

ARCHAEOLOGICAL  
ASSESSMENT OF  
PLOT 21,  
SOUTH WORCESTER,  
NORTON JUXTA KEMPSEY,  
WORCESTERSHIRE



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## **Archaeological Assessment of Plot 21, South Worcester, Norton Juxta Kempsey, Worcestershire**

Nicholas Daffern and Jonathan Webster

With contributions by Nick Watson (ARCA)

### **Summary**

An archaeological borehole survey and topographical survey was undertaken at Plot 21, South Worcester, Norton Juxta Kempsey, Worcestershire (SO 8677 5115). It was commissioned by The Environmental Dimension Partnership (EDP), on behalf of their client, Welbeck Strategic Land LLP, who intends to undertake residential development of the area, known as the South Worcester scheme, for which a planning application will be submitted to Malvern Hills District Council, Worcester City Council and Wychavon District Council.

This report describes and assesses the significance of the heritage assets (and potential heritage assets) that are potentially affected by the application. The setting of heritage assets is considered. The potential impact of the application, and the need for further on-site evaluation, is assessed.

No evidence could be found to suggest that a medieval fish pond (WSM 41606) is present at the site and its interpretation as such (based on the field shape) is in error. A former water course runs north to south through the field. The course of this is still evident as a shallow hollow through the field. It was of natural origin with no evidence for later reworking, being a small tributary that fed into the Hatfield brook to the south. No datable evidence was noted to indicate when the current diversion of the watercourse around the edge of the field was undertaken. It could originally have been realigned in the medieval or post-medieval periods, and appears to have been done prior to the surveying for the tithe plan of 1839. The site is considered to be of low archaeological significance.



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## Report

### 1 Background

#### 1.1 Reasons for the project

An archaeological borehole survey and topographical survey was undertaken at Plot 21, South Worcester, Norton Juxta Kempsey, Worcestershire (SO 8677 5115). It was commissioned by The Environmental Dimension Partnership (EDP), on behalf of their client, Welbeck Strategic Land LLP, who intends to undertake residential development of the area, known as the South Worcester scheme, for which a planning application will be submitted to Malvern Hills District Council, Worcester City Council and Wychavon District Council.

The site is considered to have the potential to contain a heritage asset with archaeological interest, the significance of which may be affected by the application. This heritage asset takes the form of a possible former pond of unknown date, previously considered most likely to be medieval or early post-medieval in origin (WSM 41606).

A project proposal (including detailed specification) was produced (WA 2012b) following discussions between the Client and Mike Glyde, Historic Environment Planning Officer of Worcestershire County Council (the Curator).

The project conforms to the *Standard and guidance for historic environment desk-based assessment* (IfA 2012), *Standard and guidance for archaeological field evaluation* (IfA 2009), *Standards and guidelines for archaeological projects in Worcestershire* (WCC 2010) and the *Manual of Service Practice: fieldwork recording manual* (WA 2012a).

In addition, the sampling, geoarchaeology and environmental analysis conform to relevant sections of *Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage 2002), *Geoarchaeology: Using earth sciences to understand the archaeological record* (English Heritage 2007) and *Environmental archaeology and archaeological evaluations* (AEA 1995).

The event reference for the borehole survey and environmental analysis, given by the HER, is WSM 47448, whilst the topographical survey was undertaken with the HER reference WSM 47452.

### 2 Aims

The general aims of this assessment are to:

- establish the nature and extent of the heritage assets;
- assess the significance of the heritage assets within the application site and likely to be affected by the proposed development;
- assess the impact of the application on the heritage asset/s

### 3 Methods

#### 3.1 Personnel

The borehole survey and environmental analysis were undertaken by Nicholas Daffern BA (Hons), MSc; who joined Worcestershire Archaeology in 2007 and has been practicing archaeology since 2004. The topographic survey was completed by Jonathan Webster BA (Hons); who joined Worcestershire Archaeology in 2009 and has been in professional archaeology since 2001. The project manager responsible for the quality of the project was Tom Vaughan AIFA BA (Hons) MA. Illustrations were prepared by Carolyn Hunt, MIFA BSc (Hons).

### 3.2 Documentary research

All relevant information on the history of the site and past land-use was collected and assessed. Records of known archaeological sites and monuments were obtained from Worcestershire Historic Environment Record (HER). Historic maps and published sources were consulted at Worcestershire Archive, at the Hive, Worcester. Other sources were obtained from the client including the previous desk-based assessment (EDP 2012).

### 3.3 List of sources consulted

#### *Cartographic sources*

- Tithe plan of Norton Juxta Kempsey, 1839
- 1<sup>st</sup> edition Ordnance Survey, 1885
- 1905 Ordnance Survey
- 1930 Ordnance Survey
- Geology: Solid and Drift, 1976
- British Geological Survey, 1993, scale 1:50,000
- LIDAR survey (EDP 2012)

#### *Documentary sources*

See Section 11 below.

### 3.4 Impact assessment criteria

The criteria cited in Table 1 have been used.

