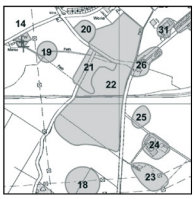
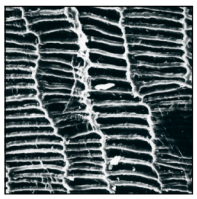
SPLL19










LAND ADJACENT TO GLEBE FARM, COVENTRY ROAD, LUTTERWORTH

ARCHAEOLOGICAL MONITORING OF BOREHOLES

PLANNING REF. 15/00865/OUT

commissioned by The Environmental Dimension Partnership
on behalf of Gazeley UK Ltd

October 2019

HEADLAND ARCHAEOLOGY

REGISTERED ORGANISATION CIfA

LAND ADJACENT TO GLEBE FARM, COVENTRY ROAD, LUTTERWORTH

ARCHAEOLOGICAL MONITORING OF BOREHOLES

PLANNING REF. 15/00865/OUT

commissioned by The Environmental Dimension Partnership
on behalf of Gazeley UK Ltd

October 2019

This report adheres to the quality standard of ISO 9001:2015

PROJECT INFO:

HA Project Code **SPLL19** / HAS No. **1361** / NGR **SP 51732 83800** / Parish **Lutterworth** / Local Authority **Harborough District Council** / OASIS Ref. **headland3-369514**

PROJECT TEAM:

Project Manager **Luke Craddock-Bennett** / Author **Brett Archer** / Fieldwork **Brett Archer, Chris Sear** / Graphics **Beata Wieczorek-Oleksy, Rafael Maya-Torcelly** / Environmental **Angela Walker**

Approved by **Luke Craddock-Bennett** .....

Headland Archaeology Midlands & West
Unit 1 | Clearview Court | Twyford Rd | Hereford HR2 6JR
t 01432 364 901
e midlandsandwest@headlandarchaeology.com
w www.headlandarchaeology.com

HEADLAND ARCHAEOLOGY

part of the RSK Group

REGISTERED ORGANISATION CIfA

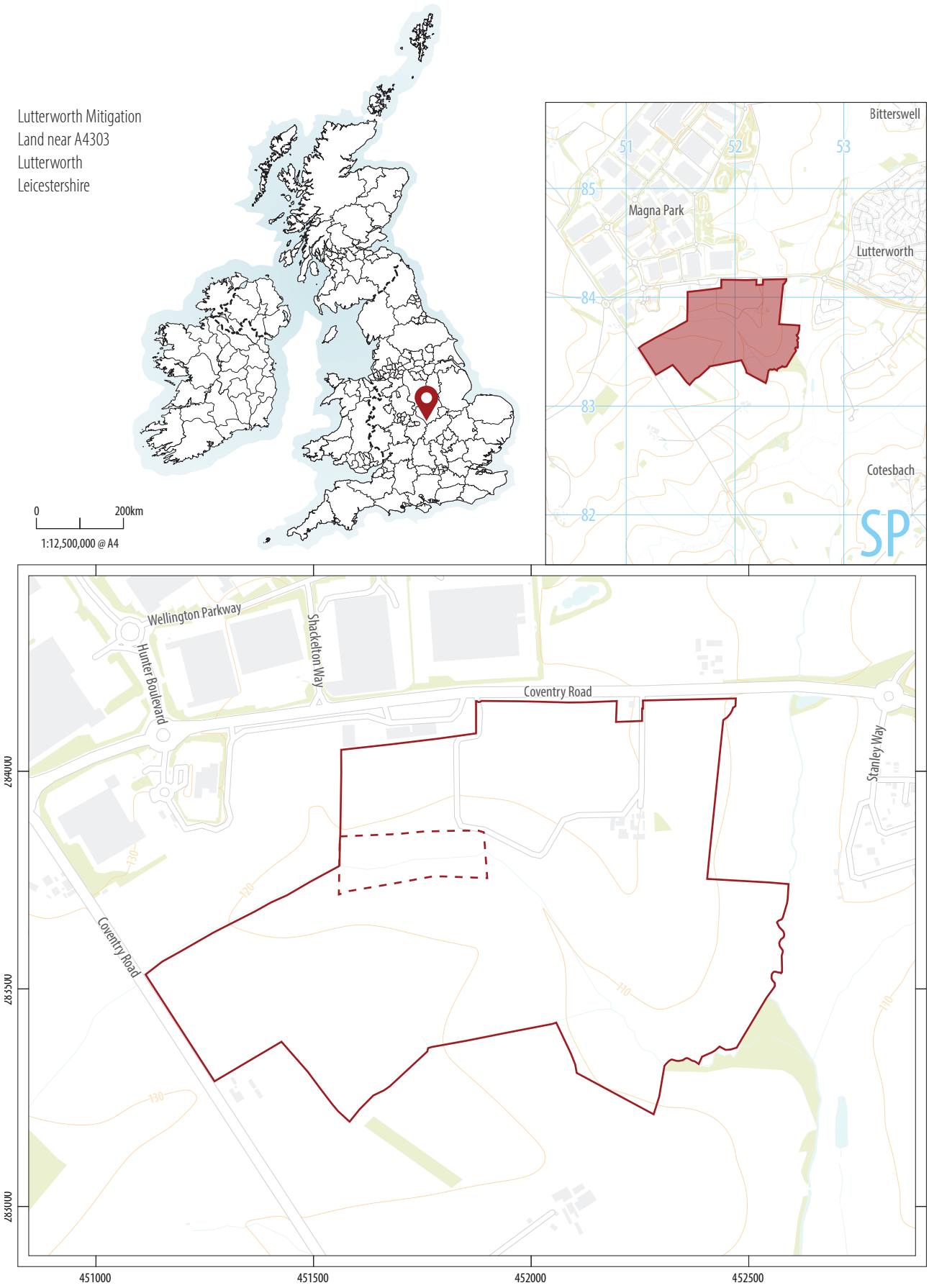
PROJECT SUMMARY

Archaeological borehole monitoring was undertaken by Headland Archaeology on land adjacent to Glebe Farm, Coventry Road, Lutterworth. Evidence suggesting intermittent and conjoining water sources contributed to deposit a sequence of alluvial deposits at the west end of the works area. This area and another to the east end of the site are on relatively flat ground and are likely to have, and continue, to see an accumulation of deposits as a result of seasonal fluctuations in water levels and resultant localised flooding. No deposits or materials suitable to aid in paleoenvironmental reconstruction were evident.

CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES



Headland Archaeology Midlands & West
Unit 1 | Clearview Court | Twyford Rd | Hereford HR2 6JR
t 01432 364 901
e midlandsandwest@headlandarchaeology.com
w www.headlandarchaeology.com

ILLUS 1 Site location

LAND ADJACENT TO GLEBE FARM, COVENTRY ROAD, LUTTERWORTH

ARCHAEOLOGICAL MONITORING OF BOREHOLES

1 INTRODUCTION

Headland Archaeology (UK) Ltd was commissioned by The Environmental Dimension Partnership Ltd (EDP), on behalf of Gazeley UK Ltd (the client), to undertake a programme of archaeological work in order to discharge conditions placed on outline planning consent regarding an application for the erection of storage, distribution buildings and other associated infrastructure. The work took the form of a paleoenvironmental borehole monitoring evaluation.

