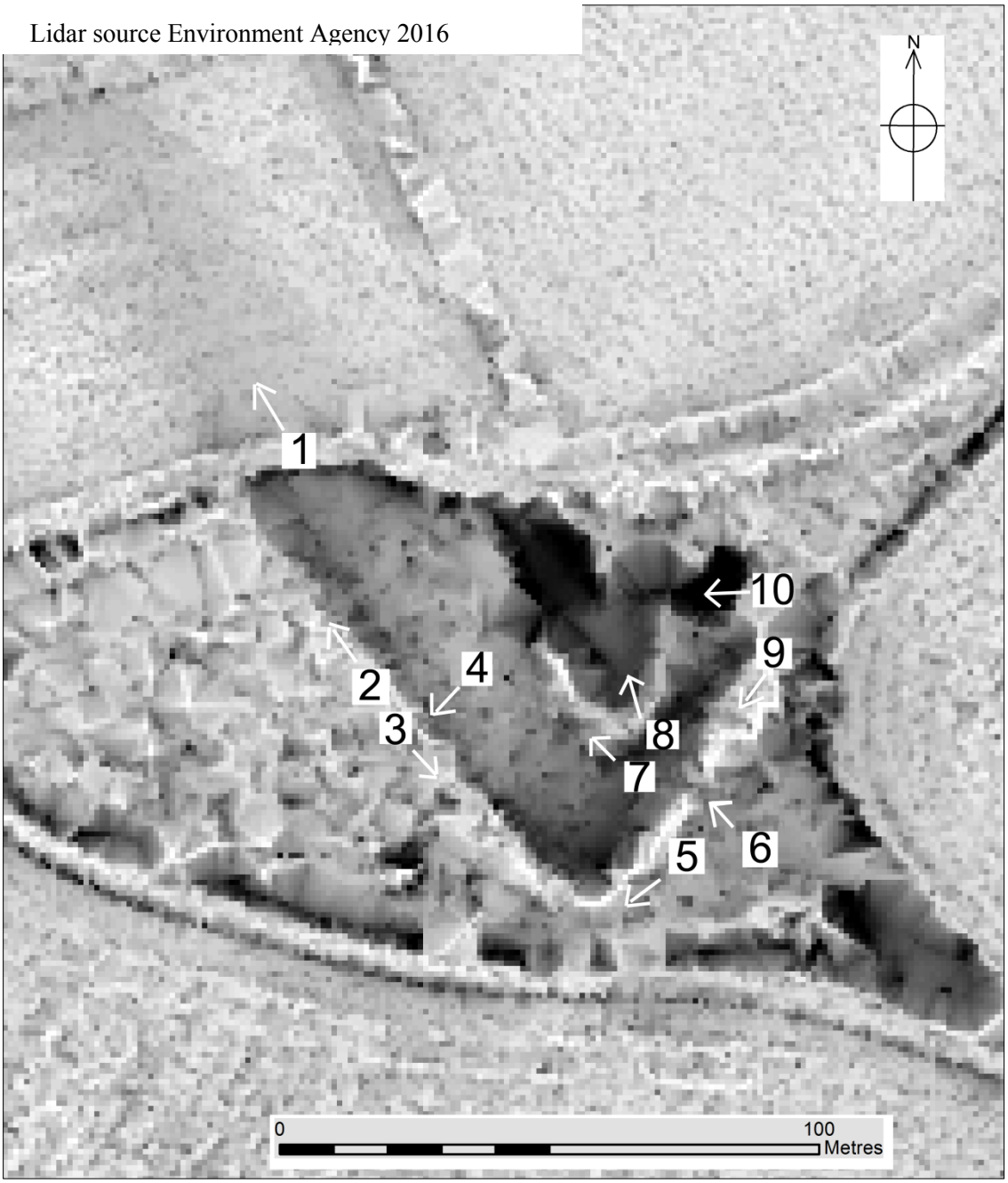

Figure 32: Pond earthworks showing photo locations (L1-L10)

Figure 33: View north from pond, showing shallow hollow (photo location L1)

Figure 34: West margin of pond, looking north-west (L2)