<b>Major Beneficial:</b> Demonstrable improvement to a designated heritage asset of the highest order (or its setting), or non-designated asset (or its setting) of archaeological interest of demonstrable significance equal to that of a scheduled monument. Designated assets will include scheduled monuments, grade I/II* listed buildings, grade I/II* registered parks and gardens, registered battlefields, protected wrecks or World Heritage Sites. Improvement may be in the asset's management, its amenity value, setting, or documentation (for instance enhancing its research value). It may also be in better revealing a World Heritage Site or Conservation Area's significance.
<b>Beneficial:</b> Demonstrable improvement to a designated heritage asset (or its setting), or non-designated asset (or its setting) of archaeological interest such that the level of improvement will demonstrably have a minor affect the area and its heritage resource, either at a local or regional level. For instance grade II listed buildings, Conservation Areas and undesignated heritage assets important at a sub-national level. Improvement may be in the asset's management, its amenity value, setting, or documentation (for instance enhancing its research value).
<b>Not Significant:</b> Impacts that have no long-term effect on any heritage asset.
<b>Minor Adverse:</b> Minor harm to a designated heritage asset (or its setting), or non-designated asset (or its setting) of archaeological interest such that the level of harm will demonstrably have a minor affect the area and its heritage resource, either at a local or regional level. For instance grade II listed buildings, Conservation Areas and undesignated heritage assets important at a sub-national level.



<p><b>Moderate Adverse:</b> Minor harm to a designated heritage asset (or its setting) of the highest significance, or non-designated asset (or its setting) of archaeological interest of demonstrable significance equal to that of a scheduled monument. For instance scheduled monuments, grade I/II* listed buildings, grade I/II* registered parks and gardens, registered battlefields, protected wrecks or World Heritage Sites.</p> <p>Harm to a designated heritage asset (or its setting), or non-designated asset (or its setting) of archaeological interest such that the level of harm will demonstrably affect the area and its heritage resource, either at a local or regional level. For instance grade II listed buildings, Conservation Areas and undesignated heritage assets important at a sub-national level.</p>
<p><b>Major Adverse:</b> Harm to a designated heritage asset (or its setting) of the highest significance, or non-designated asset (or its setting) of archaeological interest of demonstrable significance equal to that of a scheduled monument. For instance scheduled monuments, grade I/II* listed buildings, grade I/II* registered parks and gardens, registered battlefields, protected wrecks, World Heritage Sites or harm to a building or other element that makes a positive contribution to the significance of a Conservation Area as a whole.</p> <p>Substantial harm to, or loss of, a designated heritage asset (or its setting), or non-designated asset (or its setting) of archaeological interest such that the level of harm or loss will demonstrably affect the area and its heritage resource, either at a local or regional level. For instance grade II listed buildings, Conservation Areas and undesignated heritage assets important at a sub-national level.</p>
<p><b>Severe Adverse:</b> Substantial harm to, or loss of, a designated heritage asset (or its setting) of the highest significance, or non-designated asset (or its setting) of archaeological interest of demonstrable significance equal to that of a scheduled monument. For instance scheduled monuments, grade I/II* listed buildings, grade I/II* registered parks and gardens, registered battlefields, protected wrecks, World Heritage Sites or the loss of a building or other element that makes a positive contribution to the significance of a Conservation Area as a whole.</p>
<p><b>Unknown:</b> Where there is insufficient information to determine either significance or impact for any heritage asset, or where a heritage asset is likely to exist but this has not been established, or where there is insufficient evidence for the absence of a heritage asset. For instance where further information will enable the planning authority to make an informed decision.</p>

*Table 1 Impact assessment criteria for heritage asset*

### 3.5 Fieldwork Strategy

#### 3.5.1 Topographic survey

The topographical survey was undertaken using a Leica Viva NetRover from south to north across the site, with individual points being taken every 2m refining down to every 1m within areas where variation was present. At points where resolution was lost, such as under the trees at the southern boundary of the site, levels were taken from the original topographic survey supplied by the client. Once this survey was completed, an interpretive plot was produced to illustrate variations in topography across the site (Fig 2).

#### 3.5.2 Boreholes

Nine boreholes (BH 1-9) and two test pits (TP 1-2) were sunk and excavated across the site under the supervision of a Senior Environmental Archaeologist (Fig 2). The boreholes were sunk using a Competitor mini-tracked percussive auger rig to recover continuous/windowless cores of c 100-

80mm in diameter and 1m length with the aim of sampling alluvial and/or organic deposits that could be assessed for environmental remains and their potential for geoarchaeological analysis.

The location and surface height above Ordnance Datum (AOD) of each borehole and test pit were recorded using a Leica Viva NetRover (Tables 2 and 3).

Borehole Number	Easting	Northing	Height (m AOD)
1	386771.33	251098.82	27.53
2	386771.83	251123.99	27.59
3	386771.40	251149.63	27.65
4	386772.74	251174.06	27.69
5	386775.92	251198.52	27.79
6	386779.26	251223.83	28.18
7	386753.43	251099.06	27.65
8	386792.40	251103.13	27.44
9	386750.13	251119.98	27.62

*Table 2 Borehole location and AOD height*

Test pit number	Easting	Northing	Height (m AOD)
1	386744.38	251147.74	27.69
2	386782.14	251143.02	27.64

*Table 3 Test pit location and AOD height*

### **3.6 Geoarchaeology methodology, by Nick Watson**

The cores were passed to ARCA in December 2012 and were studied in the laboratory between 19 and 20 December 2012. The plastic sleeves containing the cores were slit open and the retained sediments cleaned to expose a fresh face, photographed and then described according to standard geological criteria (Tucker 1982, Jones *et al* 1999, Munsell Color 2000). The resultant lithological data was input into a database of the geological utilities program Rockworks 15 (RockWare 2012) and this used to generate the tabular data depicted in Appendix 1. There was an average 10% sediment loss/compression in each of the boreholes. Therefore, the depths quoted in the text that follows are accurate to an estimated  $\pm 0.1$ -0.2m.

