Geoarchaeological borehole survey at Hoobrook Link Road Bridge, Worcestershire

Worcestershire Archaeology
Archive and Archaeology Service
The Hive, Sawmill Walk,
The Butts, Worcester
WR1 3PD

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Date:	19 August 2015
Author:	Suzi Richer sricher@worcestershire.gov.uk
Contributors:	Andy Howard BSc, PhD, CMIfA
Illustrator:	Carolyn Hunt
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Contents

Geoarchaeological assessment of deposits at the Hoobrook Link Road Bridge, Kidderminster, Worcestershire

Suzi Richer

With a contribution by Andy Howard

Summary

A geoarchaeological borehole survey was undertaken at the Hoobrook Link Road Bridge, Kidderminster, Worcestershire (NGR SO 82969 74816). It was undertaken on behalf of Worcestershire County Council in the course of building a bridge and associated road system across the River Stour, and the Staffordshire and Worcester Canal. The project aimed to determine if any significant archaeological or palaeoenvironmental remains were present and, if so, their state of preservation, type, and quantity.

The presence of late glacial sand and gravels suggests that a post-glacial (Holocene) sequence had been present at the site. This sequence was now blanketed by undated alluvium, which was likely to have been deposited by flood events from the River Stour, and had also been truncated by made-ground, which consisted primarily of modern and post-medieval material (including coal and slag). The waste material is likely to have been associated with the post-medieval Falling Sands Rolling Mill.

Report

1 Background

1.1 Reasons for the project

A geoarchaeological borehole survey was undertaken at Hoobrook, Kidderminster, Worcestershire (SO 82969 74816). It was commissioned by Worcestershire County Council, when intending to undertake the development of a new bridge over the River Stour and the Staffordshire and Worcester Canal (WSM 12001) as part of the Hoobrook Link Road.

Previous geotechnical work by Ian Farmer Associates in 2013 consisted of a number of boreholes and a series of trial pits (Ian Farmer Associates 2014). In particular, boreholes 406, 407 and 408 revealed a mixture of fine-grained silt and clay (alluvium) underlain by sands and gravels, with pockets of 'partially decomposed organic matter'. It was the combination of the presence of these organic deposits, along with previous work (Shotton and Coope 1983; Brown 1988, WSM 39807 and Daffern 2010, WSM 42100) on the floodplain of the River Stour at Wilden Marsh (approximately 1km downstream) that suggested that the proposed development area may include significant palaeoenvironmental deposits. Both of the locations at Wilden Marsh (Daffern 2010; WSM 42100 and Brown 1988; WSM 39807) had revealed important organic deposits dating from the Mesolithic, and so the potential for organic remains in this river valley generally seemed high.

The project conforms to a brief prepared by Worcestershire County Council and for which a project proposal (including detailed specification) was produced (WA 2014). This assessment follows the procedures of the *Manual of Service Practice: recording manual (*2012, Worcestershire County Council, Worcestershire Archaeology internal report, **1842)**, with particular reference herein to the *Guidelines for environmental sampling*. The project also conforms to the *Standard and guidance: Archaeological watching brief* (CIfA 2014), and *Standards and guidelines for archaeological projects in Worcestershire* (WCC 2010).

The event reference for this project, given by the HER, is WSM 67035.

2 Aims

The aims of the borehole survey were to determine, from samples and information provided by the client, the state of preservation, type, and quantity of environmental remains recovered. This information will be used to assess the importance of any environmental remains, and will assist the client in presenting the results of archaeological fieldwork.
The specific aims for this assessment were:

- To establish the presence of any Holocene palaeochannel deposits containing environmental remains;
- To assess the state of preservation of any palaeoenvironmental remains;
- To assess the significance of the data in terms of published national and regional frameworks.

3 Methods

3.1 Personnel

The project fieldwork was undertaken by Graham Arnold (BA (hons.); MSc), who joined Worcestershire Archaeology in 2009 and has been practicing archaeology since 2002 and Suzi Richer (BSc, MSc, PhD), who joined Worcestershire Archaeology in 2014 and has been practicing archaeology since 2003. The project manager responsible for the quality of the project was Derek Hurst. Illustrations were prepared by Carolyn Hunt (BSc (hons.); PG Cert; MCIfA). Andy Howard (BSc, PhD, CMIfA), of Landscape Research and Management, contributed the geoarchaeological analysis of the cores.