1.1 PLANNING BACKGROUND AND OBJECTIVES

Outline planning consent (ref15/00865/OUT), was granted in July 2018 for the erection of storage, distribution buildings and other associated infrastructure. In relation to this consent, three conditions were attached regarding heritage and archaeology matters.

Leicestershire County Council's Historic and Natural Environment Team (HNET), acting as archaeological advisors to the Local Planning Authority (LPA), recommended that a programme of archaeological investigation be undertaken in order to ascertain the impact of the proposed development on any heritage assets including archaeological remains present on the site. The field subject to the current phase of work was evaluated during an initial trial trenching programme undertaken in 2015 (Blackburn), as a result of this, further evaluation of this area was required due to the potential for paleoenvironmental evidence to be recovered from former courses of the Padge Hall Brook.

A Written Scheme of Investigation (WSI) was prepared by EDP (Vallender 2019) in accordance with the Leicestershire County Council brief for field evaluation (2015). In response to these documents an Archaeological Method Statement (AMS) was produced by Headland Archaeology (Craddock-Bennett 2019) and approved by the archaeological advisor.

1.2 SITE LOCATION, DESCRIPTION AND SETTING

The site is located approximately 2km to the southwest of the market town of Lutterworth in Leicestershire, centred around SP 51732 83800 (ILLUS 1). It is within a 3.6ha, east to west aligned arable field under stubble, in the base of a shallow valley through which runs the Padge Hall Brook on the same alignment. Upstream, to the west, the brook turns slightly to the south – running SSW-NNE. To the east it turns sharply southwards and continues broadly north west to south east. The channel appears to have been canalised both to the east and west of the project limits. The field is enclosed with hedges on the north, west and south, beyond which are further arable fields. To the east are the temporary buildings and infrastructure of a shooting club. More broadly the site is bounded by the A5, Watling Street to the west, the A4303 to the north and by farmland to the south and east.

A number of north to south aligned depressions can be observed running downslope on either side of the channel towards the book. These are interpreted as runoff channels which transport surface water down into the valley (ILLUS 3). One particularly visible example in the north east corner of the site may be associated with the trackway which runs from the A4303 north of this site. Another large and pronounced channel runs between Transect 2 and 3. At its junction with the base of the valley its level corresponds with an area of low ground which runs along the south side of the brook and to the west, where it terminates with a moderately steep break of slope approximately 20m to the west of Transect 1.

The bedrock geology comprises Blue Lias Formation - Mudstone and Limestone, Interbedded (Sedimentary bedrock formed approximately 191 to 210 million years ago in the Jurassic and Triassic Periods in a local environment previously dominated by shallow lime-mud seas). Superficial geology is of Oadby Member – Diamicton (Superficial Deposits formed up to 2 million years ago in the Quaternary Period in a local environment previously dominated by ice age conditions). In the immediate vicinity of the watercourse the superficial geology is listed as Alluvium - Clay, Silt, Sand and Gravel (Superficial deposits formed up to 2 million

years ago in the Quaternary Period. Local environment previously dominated by rivers), (NERC 2019).

The soils are classified as Soilscape 18: Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Cranfield University 2019).

Ordnance datum on the site is recorded between approximately 119m AOD at the north west of the site and 112m AOD at the east.

1.3 ARCHAEOLOGICAL BACKGROUND

An archaeological and heritage assessment was prepared by EDP (2015). The report, which encompasses the entire PDA, concluded that the study area contained evidence for human activity throughout the prehistoric and Roman periods. Field walking undertaken on the site in 1996 and 2003 recovered pre-historic flints and Roman pottery from the topsoil. The site also lies adjacent to the modern alignment of Watling Street Roman road and, although it is unlikely that evidence for the road would be present within the site itself, it was considered possible that associated activity may be present.

Geophysical survey conducted by GSB Prospection (Attwood 2015), indicated evidence of ridge and furrow, field boundaries and land drains. The geophysical survey also identified large areas of modern, magnetic disturbance believed to relate to agricultural infill in the vicinity of the two fields to the south.

Other than agricultural usage, the historical land usage at the site included an area to the east Padge Hall Brook which was the site of a landfill that last received waste in 2004,

Relative to the evaluation area associated with this phase of works it was established that the field was used as a motocross track in the late 1990/early 2000s, that possibly used imported fill to create the track features.

The overall site potential was assessed as low.

Based on these findings an initial trial trench evaluation requested by the archaeological advisor was undertaken in 2015 (Blackburn). This targeted the limited number of anomalies of 'uncertain origin' across the wider development area. As part of these works, eight trenches (17–24 and 44), were excavated within the area currently under evaluation. They exhibited a series of deposits comprising a topsoil covering a subsoil, over a blue/grey alluvium, which covered a variably orange to brownish orange firm clay with sands, gravels and stones. This deposit was exposed between 0.60–1.10m BGL and described as geological in nature. A further soft brown silty alluvial deposit was recorded below this to a depth of 2.00m BGL nearest to the brook. A general trend was observed, where the deposits became deeper/thicker as the level of the ground surface decreased with the topography of the valley.

One of those trenches, Trench 17, contained an alluvial deposit (1704), associated with the Padge Hall Brook and interpreted to be a result of pooling. This deposit was a black organic rich deposit which contained four horse bones. There was no evidence of butchery on the bones. Following processing, a sample recovered was found to contain preserved organic material including several uncharred 'seeds' and a twig preserved by waterlogging, in addition to occasional fragments of beetle and a small number of molluscs. The shells were fossilized and may have been part of the natural strata. The 'seeds' included sedges (*Carex sp.*), thistles (*Cirsium sp.*), docks (*Rumex sp.*), knotgrass (*Polygonum sp.*), bog bean (*Menyanthes trifoliata*) and cinquefoil (*Potentilla sp.*). The deposit suggested a boggy area colonized with typical plant species for this environment.

2 AIMS AND OBJECTIVES

The objectives of the investigation are detailed in the agreed WSI produced by EPD (Vallender 2019), and subsequently the Archaeological Method Statement (AMS), produced by Headland Archaeology (Craddock-Bennett 2019).

The purpose of the evaluation is to understand the extent of the former river channels adjacent to Padge Hall Brook and identify where deposits with paleoenvironmental potential may be present.

On the basis of this information, it is proposed that during any future groundworks needed to landscape the stream channel, a watching brief will be maintained to recover samples from any deposits identified as having paleoenvironmental potential.

The resulting archive will be organised and deposited with Leicestershire Collections Resource Centre to facilitate access for future research and interpretation for public benefit.