Figure 35: West margin of pond, looking south-east (L3)

Figure 36: West margin of pond, looking west (L4)

Figure 37: Soth-western margin of pond, looking south-west (L5)

Figure 38: East margin of pond, showing possible sluice (left of scale), looking north-west (L6)

Figure 39: Bank at south end of water filled pond, looking north-west (L7)

Figure 40: Island in water filled pond (L8), looking north-west

Figure 41: East bank of pond, looking south-west (L9)

Figure 42: Channel linking two ponds, looking west (L10)

Prehistoric Flint by *W. Jarvis*

Twenty-eight pieces of struck flint were recovered during the current evaluation work, tabulated below. The majority of the artefacts were unstratified and probably represent a background scatter across the development area. Of more significance are the stratified finds from contexts (228) and (230) in Trench T214, and a slight increase in the concentration of unstratified material in this trench. From (228) the crested blades and blade-like technology of some of the other pieces suggests an earlier rather than later stone age date, with the crested pieces being potentially Palaeolithic in age. From (230) one piece, a bladelet core, could also be of an early date. The features are probable pits, so it may be the material is intrusive in later features. The unstratified material from this trench includes two thumbnail scrapers, both of which are well-made and very fresh pieces. These are commonly of a late Neolithic-early Bronze Age date although they can be earlier. Three further unstratified pieces are of a bladelet technology and potentially earlier too. It may be that the area was visited on numerous occasions, being a favoured locale as it is very close to the stream course.

One further stratified piece came from a possible posthole in Trench T217, (237) [236]. This is a very small secondary flake, of uncertain date. An unstratified bladelet core and a side scraper were also recovered from this trench.

Table1 :Worked flint

Area	Strat	Quantity	Material
T187	US	3	2ry fl, 2ry fl + ret., end scraper (v. fresh)
T188	US	1	Irregular piece cf. core
T191	US	2	2ry fl, ret. Bladelet (?Meso.)
T209	US	1	2ry flake (+usewear?)
T214	US	6	2 thumbnail scrapers (1 broken), large blade broken (good example), 2 cores (pat., 1 abraded), 2ry fl off bladelet core
T217	US	2	Bladelet core, side scraper
T228	US	1	Thumbnail scraper
T232	US	1	Frost fractured piece, pat., some use wear?
T214	(228) [227]	7	2 cf. crested blades (Pal.?), piercer on a blade, 2 bladelets, bladelet broken, 2ry fl
T214	(230) [229]	3	Bladelet core, 2 2ry fls
T217	(237) [236]	1	2ry fl small
	Total	28	

Key:- 2ry – secondary; fl – flake; ret. – retouched; Meso. – Mesolithic; Pal. – Palaeolithic; pat. – patinated.

Roman Pottery by *N. J. Cooper and W. Jarvis*

A single sherd of Roman grey ware (GW5 fabric) was identified, weighing 10g. This was recovered from the topsoil in Trench T227; it is very abraded and possibly from manuring.

Table 2: Roman pottery

T227	US	1	sherd GW5 10g

The Charred Plant Remains by *R. Small*

Introduction

Environmental samples were taken during the evaluation at Lubbesthorpe, Leicestershire. Two samples taken from probable pits were considered and thought to date from the late Neolithic to early Bronze Age. The primary aim of this report was to evaluate whether a sufficient quantity of charred material was present in the samples for carbon-fourteen (C-14) dating. Charcoal fragments need to be a minimum of 2mm in length if they are to be analysed using this method (pers. comm. Graham Morgan 2015).

Method

Sample 27 (228) was 10 litres in volume whilst sample 28 (230) was 15 litres. All parts of the samples were processed in a York tank using a 0.5mm mesh with flotation into a 0.3mm mesh sieve. The flotation fractions (flots) were transferred into plastic boxes and left to air dry; they were then sorted for plant remains using a x10-40 stereo microscope. The residues were also air dried and the fractions over 4mm (coarse) sorted for all finds. The fraction under 4mm (fine) was scanned by eye and quantities of remains recorded. A semi-quantitative scale was used: rare (+) under ten items, common (++) ten to fifty fragments and abundant (+++) over 50 specimens. Plant names follow Stace (1991).