3.2 Documentary research

Prior to fieldwork commencing a search was made of the Historic Environment Record (HER).

3.3 Fieldwork strategy

A detailed specification was prepared by Worcestershire Archaeology (WA 2014), and fieldwork was undertaken in two phases between 25 June 2014 (Phase 1) and 19 June 2015 (Phase 2).

Due to the presence of high-voltage overhead cables on the site, extra cores (AH3 and AH5) were taken during Phase 1 as a precaution; in case access closer to the river continued to be restricted. However, during Phase 2 it was possible to recover cores from closer towards the current river bank (BH3, BH4 and BH5), and it was deemed that these would provide a better east-west profile than the previously retained cores (AH3 and AH5).

The location of all of the boreholes is indicated in Figure 2.

3.3.1 Core recovery, by Andy Howard

Phase 1

Four boreholes (BH) were drilled during Phase 1 and provided with the site codes AH1, AH2, AH3 and AH 5). AH1 was drilled close to geotechnical core BH407, and AH2 was drilled close to BH408; AH5 was drilled between geotechnical cores BH1 and BH2, whilst AH3 was near BH2. The location of overhead power-lines restricted access and had to be taken into consideration when choosing sample localities (S Richer, Worcestershire Archaeology, pers comm).

Since coring was undertaken in two phases, Phase 1 borehole reporting was restricted to the sediments associated with AH1 and AH 2 (Table 1); the two other boreholes have been retained for further analysis, if required.

Borehole	Easting	Northing	Surface Height AOD (Metres)	Samples Taken
AH1	382996.1	274881.802	29.20	0-1m, 1-2m, 2-3m, 3-4m
AH2	383001.4	274864.679	29.29	0-1m, 1-2m, 2-3, 3-4m

Table 1. Boreholes examined in Phase 1, Hoobrook Link Road

Phase 2

Three boreholes were drilled during Phase 2 and provided with site codes BH3, BH4 and BH5 (Table 2). They were drilled in an east–west transect close to the proposed bridge. Restrictions of access caused by underground utility services (cables and sewers) and ground conditions (invasive plant species) resulted in the cores being taken within a triangle of land. During drilling of the 4th metre of BH5, the drill-bit became stuck and a bag of material was all that was recovered.

Borehole	Easting	Northing	Surface Height AOD (Metres)	Samples Taken
BH3	382992	274888	29.40m	3.2 m deep (4 cores)
BH4	382984	274882	28.20m	2.8m deep (3 cores)
BH5	382982	274893	28.40m	4m deep (3 cores, 1 bag)

Table 2. Boreholes examined in Phase 2, Hoobrook Link Road

3.3.2 Laboratory methods, by Andy Howard

Sample tubes were opened, and their sedimentological properties examined and described using a range of standard geological criteria (Jones *et al* 1999). These descriptions considered unit colour,

texture, internal structure, grain size, lithology, fossil content, chemical signature and artefactual content. As well as written descriptions (Appendices 1 and 2), cores were photographed (Plates 5–24).

3.4 Statement of confidence in the methods and results

The methods adopted allow a high degree of confidence that the aims of the project have been achieved.

4 The application site

4.1 Topography, geology and archaeological context, by Andy Howard and Suzi Richer

The site itself sits on the floodplain of the River Stour (Figure 1), which in turn is situated within the river valley that contains the north-south running River Stour and the Staffordshire and Worcester Canal (WSM 12001), and the east-west flowing Hoobrook (a tributary to the River Stour). To the north of the site the river valley is constricted by sandstone outcrops, but to the south of the site the flood plain widens considerably. Outside of the river valley, the topography is undulating with plateaus existing on both sides.