3 METHOD

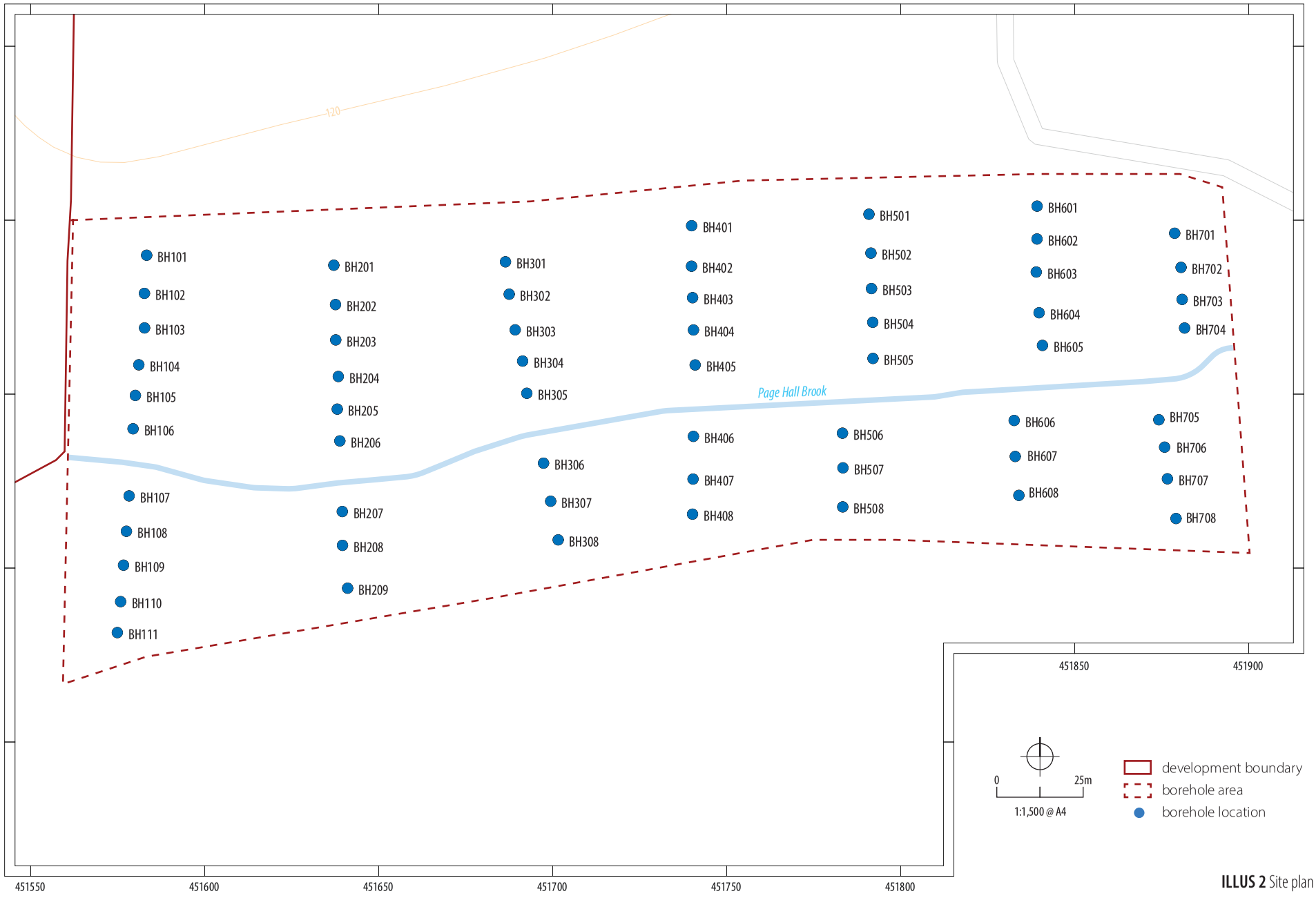
The fieldwork was conducted in accordance with the above mentioned WSI and AMS in accordance with the following documents:

- Code of Conduct (Chartered Institute for Archaeologists, 2014)
- Standards and Guidance for Archaeological Field Evaluations (Chartered Institute for Archaeologists, 2014a)

A total of 60 locations, placed at 10m intervals along seven transects set transversely along the base of a shallow valley were bored (ILLUS 2). The boreholes closest to the brook observed a 6m standoff from it to protect environmental assets. The work took place from the 18th August to the 3rd September.

Prior to the commencement of the fieldwork, utility plans were consulted. A cable avoidance tool was used to check for the presence of further potential buried services throughout the works.

The majority of the boreholes were hand-dug to 1.2m below ground level (BGL), before a Dando Terrier Site Investigation Drilling Rig was used to extract cores to 3m BGL. Later in the works the Terrier rig was used to extract cores from ground level to 3m BGL.



ILLUS 2 Site plan

ILLUS 3 Run off channels feeding into Padge Hall Brook

The excavated deposits were recorded on Headland Archaeology evaluation trench sheets.

All recording followed standard archaeological guidelines as set out by the Chartered Institute for Archaeologists (CIfA). The recorded contexts were assigned unique numbers and recording was undertaken on Headland Archaeology pro forma context record sheets. Context numbers followed a two-digit format (eg 01, 02 etc), prefixed by a three-digit borehole number. The first digit of the borehole number also represents the transect number, eg, 10203 represents Transect one, borehole two, context three.

Each borehole was excavated and drilled with an archaeologist present to record the contents. The plastic sheathed cores were opened in the field and the deposits cleaned to allow for accurate recording on Headland recording sheets. Each deposit and core were photographed with a graduated metric scale clearly visible, using digital SLR and black & white film SLR cameras.

Samples were taken from deposits based upon their palaeoenvironmental potential. Initially samples were taken from hand excavated material if from the upper 1.2m, or removed from cores as a bulk sample if from depths greater then 1.2m BGL. This methodology was later revised and deposits selected for retention were retained within a core. The sample deposit position was clearly marked and the core was resealed in order preserve its moisture content and prevent oxidisation.

An overall site plan of the borehole locations was produced digitally (ILLUS 2). Digital surveying was undertaken using a Trimble dGPS system.

4 RESULTS

A plan of borehole (and therefore transect), locations is presented in ILLUS 2 and representative sections of each borehole are depicted in a 3D illustration (ILLUS 5). A preceding summary and description of the general stratigraphy identified across the site is also given.

In order to more clearly report on the findings of the project, and so that the 3D representation of the deposits be simple enough to illustrate the findings, deposits have been grouped based on their morphological characteristics. The groupings will be used most often in descriptions. An outline of the contents of each group is given below, and a more comprehensive description of each group's characteristics is presented as Appendix 1.

The locations from which environmental samples were recovered are presented in Appendix 2.