### **3.7 Structural analysis**

All fieldwork records were checked and cross-referenced. Analysis was effected through a combination of structural and artefactual evidence, allied to the information derived from other sources.

## **4 The application site**

### **4.1 Topography, geology and soils**

The site lies in the base of a shallow valley that runs from north to south and the general lie of the land gently drops from north to south (a total of 0.5m across the length of the site or 1:314). Deliberately cut drainage channels have been created around the field boundary and these take most of the water away from the field, even so it remains boggy in nature and the vegetation

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indicates that it remains wet year around. The underlying geology is mapped as Branscombe Mudstone formation dating to the Triassic overlain by Quaternary Alluvium. The soils are described as typical brown earths of the Hall and Wick series (Beard *et al* 1986). Brown earths of this subgroup (541) are permeable, well-drained, non-calcareous loams or clays.

## **4.2 Current land-use**

The site is currently used as pasture associated with a horse paddock and stables located in the field to the immediate west.

## **4.3 Historic land-use and archaeological character**

Plot 21 had been previously described as a former fish pond of probable medieval date (WSM 41606) that was fed by further fishponds and a moat associated with Newlands Farm to the north-east. With a rounded northern end and straight southern end it was thought that the southern boundary was also the location of a former dam.

The earliest known reference to the field is within the 1839 Tithe award where the field is identified as 'landing meadow', owned by Mrs Mary Whittaker and leased to a Mr Henry Hemuss who used the plot for pasture. The usage of the word 'meadow' suggests that (as today) the field was wet for at least part of the year. The form of the field, its boundaries and drainage appear to be the same as that seen today. There is no historic reference to suggest that this field had an earlier origin as a pond or water course and no other features in the immediate vicinity give any hint as to this usage.

The current drainage channel that runs around the edge of the field appears to have been constructed at some point before 1839, and is still in usage today, with evidence that it had been cleaned out and redug in the last 6 months or so.

Peat deposits are known to the south of the site, along with an alluvial band noted on the geological maps, indicating that there was a high potential for preserved organic remains (BGS 1993).

# **5 Topographical assessment**

## **5.1 Discussion**

The investigation area gently dropped in height from north to south a total of 0.5m across the length of the site or 1:314, but no other general variations were noted. The main feature that runs across the site is a small irregular linear hollow that is orientated from north to south along the eastern side of the field, becoming progressively wider and deeper. It ranges from 0.08m in the north, to 0.23m towards the south, before it drops into the canalised stream system on the southern boundary of the field. The feature contains water in places and the ground conditions suggest that it is a relict water course of probable natural origin. In addition to this, a small north to south linear was noted toward the west side of the field to the immediate north of the entrance. This feature, given its width and location, is thought to be a recent wheel rut, created by a vehicle moving across the wet, boggy ground. The lack of variation across the site as a whole indicates that it is extremely unlikely that a backfilled feature such as a pond is present. Although there is a large variation along the boundary of the site this relates to what appears to be a deliberately channelled drainage system.

# **6 Geoarchaeological assessment, by Nick Watson**

## **6.1 Stratigraphy**

The British Geological Survey 1:50,000 map of Worcester shows that the site is located on superficial deposits of Holocene alluvium (BGS 1993). These were deposited by a stream (unnamed in the mapping) which rises at Newlands Farm 0.5km to the north-east and where earthworks are recorded on the Ordnance Survey maps as a moat. The stream enters the site from

the north and exits in the south to join the Hatfield Brook, a small tributary of the River Severn flowing 0.2km further to the south from north-east to south-west. This is one of a network of streams developed in the Holocene, which bisect the Pleistocene terraces of the Severn below the 20m contour.

The bedrock of the study area is mapped as the Branscombe Mudstone Formation whose parent unit is the Mercia Mudstone Group. The ground level dips gently from north to south and follows a dip in the bedrock with local highs either side (BH7 and 9) of the transect, most likely reflecting the erosion of the stream channel through the site

### **6.1.1 Mercia Mudstone Group**

Red clays derived from the Branscombe Mudstone Formation were recovered in all the boreholes. These are calcareous clays and mudstones deposited in the Norian to Rhaetian stages of the Upper Triassic period between c 200 and 228 million years ago. In BH7 and BH9 they outcrop at c 0.6m below ground level (BGL), but otherwise the bedrock is between 1.27m (BH6) and 1.90m BGL (BH8). The clays are characterised by a brecciated texture, green/grey reduction spots and increase in induration with depth. The brecciation is probably a consequence of repeated seasonal freeze- thaw cycles of the permafrost during Pleistocene cold stages.

### **6.1.2 Alluvium**

Approximately 1m of structureless and compact grey silt/clay overlies the Branscombe Mudstone in all the boreholes (a maximum of 1.6m and minimum of 0.3m in thickness are recorded from BH8 and 9 respectively). Local turbulent flow has entrained sand-sized particles of weakly cemented bedrock, which settle out at slack water with the grey coloured allochthonous fines creating a graded heterogenous base to the alluvial deposit. Alluviation continues with the deposition of a suspended load of clays and silts under the low energy conditions that would pertain to a pond.