The region is underlain by sandstone bedrock of Triassic age (Wildmoor Sandstone Formation), in turn, overlain by remnants of Pleistocene river terrace sediments associated with the Severn-Avon drainage system (Wills 1938, Maddy *et al* 1995, Maddy 1999). Within the Hoobrook area itself, these terrace sands and gravels are restricted to small remnants of the Power House Terrace (Wills 1938), which infill the wider valley floor and occasionally form elevated islands within it. The upper part of the Power House Terrace has been dated to around 12,500 radiocarbon years Before Present (BP) at nearby Wilden (Shotton and Coope 1983) and was deposited in the harsh cold climate of the Late-glacial (upper Palaeolithic). For the most part the Powerhouse Terrace deposits are not exposed, but are blanketed beneath a veneer of fine-grained alluvium deposited during the Holocene.

Regionally, the post-glacial alluvial deposits of the Stour Valley have been investigated at a number of localities, notably Cookley, Wilden Marsh and Hartlebury Common, demonstrating the potential of these sediments to yield high-quality palaeoenvironmental remains (Shotton and Coope 1983; Brown 1988; Greig 2007; Daffern 2010). Given this previous work, it was considered that the deposits encountered along the Hoobrook Link Road might yield further environmental remains capable of elucidating the landscape history of the area.

Historically, the site is situated within an area marked on the OS maps (1884–5, 1902, 1927, and 1938) as 'Falling Sands'. All editions prior to 1938 mark the area as 'Liable to flood', which is reflected in the presence of alluvium on the site, and, therefore, the possibility of organic deposits.

There are no archaeological monuments located at the site, however the site in question sits within the middle of a post-medieval industrial landscape, with an old leat (WSM 38010) running to the west of the site, originally constructed to bypass water around the Falling Sands Rolling Mill (WSM 34444). The Falling Sands Rolling Mill (WSM 34444) was operational between the end of the 18th century and the turn of the 20th century, and was located approximately 300m to the south of the site, being composed of a forge, rolling mill, slitting mill and watermill.

5 Environmental analysis by Andy Howard

The locations of the boreholes taken are shown in Figure 2. The results of the environmental analysis are presented in Appendices 1–2.

5.1 Phase 1

Both inspected cores comprised 4m of deposits and revealed a tripartite sequence comparable to that recorded in the earlier site boreholes. The uppermost unit (1a) comprised a combination of

sand, silts and clays, sometimes forming a loam, which is interpreted as a modern overbank flood layer (alluvium) upon which a modern vegetation layer (turf) has developed. Occasional small 'Bunter' pebbles derived from the local sandstone were recorded and are a common feature of the superficial deposits of the region. Below approximately half a metre, the overbank alluvium rested upon a unit dominated by anthropogenic debris (made-ground) comprising a mixture of tightly-packed modern material including: bottle and window glass; plastic; tin foil; plastic toy soldiers; coal; wood; slate; and roof tile (Unit 1b). In Core AH1, the made-ground had a strong diesel oil/bitumen odour between 1.2 and 1.5m OD. The made-ground deposits rested upon stiff, olive-grey silty clay (Unit 2), which was gleyed and frequently mottled by iron and manganese; gleying and chemical precipitation are features associated with regular fluctuation of local groundwater-tables. In both cores, the silty clay was around 1m thick and again is interpreted as the result of overbank alluvial deposition. Overall, Unit 2 contained little in the way of organic material, either preserved within discrete palaeochannel fills and/or across more extensive backswamp surfaces. The only marginally organic material recorded throughout core analysis comprised 2cm of humic silty clay at 2.63m depth in AH2 (Core 3), but it did not include any visible macroscopic organic remains; the 2cm of material was, however, sampled and retained for future reference. Unit 2 was underlain by brown, well sorted medium sand; with depth, the sand became increasingly coarse and gravelly, eventually becoming coarse, reddish-brown clast-supported sand and gravel deposits by around 4m. Since these sand and gravel deposits are considered to represent the underlying Powerhouse Terrace deposits aggraded during the Last Glacial Maximum, they are considered to represent a single sediment body (Unit 3).

5.2 Phase 2

As with Phase 1 analysis, all cores revealed a tri-partite sequence of deposits, similar to those described above: (Unit 1) made ground; (Unit 2) silty clay alluvium; and (Unit 3) terrace sands and gravels. All the sediments were devoid of organic matter or any other remains of archaeological interest.