ILLUS 4 Transect 1 (south side), located in depression at downslope end near to current watercourse

4.1 GROUPED DEPOSITS

GROUP	DESCRIPTION
A	Topsoils across the site.
B	Subsoil over upper alluvial deposits which in turn cover an orangey sandy deposit with occasional patches of gravels.
C	A series of alluvial deposits which become darker as depth increases and lies below group B.
D	Deposits at the bottom of the recorded sequence. Two deposits of natural geological material from this group.
E	Upper alluvial deposits, from a depth of c. 0.35m BGL at the east end of the site, to the south of the brook on the inside of a bend where it starts turning to the south east.
F	Alluvial deposits immediately below the topsoil from a depth of c 0.30m BGL, at the west end of the site in the immediate vicinity of the brook.
G	Located at the east end of the site and represents a series of banded alluvial deposits from c 1.10m BGL.
H	Formed of distinct bands of sands and gravels.

4.2 GENERAL STRATIGRAPHY

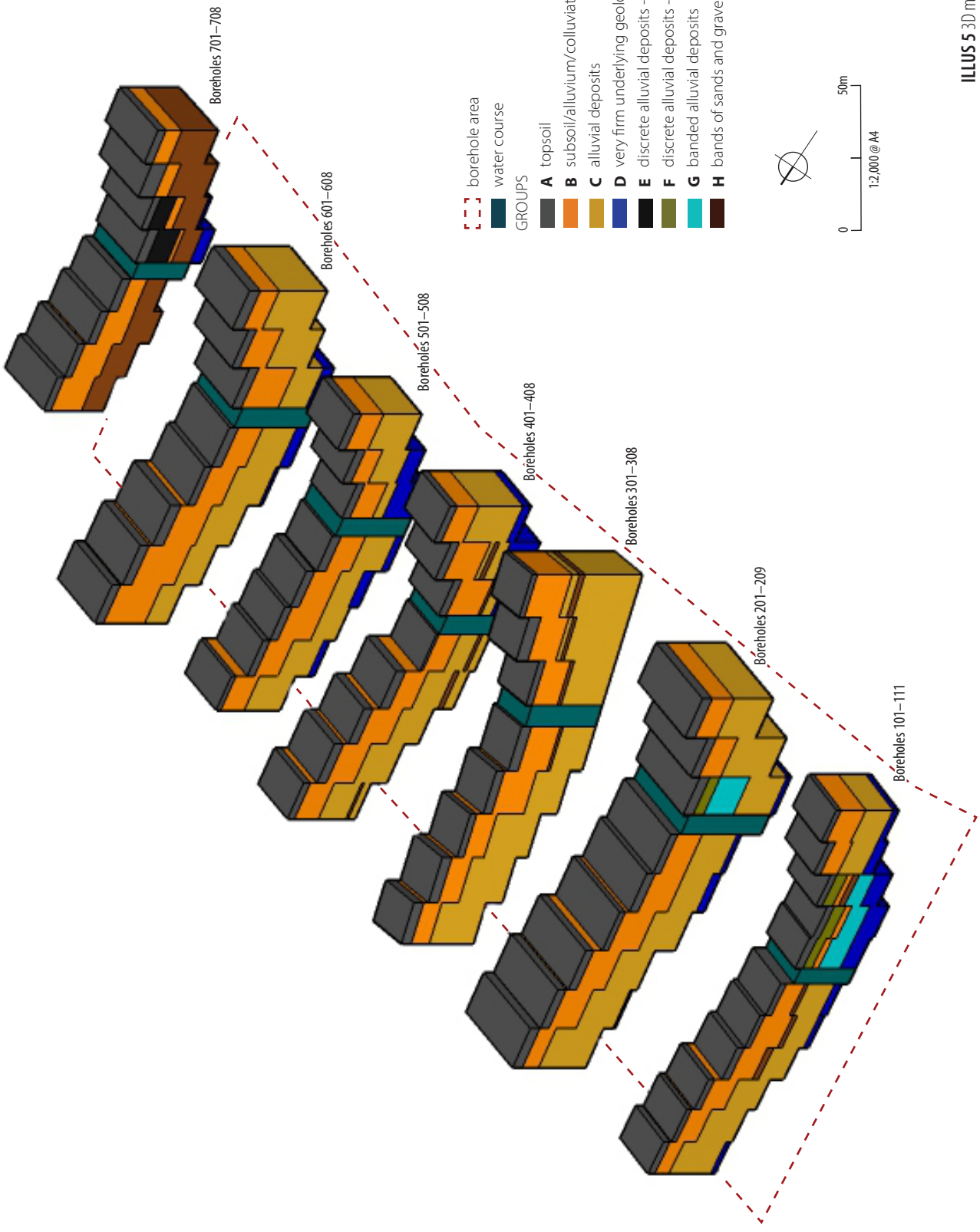
The majority of the site was in use as arable land and was under stubble, with bales awaiting collection. The exception being the southern end of Transect 7 (south of the current watercourse), which lay outside of the ploughed area and was under grass. Topsoil (Group A), continuing to an average depth of 0.30m, was present across the entire site and covered an alluvially derived subsoil, a sequence of alluvial deposits and ultimately an orangey brown sandy deposit which contained patches of gravels (Group B). This sandy deposit (eg 60404), being the same as the geological horizon at which excavation stopped during the 2015 evaluation. The top of this deposit was recorded between 0.60–1.71m BGL, the average being c. 0.90m BGL. Typically the greater depths were closer to the brook.

A further sequence of alluvial silty and sandy clays (Group C) continued to average depths of 2.80m becoming progressively darker with depth. Below the alluvial deposits a distinctly darker, firmer and 'cleaner' clay material and a heterogenous brown geological, deposit (Group D), were recorded. Whilst these deposits were not present in every core, they were common enough to understand that they are consistent at variable depth along the length of the valley and that the tops of the deposits are likely to represent the post-glacial 'cut' form of a river channel.