We can hypothesize about the fluvial regime, but unfortunately draw few, if any, conclusions: with no dating evidence available it is impossible to estimate the rate of accretion of the alluvium, fractions of millimetres per annum to a centimetre are possible and depend upon interrelated variables such as storm frequency, flood overspill from the Hatfield Brook or local agricultural intensity. Indeed, the reach of the feeder stream is very short, while the topography mitigates against run off, so perhaps an accretion rate of a few millimetres per annum is not unreasonable. The lack of organic remains suggests that anaerobic conditions did not develop and a through-flow of oxygenated water ensured that the area never became a small floodplain backswamp. That such an event is a possibility is evidenced by a record of peat 1km south-west on the Hatfield Brook (BGS 1993).

A soil has developed in the top of the alluvium. There are no indications for the structures retained in the soil that it has any great maturity.

## **6.2 Discussion**

The Branscombe Mudstone Formation at the base of the sequence has no palaeoenvironmental or archaeological potential on account of the Triassic age of the deposits.

The alluvium contains neither artefacts nor biological materials that might be used for radiocarbon dating, while biological preservation is poor throughout. This unit is therefore assessed as having both **low archaeological and palaeoenvironmental potential**.

## **6.3 Recommendations**

No further geoarchaeological work is recommended on the cores from the site.

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## 7 Environmental assessment

### 7.1 Environmental remains

Assessment of the boreholes and test pits was undertaken by a Senior Environmental Archaeologist subsequent to the geoarchaeological assessment. The conclusions from this assessment were the same as above, with the palaeoenvironmental potential being considered as low with no evidence for organic preservation or the presence of material suitable for environmental assessment or radiocarbon dating.

### 7.2 Discussion

As previously observed (Section 5.1.2), the presence of clay and silt, detrital particles whose presence is usually associated with low energy flow conditions, are indicative of ponding, although it should be noted that it is equally as likely that this is an indication of 'accidental' or natural ponding caused by blockage of the stream channel as the depositional processes involved would appear the same.

The cause of such 'accidental' or natural ponding is uncertain, but a change in the fluvial regime, associated with the diversion of the stream to create the present field boundaries, is proposed as being responsible for this.

## 8 Assessment of the significance

### 8.1 Sites of archaeological interest

#### *Nature of the archaeological interest in the site*

The site is recorded in the Worcestershire HER as a former fish pond of probable medieval origin (WSM 41606), based on morphological details in the shape of the field (bullet shaped) with a possible dam along the southern boundary and a feeder stream to the north that runs from the nearby moated manor house at Newlands Farm.

However, no documentary evidence (either cartographic or written) exists that helps to support this conclusion and further study of the site during the current works shows that no evidence can be found to support the above interpretation, with the borehole and topographic surveys demonstrating that the field contains a former stream route, lying as it does within a natural hollow. The construction of the field boundaries diverted the water around the field (in the present drainage channels) to allow the area to become useful for farming, although remaining 'bog like' in nature it was used for pasture. As such, no deposits or structures of archaeological significance are known on the site.

#### *Relative importance of the archaeological interest in the site*

No archaeological features or deposits are known to exist on the site and, as such, the proposed development is likely to have no significant effects on the archaeological record.

## 9 The impact of the development

The area of investigation contains no archaeological deposits or features of note. The borehole survey has demonstrated that the former route of a natural watercourse contains deposits of low preservation only. No further archaeological investigation is recommended due to the low yield of organic remains likely to have survived. As such, the proposed development impact is expected to be **not significant**.

### 9.1 Impacts during construction

The proposed development will affect the following heritage assets and the impact has been categorised as described in Table 1

The construction of the proposed development will have no significant impact on the known archaeological record and, given the naturally wet nature of the site, it is unlikely that any unknown archaeological deposits or features are likely to be found. It is known that the site has been used as nothing but a pastoral field since its inception and its boggy wet nature suggests that little activity would have been undertaken prior to this.

## **9.2 Unknown impacts**

As always, there is a potential that archaeologically significant remains may be present on the site, buried and not visible until construction begins. However, it is considered that this potential is extremely low given the nature of the area and known records. Certainly no activity has occurred in this area during recorded history and the nature of the wet ground means that occupation or industrial activity is unlikely to have been present prior to this. Any features or objects found are likely to be small and ephemeral relating to transient populations through the landscape and probably associated with either water collection or hunting.

## **10 Publication summary**

Worcestershire Archaeology has a professional obligation to publish the results of archaeological projects within a reasonable period of time. To this end, Worcestershire Archaeology intends to use this summary as the basis for publication through local or regional journals. The client is requested to consider the content of this section as being acceptable for such publication.