6 Synthesis, by Andy Howard and Suzi Richer

Boreholes drilled during this project revealed a sequence of fine-grained Holocene alluvium masking coarser sands and gravels of the Powerhouse Terrace. The terrace sands and gravels were bottomed in all of the boreholes investigated indicating that the entire post-glacial (Holocene) sequence was recorded at the site. However, the upper part of the alluvium has been truncated by between 1-2m of made-ground deposits with significant modern debris and contaminated by petroleum-based products. Other material within the made-ground, such as the coal and slag seen in AH1 and AH2, are likely to be waste spread from the nearby 18th–20th century industrial area of the Falling Sands Rolling Mill (WSM 34444).

No laterally or vertically significant organic remains, such as those preserved within palaeochannels and/or across backswamp environments, were recorded in the boreholes; the total organic content of the entire suite of cores investigated comprised just a 2cm thick layer of humic silty clay within Core AH 2 (Phase 1 drilling). No artefacts or other archaeological materials were recorded below the made-ground (Units 1a and 1b) during inspection of the cores.

Based on this analysis of boreholes, it can be stated that the palaeoenvironmental potential of this particular area is low.

7 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.

A geoarchaeological borehole survey was undertaken on behalf of Worcestershire County Council at Hoobrook, Kidderminster, Worcestershire (SO 82969 74816; WSM 67035).The presence of late-glacial sand and gravels suggests that the entire post-glacial (Holocene) sequence was recorded at the site. This was composed primarily of alluvium, which was likely to have been deposited by flood events from the River Stour. The alluvium was truncated by made-ground, which consisted primarily of post-medieval and modern material, including coal and slag, which could be waste from the operation of the nearby Falling Sands Rolling Mill.