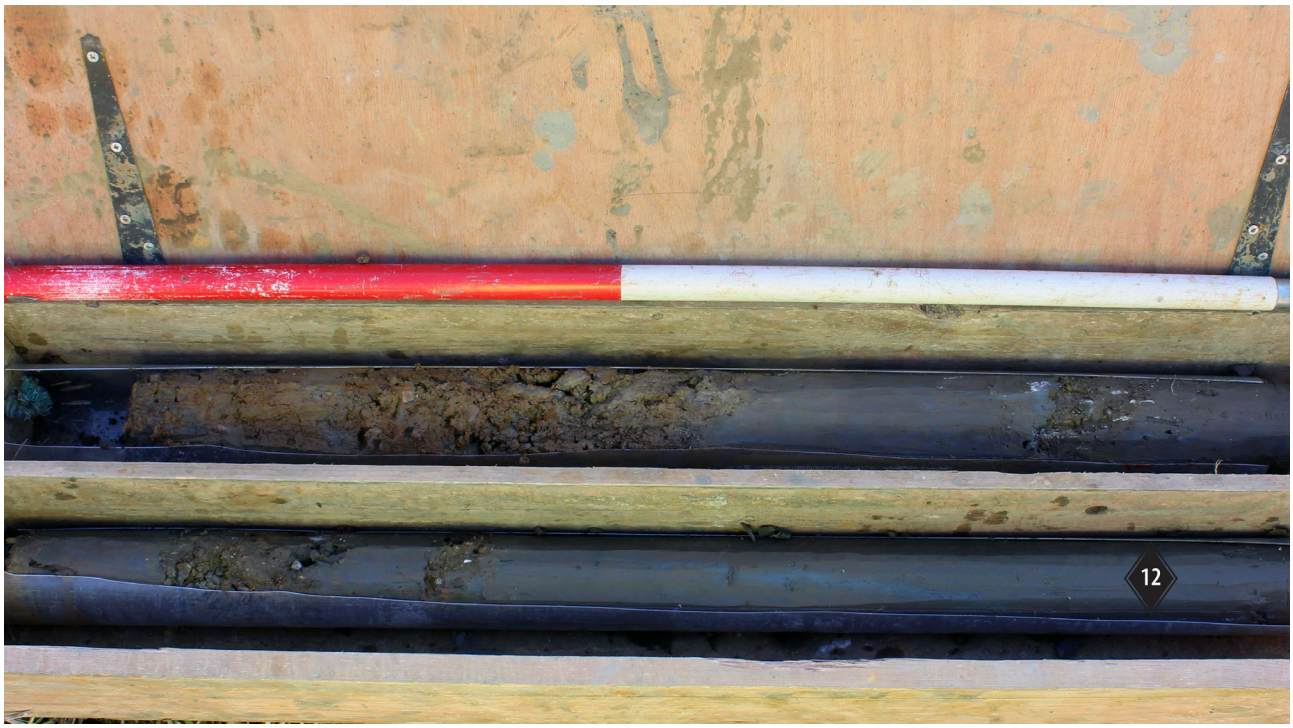
Bands of sand and gravel of variable thickness were visible in many cores. Where it was feasible to do so, they have been represented in the 3D model (ILLUS 5), as (Group H).

4.3 DIFFERENCES IN STRATIGRAPHY

Notable differences in stratigraphy were noted in transects at each end of the works area. Transect 7, at the eastern end contained a distinct homogenous upper alluvial deposit (Group E), up to a metre deep in boreholes 705 and 706.



ILLUS 5 3D model of grouped deposits



ILLUS 6 Cores from Borehole 106, 1–3m, BGL (1m BGL top left – 3m BGL bottom right). Sample 012 recovered from Group D - (10614) at 2.62–3.00m BGL

At the western end of the site in Transects 1 and 2 (in boreholes 106, 107, 108, 109 and 207), two series of alluvial deposits were recorded and sorted into Group F (upper), which was up to 0.5m deep, and Group G (lower), which was up to 1.05m deep. The deposits forming Group G in Transect 1 on the north side of the current brook exhibited banding of alluvial materials between sand and gravels (10608–10613).

4.4 ENVIRONMENTAL ASSESSMENT

by Angela Walker

Introduction

Fourteen 200ml sub-samples were extracted from soil cores, taken during archaeological borehole monitoring on land adjacent to Glebe Farm, Coventry Road, Lutterworth. The monitoring formed part of a programme investigating the impact of the proposed development on any heritage assets including archaeological remains. Previous evaluation work carried out in 2015 revealed archaeological features and several alluvial deposits (Blackburn 2015). The palaeoenvironmental assessment of the waterlogged plant remains from Trench 17 determined they were not associated with human activity. The samples were deemed unlikely to contribute to the understanding of the archaeology of the site (Bailey and Holden 2015).

The aims of the assessment of deposits from the 2019 borehole monitoring work were to assess the presence, preservation and abundance of any environmental remains that would contribute to our understanding of the extent of the former river channels adjacent to the Padge Hall Brook and to identify deposits with palaeoenvironmental potential.