*An archaeological borehole survey and topographical survey was undertaken at Plot 21, South Worcester, Norton Juxta Kempsey, Worcestershire (SO 8677 5115). They were commissioned by The Environmental Dimension Partnership (EDP), on behalf of their client, Welbeck Strategic Land LLP, who intends to undertake residential development, known as the South Worcester scheme, for which a planning application will be submitted to Malvern Hills District Council, Worcester City Council and Wychavon District Council.*

*No evidence could be found to suggest that a medieval fish pond (WSM 41606) is present at the site and its interpretation as such (based on the field shape) is in error. A former water course runs north to south through the field. The course of this is still evident as a shallow hollow through the field. It is of natural origin with no evidence for later reworking, being a small tributary that fed into the Hatfield brook to the south. No datable evidence was noted to indicate when the current diversion of the watercourse around the edge of the field was undertaken. It could originally have been realigned in the medieval or post-medieval periods, and appears to have been done prior to the surveying for the tithe plan of 1839. The site is considered to be of low archaeological significance.*

## **11 Acknowledgements**

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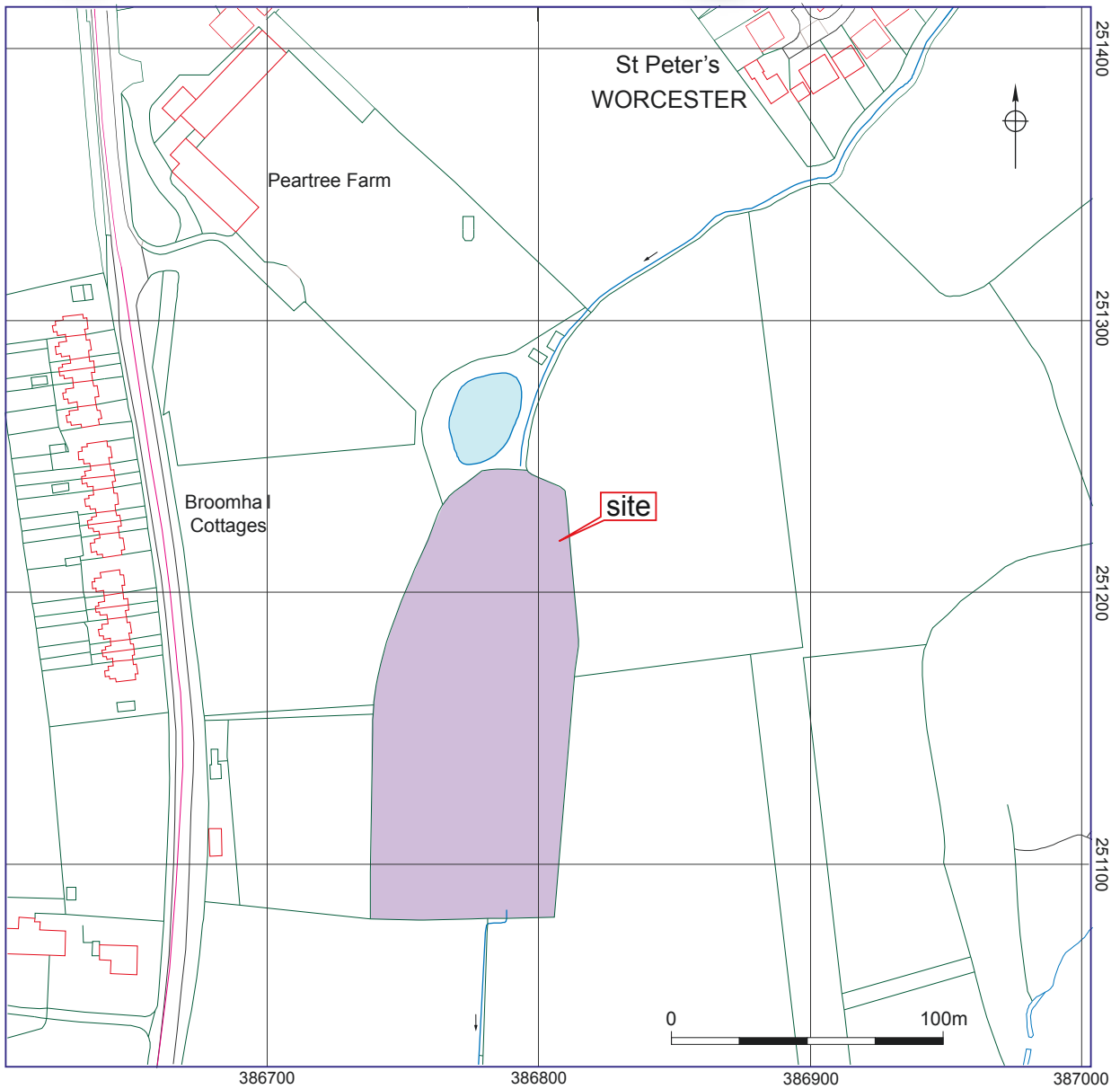
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**Figures**