8 Acknowledgements

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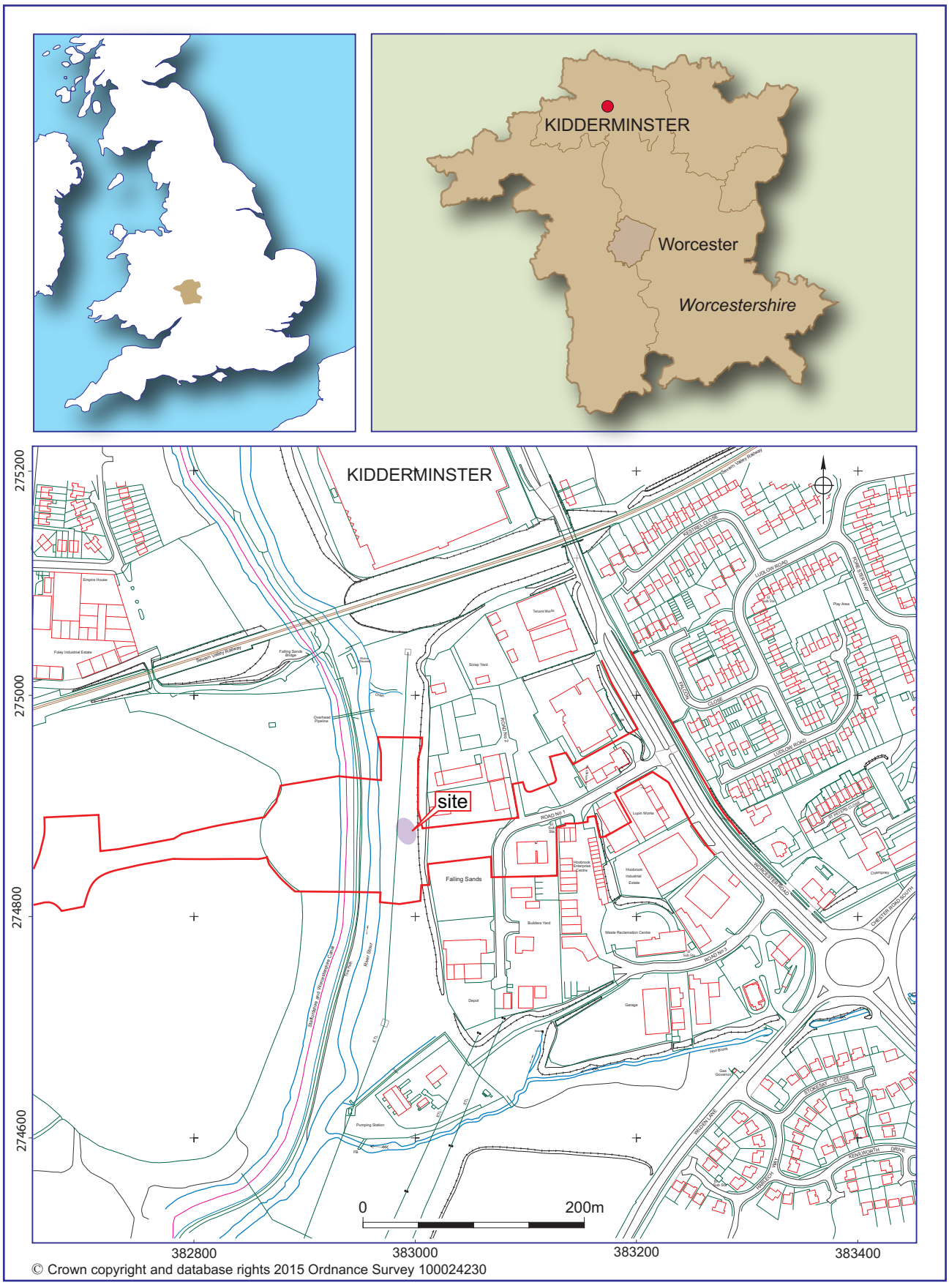
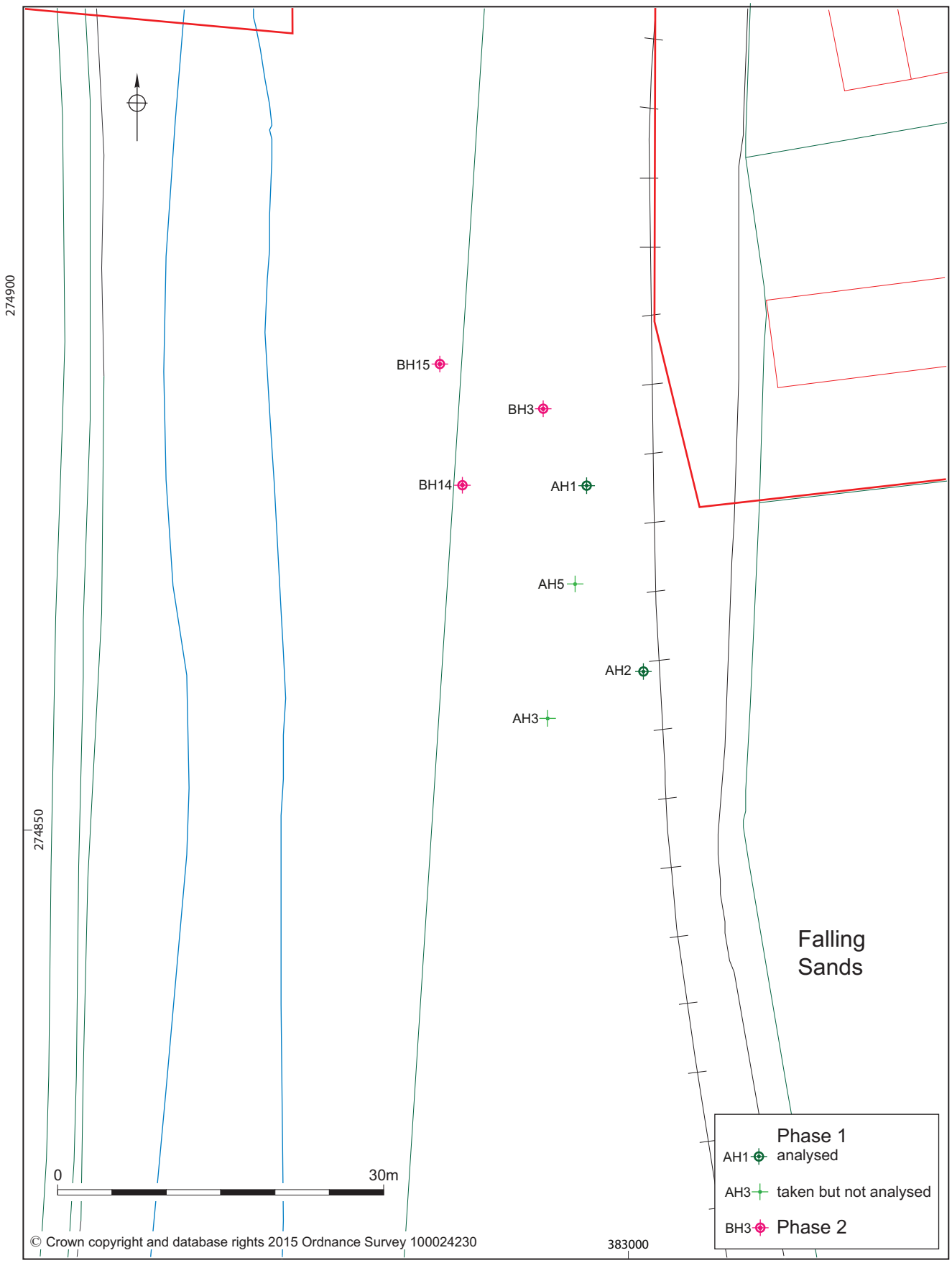
Figures