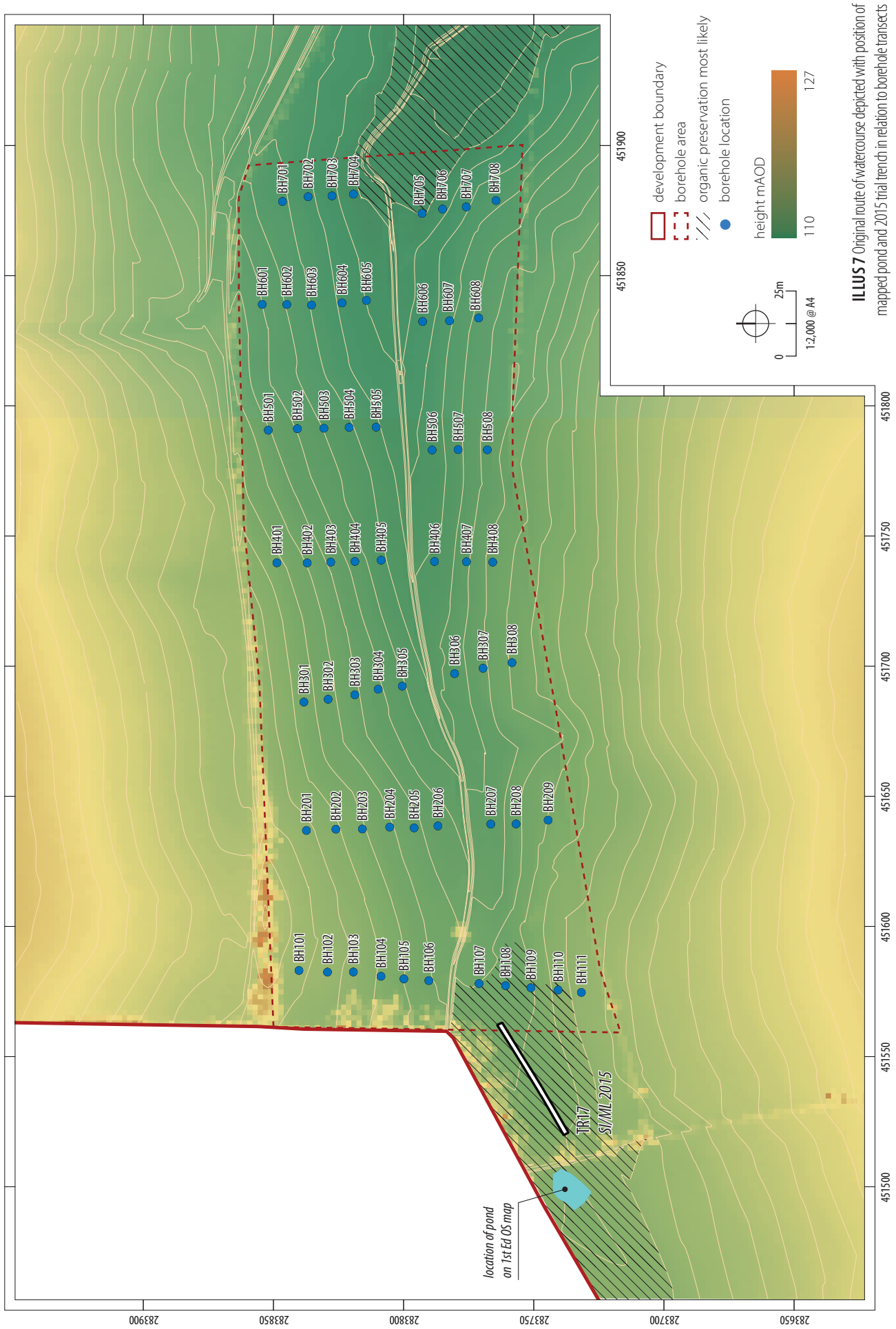
Method

In the field, fourteen samples were selected from deposits with visible palaeoenvironmental remains. In the laboratory, a 200ml sub-sample was then taken from each of the fourteen samples. Samples 5 and 7–14 were taken from retained cores (see ILLUS 6) and were selected from the bottom section of the deposits in the laboratory. Samples 1, 2, 3, 4 and 6 were bulk sediment samples taken from the cores whilst in the field, and so it was not possible to determine where in the deposit the sub-sample derived (ie top, middle, bottom). Sub-sampling the deposits within the cores and bulks ensured that there is still material available should further palaeoenvironmental work be required.

The samples were subjected to flotation and wet sieving in a Siraf-style flotation machine. The floating debris (the flot) was collected in a 250 µm sieve and once dry, scanned using a binocular microscope. Any material remaining in the flotation tank (retent) was wet-sieved through a 1mm mesh and air-dried. Due to the small size of the assemblages produced, the resulting flot and retent for each sample were combined and assessed together. All samples were scanned using a stereomicroscope at magnifications of x10 and up to x100. Identifications, where provided, were confirmed using modern reference material and seed atlases including Cappers et al. (2006) and Zohary et al. (2012); nomenclature for wild taxa follows Stace (1997).

Results

The results of the assessment are presented in Table form as Appendix 2 (Borehole sample results). Three of the sampled deposits (10614), from Group D; (10907), from Group G; and (50406), from Group C, did not produce any botanical remains.



ILLUS 7 Original route of watercourse depicted with position of mapped pond and 2015 trial trench in relation to borehole transects

Wild taxa
Uncharred 'weed seeds' (here used to include seeds, fruits, achene, caryopses etc) were recovered from three deposits (Table 1). The wild plant assemblage was very small (four items) comprising individual seeds of rushes (*Juncus sp.*), buttercups (*Ranunculus sp.*), common nettle (*Urtica dioica*) and grasses (*Poaceae*). The assemblage does not offer any information on the characterisation of the local environment.

Other plant remains
Uncharred fragments (undifferentiated) of plant epidermis, root material and monocot stems were present in varying quantities in all but three of the sampled deposits (Table 1). The remains exhibited mixed levels of preservation ranging from good to poor. It was noted that material deriving from deposits lower in the stratigraphic sequence were more degraded and poorly preserved.

Wood charcoal
Individual fragments of abraded oak charcoal (<5mm) were recovered from Group G (20704), and Group C (60407) and (70505) (Table 1). The fragments were of a size insufficient for AMS radiocarbon dating.

Uncharred wood
Uncharred undifferentiated fragments of wood were present in three of the sampled deposits (Table 1). The fragments were abraded and poorly preserved and would be insufficient for wood species identification.

Insects
A small number (<5) of insect remains were recovered from two deposits (Table 1). It is unlikely that further work would provide any information about the nature of the local environment.

Scientific dating potential of the remains
No material sufficient for AMS radiocarbon dating was recovered.

Discussion and recommendations
The overall palaeoenvironmental assemblage was limited in both size and content. Neither the material types present, nor the collective assemblage provides enough information to investigate the character or the development of the local landscape. The dominance of clays with sands and gravels suggests that the palaeoenvironmental evidence types normally used for environmental reconstruction and landscape characterisation, such as pollen, plant remains, insect remains and molluscs, will either be absent or if present, will be in very small numbers and poorly preserved. The monocot stem, root material, plant epidermis and insect remains from the assessment samples attest to this. In addition, no waterlogged deposits were observed in any of the 60 boreholes resulting in an absence of waterlogged (humic) material. Waterlogged (anoxic) conditions provide the optimal preservation environment for uncharred palaeoenvironmental remains such as plant microfossils, insect remains, pollen grains and spores. Palaeoenvironmental reconstruction work should ideally be undertaken on material from waterlogged deposits.

There is also the issue of the contextual security the palaeoenvironmental remains present. The stratigraphic sequence across the site represents deposition resulting from fluvial activity. Therefore, none of the remains present are in their primary depositional contexts. The material could have originated from anywhere and have been washed in at any time. It is unlikely that the remains present could be used to accurately document the development of the site.

Given the paucity of remains, issues of preservation and survival of material and the questionable contextual integrity of the palaeoenvironmental evidence, it is not recommended that further sampling of these deposits is undertaken during later works carried out at the site.

5 DISCUSSION AND CONCLUSION
The 3D representation of the groups of deposits recorded along the length of the site clearly highlight the continuity of a sequence starting with Group D at its base and rising through Groups C, B and A. Group C would appear to represent deposition associated with later glacial melt water runoff. As such it would have effectively cut Group D to form a river channel. With the main watercourse finally silted up with Group C, a colluviated glacial till – the bottom deposit associated with Group B, settled into the valley. Above this deposit and within Group B, a gleyed alluvial deposit was recorded indicating further slow-moving fluvial deposition and fluctuating water levels. The subsoil above is derived of this alluvial material.

The upper alluvial deposit recorded as Group E at the eastern end of this site is located on the inside of a bend in the current brook and represents deposition from slack water as faster moving water moved around the outside. The effect of this would have pushed the bend further to the east and has left a flat area that continues further east along the inside of the brook, which appears as a discrete floodplain.

Trial Trench 17, excavated during the 2015 evaluation was located to the west of Transect 1. Its eastern end was 15m west of Borehole 108 and 18.5m south of the current course of Padge Hall Brook. The organic rich deposit that was recorded in the trench between 0.60–1.30m BGL was not present in any of the boreholes drilled during this project. However, two series of alluvial deposits were recorded (Groups F and G), in boreholes immediately to the west and in close proximity to the brook. These groups were anomalous to the general sequence of deposits described above. The upper deposit, Group E, which is located within a clearly defined low-ground area in the current landscape is probably the result of seasonal differences in water levels, or flood events. It now lies outside of the course of the brook but it is likely that the area is still prone to flooding. Group G, a series of laminated deposits of fine alluvial and sand/gravel deposits which are lower in the sequence and below the colluviated material at the bottom of Group B seems to represent an earlier, and broader course of Padge Hall Brook, which, as evidenced by these laminations witnessed discrete changes in the rate of flow of water through it.