Results

Modern rootlets and plants remains, including goosefoots (*Chenopodium* spp.), were present in the flots; their quantities were low suggesting disturbance to the contexts was minimal. No charred plant remains were identified.

Charcoal fragments, over 2mm in length were present in the flots of both samples but in low quantities. Remains were more numerous in the fine and coarse fractions. Considering the total number (flot and fractions combined), fragments were abundant (over 50 items) in both samples.

Discussion

Plant remains are rarely recovered from sites dating to this period; if found, numbers are generally low and nutshell and fruit stones are more common than grain, for example at the site of Briars Hill, Northamptonshire (Monckton 2006).

Both samples contained a sufficient quantity of suitably sized charcoal fragments for C-14 dating. The flots and coarse fractions were sorted in their entirety; however, the fine fractions were not and this may need to take place at a future date when remains are selected for analysis.

The results suggest good potential for the recovery of charcoal from this site. When future sampling takes place, the implementation of a suitable strategy is recommended targeting features such as pits which have shown to be productive.

Conclusion

During this phase, forty-five trenches were excavated targeting residential and infrastructure areas in the north of the proposed scheme. The majority of the site area evaluated during this stage of the works proved negative. Follow up trenching near Old Warren Farm and Hatt Spinney around two previously identified areas of prehistoric activity did not expose any further archaeological deposits, indicating that they are isolated features.

A small area in the west of the proposed site near to Beggars Lane did produce evidence of prehistoric activity. Here a small amount of worked flint was recovered from stratified deposits, and evidence for burning was also identified in the form of charcoal. The lithics suggest multiple visits to this area of the site over a considerable period of time. Several linear features of uncertain date were also identified in this west area. There is a possibility of some Roman activity in the vicinity, with a few unstratified sherds of Roman pottery having been recovered from both current and previous work.

An archaeological earthwork survey by aerial LiDAR was also carried out, with a follow-up walkover survey, of the ponds near to the Old House. The LiDAR results indicated that these are a series of substantial earthworks, and also that there is good agreement between the LiDAR results, Hartley's (1989) survey, and the survival of the earthworks on site. The results also indicated that the earthworks would be impacted upon by the proposed balancing pond here (Pond 4).

Acknowledgements

ULAS would like to thank Martin Ward of Mather Jamie Ltd. and Andrew Hiorns of Andrew Hiorns Planning for their help and co-operation with this project. The project was monitored on behalf of the Planning Authority by Richard Clark. The project was managed by Patrick Clay and the fieldwork was carried out by Wayne Jarvis with assistance from Andy McLeish also of ULAS. Wayne Jarvis is grateful to Lynden Cooper and Nicholas Cooper, for assistance identification of the finds, and to Rachel Small also of ULAS for the environmental analysis.

Publication

Since 2004 ULAS has reported the results of all archaeological work through the *Online Access to the Index of Archaeological Investigations* (OASIS) database held by the Archaeological Data Service at the University of York.

A summary of the work will also be submitted for publication in a suitable regional archaeological journal in due course.

OASIS data entry

Project Name	New Lubbesthorpe
Project Type	Evaluation
Project Manager	P. Clay
Project Supervisor	W Jarvis
Previous/Future work	DBA, Geophysical survey, Evaluation, mitigation
Current Land Use	Arable and pasture
Development Type	Mixed use
Reason for Investigation	NPPF
Position in the Planning Process	Requirement
Site co-ordinates	SK 531 017
Start/end dates of field work	01/12/2015 – 25/01/2016
Archive Recipient	Leicestershire Museums
Study Area	38ha

Archive

The archive for this project will be deposited with Leicestershire Museums with accession number XA112.2011, and forms part of a larger archive incorporating earlier work.