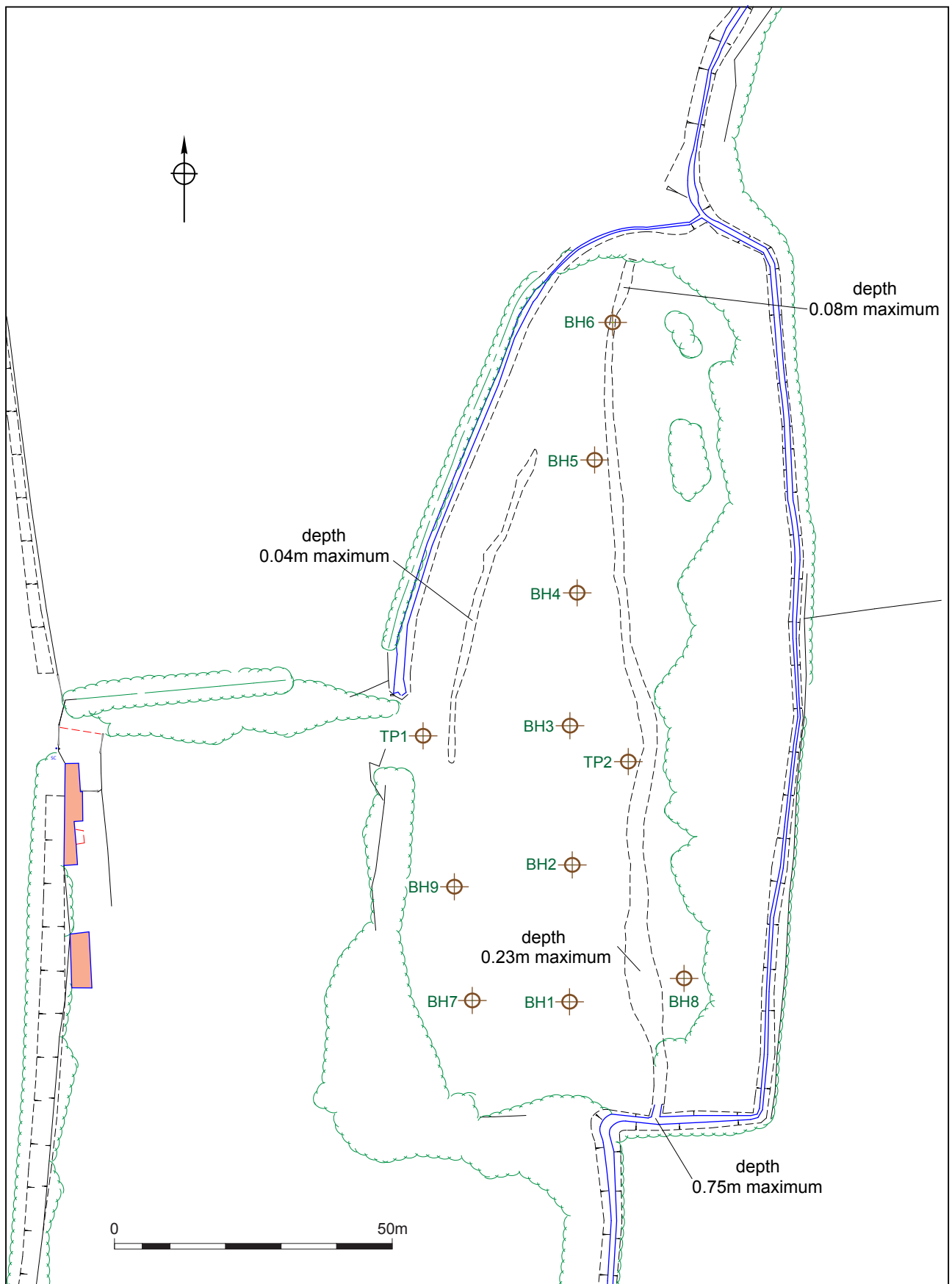




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*Location of the site*

*Figure 1*



*Topographical Survey interpretation and borehole locations*

*Figure 2*

## Plates



*Plate 1: The southern end of the site (view south)*



*Plate 2: The northern end of the site (view north)*





*Plate 3: Western boundary of the site illustrating the recently recut ditch (view north)*



*Plate 4: Southern boundary of the site and the brooks present course; again with evidence for recent recutting/channel management (view south)*





*Plate 5: Depression running towards the southern site boundary possibly marking the former stream course through the site prior to diversion of the channel to its present course (view south)*



*Plate 6: Depression running towards the southern site boundary (view south-west)*

## Appendix 1 Lithological recording

Bore	Top (m)	Base (m)	Lithology	Description
BH1	0.00	0.09	Soil	10 YR 4/1 Dark grey silt/clay with rare coarse sand sized mineral grains. Frequent granular-sized roots. (Rootmat and small volume of topsoil) Sharp boundary to:
	0.09	0.30	Soil	7.5 YR 4/3 Brown, compact silt/clay with occasional fine sand-sized orange grains of iron oxide. Occasional disrupted pebble-sized lenses of 10 YR 4/1 Dark grey silt/clay with a fine granular crumb structure typical of a topsoil. Occasional fine sand and granular-sized roots. Sharp boundary to:
	0.30	0.37	Soil	10 YR 4/1 Dark grey, homogenous silt/clay with fine granular crumb structure. (Topsoil: probably a large lens within a poorly mixed unit 0-0.37m of clay and topsoil with a modern turf surface) Sharp boundary to:
	0.37	0.86	Clay	7.5 YR 4/3 Brown, compact and homogenous silt/clay with occasional to frequent fine sand-sized orange iron oxide grains forming a fine mottled web. Rare sub angular (broken) pebble of reddish quartzite. (Alluvial clay within fluctuating watertable) gradual boundary to:
	0.86	1.10	Clay	2.5 Y 5/3 Light olive brown, compact and homogenous silt/clay with orange mottles and occasional coarse sand-sized black manganese grains. (Alluvial clay) Gradual boundary to:
	1.10	1.45	Clay	2.5 Y 5/3 Brown silt/clay with gradually increasing to base 5 YR 4/4 Reddish brown silt/clay which is gritty in texture. Rare coarse sand-sized black manganese grains. (Alluvial clay grading into bedrock) Gradual boundary to:
	1.45	2.00	Siltstone	5 YR 3/4 Dark reddish brown compact and homogenous silt/clay with frequent green/grey reduction spots and mottles. Coarse sand to granular-sized brecciated texture. (weathered Mercia Mudstone )
BH2	0.00	0.06	No Recover	Void
	0.06	0.15	Soil	10 YR 3/2 Very dark greyish brown silt/clay with poorly developed ped structure and rare medium sand-sized mineral grains. Frequent fine to granular-sized roots and rare red sub angular pebble-sized mudstone clast. (Topsoil) Gradual boundary to:
	0.15	0.30	Soil	7.5 YR 4/2 Brown compact silt/clay with rare granular-sized charcoal fragments. Illuviated brown clays mottle the 7.5 YR 4/3 Brown silt/clay. Gradual boundary to:



Bore	Top (m)	Base (m)	Lithology	Description
BH2	0.30	1.10	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay with occasional sand-sized granules of manganese oxide and orange iron oxide increasing towards base. (Alluvial clay) Gradual boundary to:
	1.10	1.60	Clay	5 Y 5/1 Grey compact and homogenous silt/clay. Occasional orange oxide mottles and black grains of manganese oxide. (Alluvial clay below watertable) Sharp boundary to:
	1.60	1.97	Clay	Mixed unit of 5 Y 6/1 Grey compact silt/clay with distinct and frequent (60%) inclusions of 5 YR 4/4 Reddish brown silt/clay with a hard granular texture. (Eroded top of Mercia Mudstone)
BH3	0.00	0.12	Soil	10 YR 3/2 Very dark greyish brown silt/clay with frequent sand to granular-sized roots. ped structure disguised by muddy texture. (Topsoil) diffuse boundary to:
	0.12	0.32	Soil	7.5 YR 4/3 Brown silt/clay mixed with illuviated brown clays forming a poor prismatic structure. Occasional sand-sized roots and granular-sized charcoal fragments. (B horizon) Sharp boundary to:
	0.32	0.70	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay. (Alluvial clay) Diffuse boundary to:
	0.70	1.70	Clay	10 YR 5/2 Greyish brown compact and homogenous silt/clay grading into 5 Y 5/1 Grey towards the base. (Alluvial clay) Diffuse boundary to:
	1.70	1.97	Siltstone	5 YR 3/4 Dark reddish brown silt/clay with occasional green/grey reduction spots and mottles. sand to granular -sized brecciated gritty texture. (weathered Mercia Mudstone)
BH4	0.00	0.13	Soil	10 YR 3/2 Very dark greyish brown silt/clay with poorly developed ped structure and rare medium sand -sized mineral grains. Frequent fine to granular-sized root. (Topsoil) Diffuse boundary to:
	0.13	0.26	Soil	7.5 YR 4/3 Brown silt/clay mixed with illuviated brown clays forming a very poor prismatic structure. Diffuse boundary to:
	0.26	0.70	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay. (Alluvial clay) Diffuse boundary to:
	0.70	1.00	Clay	2.5 Y 4/2 dark greyish brown, compact and homogenous silt/clay with occasional sand - sized grains of red gritty mudstone. (Alluvium)

	1.00	1.11	No Recover	Void
Bore	Top (m)	Base (m)	Lithology	Description
BH4	1.11	1.48	Clay	5 Y 5/1 grey compact and homogenous silt/clay with sand-sized grains of gritty red mudstone increases towards the base. Gradual boundary to:
	1.48	1.97	Siltstone	5 YR 3/4 dark reddish brown silt/clay with occasional green/grey reduction spots and mottles. sand to granular -sized brecciated gritty texture. (Weathered Mercia Mudstone)
BH5	0.00	0.08	No Recover	Void
	0.08	0.23	Soil	10 YR 3/2 Very dark greyish brown silt/clay with rare medium sand-sized mineral grains. Frequent sand to granular -sized roots. poor ped structure? but muddy texture. (Topsoil) Diffuse boundary to:
	0.23	0.41	Soil	7.5 YR 4/3 Brown silt/clay mixed with illuviated brown clay mottles and lenses of topsoil with poor prismatic structure. Rare granular-sized charcoal fragment. Diffuse boundary to:
	0.41	0.69	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay. (Alluvium) Diffuse boundary to:
	0.69	1.50	Clay	2.5 Y 5/2 greenish brown compact and homogenous silt/clay with occasional sand-sized grains of orange iron oxide, and reddish and orange mottles. Rare pebbles of sub rounded vein quartz and quartzite. Occasional oxide grains and gradual colour change to 5 Y 4/1 Grey towards base. Mudstone clasts increase towards base. (Alluvium) Diffuse boundary to:
	1.50	1.98	Siltstone	5 YR 3/4 Dark reddish brown silt/clay with occasional green/grey reduction spots and mottles. Sand to granular -sized brecciated gritty texture becoming more indurated at the base. (Weathered Mercia Mudstone)
BH6	0.00	0.11	No Recover	Void
	0.11	0.33	Soil	10 YR 3/2 Very dark greyish brown silt/clay with rare medium sand-sized mineral grains. occasional sand to granular-sized roots. No ped structure and gradual change to 7.5 YR 4/3 Brown. Turf is moss rather than grass. (Topsoil) gradual boundary to:
	0.33	0.70	Clay	7.5 Y R4/3 Brown compact and homogenous silt/clay. (Alluvium) Diffuse boundary to:

	0.70	1.27	Clay	2.5 Y 5/2 Greyish brown compact and homogenous silt/clay. (Alluvium) Diffuse boundary to:
	1.27	2.00	Siltstone	5 YR 3/4 Dark reddish brown silt/clay with occasional green/grey reduction spots and mottles. Sand to granular -sized brecciated gritty texture becoming more indurated at the base. (Weathered Mercia Mudstone)
Bore	Top (m)	Base (m)	Lithology	Description
BH7	0.00	0.07	No Recover	Void
	0.07	0.29	Soil	10 YR 4/2 dark Greyish brown silt/clay with occasional fine sand-sized mineral grains. Poorly developed fine granular ped structure and occasional sand-sized roots. (Topsoil) Diffuse boundary to:
	0.29	0.60	Clay	5 YR 4/4 Reddish brown compact and homogenous silt/clay (Fluvially weathered/ redeposited top of Mercia Mudstone) Gradual boundary to:
	0.60	1.00	Siltstone	5 YR 3/4 Dark reddish brown indurated silt/clay. (Mercia Mudstone)
BH8	0.00	0.07	No Recover	Void
	0.07	0.28	Soil	10 YR 4/2 Dark greyish brown silt/clay with occasional fine sand-sized mineral grains. Poorly developed fine granular ped structure and occasional sand-sized roots. (Topsoil) Diffuse boundary to:
	0.28	1.15	Clay	7.5 YR 4/4 Brown compact and homogenous silt/clay with rare root and sand-sized oxide grains. (Alluvium) Diffuse boundary to:
	1.15	1.90	Clay	5 Y 4/1 Dark grey compact and homogenous silt/clay with sand-sized red mudstone inclusions increasing towards base. Rare pebble of angular quartzite (broken) and sand-sized roots. (Alluvium) Diffuse boundary to:
	1.90	2.00	Siltstone	5 YR 3/4 Dark reddish brown compact and brecciated mudstone with 50% intercalated grey clay. (Top of weathered Mercia Mudstone)
BH9	0.00	0.05	No Recover	Void
	0.05	0.31	Clay	10 YR 4/2 Dark greyish brown silt/clay with rare fine sand-sized mineral grains. Frequent sand-sized roots and rare pebble-sized fragment of angular red tile and granular-sized charcoal. Poorly developed prismatic structure towards base and occasional pebble sized lens of 7.5 YR 4/3 Brown silt/clay. (Topsoil) Diffuse boundary to:

	0.31	0.58	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay. Rare sand-sized Mn oxide grains. (Alluvium) Gradual boundary to:
	0.58	1.00	Siltstone	5 YR 3/4 Dark reddish brown compact and brecciated mudstone increasingly indurated towards the base with occasional green/grey reduction spots. (Weathered Mercia Mudstone)
Bore	Top (m)	Base (m)	Lithology	Description
TP1	0.00	0.15	Soil	10 YR 3/2 Very dark greyish brown silt/clay with poorly developed ped structure and rare medium sand-sized mineral grains. Frequent fine to granular-sized roots and rare red sub angular pebble-sized mudstone clast. (Topsoil) Gradual boundary to:
	0.15	0.30	Soil	7.5 YR 4/2 Brown compact silt/clay with rare granular-sized charcoal fragments. Illuviated brown clays mottle the 7.5 YR 4/3 Brown silt/clay. Gradual boundary to:
	0.30	0.92	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay. Rare sand-sized Mn oxide grains. (Alluvium) Gradual boundary to:
	0.92	1.00	Siltstone	5 YR 3/4 Dark reddish brown compact and brecciated mudstone increasingly indurated towards the base with occasional green/grey reduction spots. (Weathered Mercia Mudstone)
TP2	0.00	0.12	Soil	10 YR 3/2 Very dark greyish brown silt/clay with frequent sand to granular-sized roots. ped structure disguised by muddy texture. (Topsoil) diffuse boundary to:
	0.12	0.30	Soil	7.5 YR 4/2 Brown compact silt/clay with rare granular-sized charcoal fragments. Illuviated brown clays mottle the 7.5 YR 4/3 Brown silt/clay. Gradual boundary to:
	0.30	0.86	Clay	7.5 YR 4/3 Brown compact and homogenous silt/clay. Rare sand-sized Mn oxide grains. (Alluvium) Gradual boundary to:
	0.86	1.00	Siltstone	5 YR 3/4 Dark reddish brown compact and brecciated mudstone increasingly indurated towards the base with occasional green/grey reduction spots. (Weathered Mercia Mudstone)

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## **Appendix 2 Technical information**

### **The archive (site code: WSM 47448 & 47452)**

The archive consists of:

- 43 Digital photographs
- 1 CD-Rom/DVDs
- 1 Copy of this report (bound hard copy)

The project archive is intended to be placed at:

Worcestershire County Museum  
Museums Worcestershire  
Hartlebury Castle  
Hartlebury  
Near Kidderminster  
Worcestershire DY11 7XZ  
Tel Hartlebury (01299) 250416