Given the differences in the deposits recorded during 2015 to those of this evaluation, it is clear that there should be a reason to explain the

disparity. An investigation into the broader landscape context of the areas under question provided evidence to support an interpretation.

- The first edition Ordnance survey map of the area shows a pond to the west of the location of 2015 Tr17. The location of the pond correlates very closely with a depression highlighted in modern mapping relief lines (ILLUS 7).

- Analysis of maps old and new has highlighted a number of factors to consider. Relief lines show that the natural low point in the topography of the valley, to the west of the borehole locations, lies to the south of the current course of the brook. In addition, the route at this point is very straight and appears to have been canalised, which suggests that as part of the canalisation it was moved slightly north (ILLUS 7). Further trial trenching conducted concurrently with this borehole phase of works further supports that the route of the brook was at one point located slightly to the south (Thomson 2019). The valley is far broader and shallower in profile to the west of the borehole locations, than its course further downstream. In particular, the immediate area encapsulating Transect 1, the 2015 Tr17, and the pond is particularly broad and with a very shallow drop.

- The origin of the brook is ambiguous. It does not flow from high ground, rather its mapped start point is only 1km to the WSW., suggesting that it springs from that point and/or that it is formed mainly from surface runoff water.

Taking these factors into account leads to an interpretation that the flow from the west down the broad shallow portion of the valley would have been slow, perhaps threaded, and later possibly intermittent dependant on climatic conditions. Water may have pooled and stagnated in the area of the pond, only flowing over to join the steeper portion of the valley sporadically. The near flat plain between the pond and Transect 1, with low energy deposition petering out to nothing would leave a wet area in which vegetation would thrive, perhaps explaining the organic rich deposit recorded in 2015. Transect 1 is located at a point in the landscape where the valley starts to steepen allowing for a more focused channel flow (ILLUS 7). In addition, the runoff channel which joins the brook between Transects 2 and 3, and which is relatively large in scale, does so at approximately the same current surface level as those of boreholes 106–109 and 207, in which both Groups F and G were recorded. These factors contribute to the variable flow rates that would be required to produce the sequence of deposits that were only observed in this area.

The only human activity that may have had any bearing on the formation of deposits recorded through the series of works in this area are that of canalising the brook to the west of Transect 1. All other formation processes are entirely the result of natural processes. The environmental samples collected during the borehole evaluation produced very little material were not suitable to aid in paleoenvironmental reconstruction.

A greater understanding of the previous route of Padge Hall Brook and its formation has been established relative to the area under evaluation and to an extent its course further upstream to the west.

Two areas have been identified as being most likely to contain deposits with organic preservation (ILLUS 7). These areas share the characteristic of being located where the topography exhibits a shallow to flat profile, conducive to the deposition of fine-grained sediments. The deposits present in these areas is of uncertain (potentially modern), date; therefore further works in these areas are unlikely to produce data capable of expanding upon the current understanding of the area's formation.

6 REFERENCES

Bailey L & Holden T (2015) Environmental Assessment in ***Blackburn Land Adjacent to Glebe Farm, Coventry Road, Lutterworth: Archaeological Evaluation*** Headland Archaeology [unpublished client report] HAS1142

Blackburn R (2015) ***Land Adjacent to Glebe Farm, Coventry Road, Lutterworth: Archaeological Evaluation*** Headland Archaeology [unpublished client report] HAS1142

Cappers RTJ, Bekker RM and Jans JEA (2006) ***Digital seed atlas of the Netherlands*** Groningen

Chartered Institute for Archaeologists (ClfA) 2014 ***Standard and guidance for the collection, documentation, conservation and research of archaeological materials*** (Reading) http://www.archaeologists.net/sites/default/files/ClfAS&GFinds_1.pdf accessed 26 September 2019

Chartered Institute for Archaeologists 2014 ***Code of Conduct***

Chartered Institute for Archaeologists 2014 ***Standards and Guidance for archaeological field evaluation***

Craddock-Bennett L 2019 ***Archaeological monitoring of boreholes Land adjacent to Glebe Farm, Coventry Road, Lutterworth: Archaeological Method Statement*** Headland Archaeology [unpublished client document]

EDP (2015) ***Symmetry park, Lutterworth: Archaeological and Heritage Assessment.*** [unpublished client document] The Environmental Dimension Partnership. Ref: EDP2307_04c

Knight D, Vyner B, Allen C 2012 ***East Midlands Heritage; An updated Research Agenda and Strategy for the Historic Environment of the East Midlands***

Vallender J 2019 ***Symmetry Park, Lutterworth: Written Scheme of Investigation*** [unpublished client document] Environmental Dimension Partnership Ref: edp2307_r022

Cranfield University 2017 ***Cranfield Soil and Agrifood Institute Soilscapes*** [online] accessed 05 June 2019 from www.landis.org.uk/soilscapes/ accessed 26 September 2019

Natural Environment Research Council (NERC) 2019 ***British Geological Survey*** http://www.bgs. ac.uk/ accessed 26 September 2019

Stace C (1997) ***New Flora of the British Isles*** (2nd edn) Cambridge

Thomson 2019 ***Land Adjacent to Glebe Farm, Lutterworth, Leicestershire: Archaeological Evaluation*** Headland Archaeology [unpublished client document]

Vallender J 2019 ***Symmetry Park, Lutterworth: Written Scheme of Investigation*** [unpublished client document] Environmental Dimension Partnership Ref: edp2307_r022

Zohary D, Hopf M & Weiss E (2012) ***Domestication of Plants in the Old World*** (4th edn) Oxford

7 APPENDICES

APPENDIX 1 DEPOSITS GROUPS AND THEIR COMPOSITION

Group A

Group A represents the topsoils across the site. Most of the site is covered with a topsoil the same as (60401), a mixed orangey brown and brown friable silty clay. Occasional differences were noted at the southern extremes of the transects, such as with (20301, 70801), where the material may have been derived from colluvial action, with the hill slope to the south of them being slightly steeper than at other points along that side of the valley. A number of boreholes immediately south of the current brook in Transects 1 and 2 (10701, 10801, 10901, 20701), were a homogenous greyish brown silty clay, containing a high level of alluvial material.

Group B

Group B represents subsoil over upper alluvial deposits which cover an orangey sandy deposit with occasional patches of gravels (60404). This sequence is common along the length of the valley and was also exposed across portions of the wider development area during the 2015 trial trenching (Blackburn 2015). The alluvial deposits were light blue to grey with brown mottling. The orangey deposit was identified as the first geological horizon. Given its heterogenous make up predominantly of sand, sandy silt and in places gravels and small stone, and its presence beyond the extents of the valley base it is best described as a colluviated glacial till and the result of formation processes following initial meltwater runoff.

Environmental sample 001 was recovered from deposit (60103) in this group.