The archive for this phase consists of the following:

- Trench Index (1 A4 page) and 45 Trench record sheets (A4)
- 3 Photo Record sheets. Other site indices (1 context index sheets, 21 A5 context sheets (context no.s 221-244), 1 drawing index and drawing record sheet, 1 sample index sheet, 3 A3 and 1 A2 permagraph drawing sheets)
- 1 Unbound copy of this report (ULAS Report 2016-004)
- Digital photograph contact sheets
- Digital photographs on CD

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28-01-2016

Appendix 1. Trench Details – current phase

T	Eing	Ning	Dev Area	Notes
184	453808	301862	R15 pt5	"Neo area"
185	453823	301888	R15 pt5	"Neo area"
186	453861	301916	R15 pt5	"Neo area"
187	453819	301923	R15 pt5	"Neo area"
188	453785	301942	R15 pt5	"Neo area"
189	453769	301904	R15 pt5	"Neo area"
190	453733	301946	R15 pt5	"Neo area"
191	453792	302003	R15 pt5	"Neo area"
192	453827	302027	R15 pt5	"Neo area"
193	453872	301970	R15 pt5	"Neo area"
194	453890	302006	R15 pt5	"Neo area"
195	453906	302035	R15 pt5	"Neo area"
196	453945	302053	R15 pt5	"Neo area"
197	453890	302063	R15 pt5	"Neo area"
198	453850	302080	R15 pt5	"Neo area"
199	453819	302064	R15 pt5	"Neo area"
200	452782	302174	Primary School	"Neo area"
201	452873	302112	R2 pt 1	"Crems area"
202	452900	302153	R2 pt 2	"Crems area"
203	452875	301884	Pond 4	Covert. Neg.

204	453160	301440	Road nr New Ho Fm	Not Exc. - crop
205	453070	301540	Road nr New Ho Fm	Not Exc. - crop
206	452941	301622	Road W of New Ho Fm	Not Exc. - crop
207	452840	301612	Road W of New Ho Fm	Not Exc. - crop
208	452691	301650	Road W of New Ho Fm	Feats.
209	452659	301557	Road to Pmp Stn	
210	452645	301480	Road to Pmp Stn	
211	452653	301444	Road to Pmp Stn	
212	452715	301430	Road to Pmp Stn	
213	452751	301415	Pmp Stn	
214	452590	301473	Pond 7	Feats.
215	452614	301514	W of SE Blncng Pond	
216	452567	301537	W of SE Blncng Pond	
217	452493	301560	W of SE Blncng Pond	Feats.
218	452531	301571	W of SE Blncng Pond	
219	452640	301580	R10	
220	452596	301583	R10	
221	452563	301624	R10	
222	452514	301650	R10	
223	452598	301643	R10	
224	452556	301673	R10	
225	452572	301701	R10	
226	452616	301691	R10	
227	452487	301677	R10	
228	452449	301643	R10	
229	452421	301615	R10	
230	452388	301657	R10	
231	452371	301688	R10/Pond 5	
232	452572-585	301480-465	Pond 7	Extra T, no feats.

Appendix 2. Context Index – current phase

Context	Cut	Area	Description
221	221	T183	Gully cut
222	221	T208	Gully fill
223	223	T208	Gully cut
224	223	T208	Gully fill
225	225	T208	Pit cut
226	225	T214	Pit fill
227	227	T214	Pit cut
228	227	T214	Pit fill
229	229	T214	Pit cut
230	229	T214	Pit fill
231	229	T214	Pit fill - primary

232	232	T214	?Linear cut
233	232	T214	?Linear fill
234	234	T217	Posthole? Cut # rich
235	234	T217	Posthole? fill # rich
236	236	T217	Posthole cut
237	236	T217	Posthole fill
238	238	T217	Posthole cut
239	238	T217	Posthole fill
240	240	T217	Posthole cut
241	240	T217	Posthole fill
242	242	T217	Posthole cut
243	242	T217	Posthole fill
244	244	T217	Ditch cut
245	244	T217	Ditch fill
246	246	T217	Ditch cut (recut of [244])
247	246	T217	Ditch fill
248	248	T217	Gully cut
249	248	T217	Gully fill
250	250	T214	Posthole/feature unexc.
251	251	T214	Pit/feature unexc.
252	252	T214	Gully/feature unexc.

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