Group C

Below Groups B, a series of alluvial deposits form Group C, which are up to 1.8m thick. These deposits become darker at increased depth and were made up of mottled greyish silty materials with orange to brown sandy clay deposits. There were very few large inclusions.

Six environmental samples; 002 from (60407), 003 from (50406), 007 from (70505), 008 from (70506), 009 from (70508), 010 from (70510) and 011 from (10510), were recovered from deposits within this group.

Group D

This group of deposits lies at the bottom of the sequence of deposits recorded and consists of 2 main deposits. One of very firm, dark grey (sometimes mottled with dark brown), slightly sandy clay which was mainly very 'clean', though occasionally containing moderate small inclusions. The other was a firm, mid brown sandy clay with frequent inclusions. These deposits were observed at an average depth of 2.80m BGL.

Environmental samples 006 from (70610), and 012 from (106014), were recovered from this group.

Group E

Upper alluvial deposits (70502, 70602, 70503), from a depth of c 0.35m, consisted of dark, silty, mottled, fine-grained alluvial deposits with very few inclusions. Located at the east end of the site and to the south of the brook on the inside of a bend where it starts turning to the south east. They are within a low-lying area at the base of a relatively steep slope and were deposited as result of low energy water action - a result of both slack waters running around the bend, and of seasonal/occasional flooding.

Environmental sample 006 was recovered from (70502).

Group F

Alluvial deposits immediately below the topsoil from a depth of c 0.30m BGL, were recorded in Boreholes 107–109 and 207 at the west end of the site and immediately south of the brook. They lay within an area of low ground (ILLUS 4), the same as that discussed below in Group G. They consist of an alluvially derived subsoil and a very fine dark alluvial deposit – the result of very low energy water action, probably seasonal or occasional flooding events.

Group G

At the west end of the site in Transects 1 and 2, a series of banded alluvial deposits from c 1.10m BGL, consisting of silty clays between more sandy and gravelly material, were observed in Boreholes 106–109 and 207, the banding appearing more pronounced on the north side of the brook in Borehole 106. A soft mid grey, silty sand was present at the base of this group. The combined maximum thickness of these deposits was 1.09m in Borehole 107 nearest to the brook, reducing to 0.76m further south in Borehole 109, which was located on a sharp break of slope leading into a low-ground depression that remains visible in the landscape (ILLUS 4). This low area was clearly visible running east to west, south of the brook in the area of transect 1, it terminated c 20m to the west, with the breakoff slope the same as that observed around Transect 109. Relief lines on modern mapping depict this low level at the west of the site and show it continuing on the south side of the brook until it meets a north to south aligned run off channel between Transects 2 and 3.

This group represents a series of changing energy levels in the flow of water, possibly both from the route of the brook to the west and the runoff channel to the east.

Environmental samples 004 from (20704), 013 from (10708) and 014 from (10907) were recovered from this group.

Group H

Distinct bands of sands and gravels were evident in cores taken throughout the valley. It was not possible to tie these into consistent bands along its length. Where there were stronger indications of continuity, these deposits have been grouped. Where individual deposits of similar material were observed but could not be reasonably added to this group (in terms of representation within ILLUS 5, they have remained within Group C.

This group most probably represents variable and different interbedded deposits associated with higher energy water movement than that depositing the alluvial deposits surrounding them. They may represent the base of the channel at various points in time.

APPENDIX 2 BOREHOLE SAMPLE RESULTS

TABLE 1 Borehole sample results

CONTEXT				10510	10614	10708	10907	20704	50406	60103	60407	70502	70505	70506	70508	70510	70610
Sample				011	012	013	014	004	003	001	002	006	007	008	009	010	005
Group				C	D	G	G	G	C	B	C	E	C	C	C	C	D
Sample type				Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole	Borehole
Spot date				Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Sample Vol (ml)				200	200	200	200	200	200	200	200	200	200	200	200	200	200
Combined Flot/Retent Vol (ml)				1	0	1	1	1	30	1	1	2	85	5	5	3	2
Sufficient for AMS?				N	N	N	N	N	N	N	N	N	N	N	N	N	N
WILD PLANTS																	
WETLAND TAXA																	
Juncus sp.	rushes	seed	u	–	–	–	–	+	–	–	–	–	–	–	–	–	–
Ranunculus sp.	buttercups	achene	u	–	–	–	–	–	–	–	–	–	+	–	–	–	–
Ruderal (wasteland and disturbed ground) taxa																	
Urtica dioica	common nettle	achene	u	–	–	–	–	+	–	–	–	–	–	–	–	–	–
EURYTOPIC TAXA																	
Poaceae >2 mm	grass family	caryopsis	u	–	–	–	–	–	–	–	–	+	–	–	–	–	–
OTHER BOTANICAL REMAINS																	
monocot stems	undifferentiated	fragment(s)	u	–	–	+	–	–	–	+++	+	+	+++	+++	+++	+	++
plant epidermis	undifferentiated	fragment(s)	u	+	–	+	–	+++	–	+	+	+++	+++	+++	+	+	+
root material	undifferentiated	fragment(s)	u	-	–	–	–	+++	–	++	–	+++	+++	+++	+++	–	–
wood fragments	undifferentiated	fragment(s)	u	+	–	++	–	–	–	–	–	–	+	–	–	–	–
CHARCOAL																	
charcoal (macroscopic <5 mm)	oak	fragment(s)	ch	–	–	–	–	+	–	–	+	–	+	–	–	–	–
OTHER REMAINS																	
amorphous vesicular matter	undifferentiated	fragment(s)	ch	–	–	–	–	–	–	+	–	–	–	–	–	–	–
ANIMAL REMAINS																	
insect remains	undifferentiated		–	–	–	–	–	+	–	+	–	–	–	–	–	–	–

Key: + = rare (0–5), ++ = occasional (6–15), +++ = common (15–50) and ++++ = abundant (>50)

Preservation type: ch = charred, w/l = waterlogged, u = uncharred

NB charcoal over 10mm is sufficient for identification and AMS dating

part of the RSK Group

Headland Archaeology Scotland
13 Jane Street
Edinburgh EH6 5HE
t 0131 467 7705
e scotland@headlandarchaeology.com

Headland Archaeology Yorkshire & North
Unit 16 | Hillside | Beeston Rd
Leeds LS11 8ND
t 0113 387 6430
e yorkshireandnorth@headlandarchaeology.com

Headland Archaeology South & East
Building 68C | Wrest Park | Silsoe
Bedfordshire MK45 4HS
t 01525 861 578
e southandeast@headlandarchaeology.com

Headland Archaeology Midlands & West
Unit 1 | Clearview Court | Twyford Rd
Hereford HR2 6JR
t 01432 364 901
e midlandsandwest@headlandarchaeology.com

Headland Archaeology North West
Fourways House | 57 Hilton Street
Manchester M1 2EJ
t 01432 364 901
e northwest@headlandarchaeology.com

www.headlandarchaeology.com