Location of the site *Figure 1*



Location of boreholes *Figure 2*

Plates

Plate 1 The site before works began, showing the overhead pylon looking north.

Plate 2 Phase 1. The location of BH1 before sampling looking north.

Plate 3 Borehole 4 drilling in progress. Looking west.

Plate 4 The bridge works in progress, looking west towards the Link Road.

Phase 1 - Cores

Plate 5 Phase 1 AH2 0–1m (Photo: A Howard)

Plate 6 Phase 1 AH2 0–1m (base) (Photo: A Howard)

Plate 7 Phase 1 AH2 0–1m (top) (Photo: A Howard)

Plate 8 Phase 1 AH2 1–2m (Photo: A Howard)

Plate 9 Phase 1 AH2 2–3m (Photo: A Howard)

Plate 10 Phase 1 AH2 3–4m (Photo: A Howard)

Plate 11 Phase 1 AH1 0–1m (Photo: A Howard)

Plate 12 Phase 1 AH1 0–1m (top) (Photo: A Howard)

Plate 13 Phase 1 AH1 0–1m (base) (Photo: A Howard)

Plate 14 Phase 1 AH1 1–2m (Photo: A Howard)

Plate 15 Phase 1 AH1 2–3m (Photo: A Howard)

Plate 16 Phase 1 AH1 3–4m (Photo: A Howard)

Phase 2 - Cores

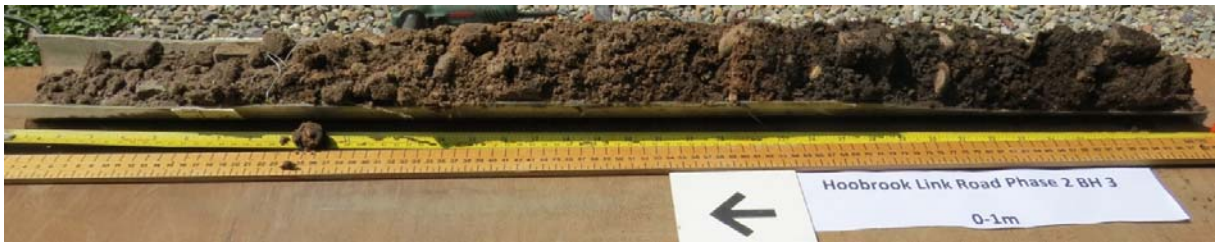


Plate 17 Phase 2 BH3 0–1m (Photo: A Howard)

Plate 18 Phase 2 BH3 1–2m (Photo: A Howard)

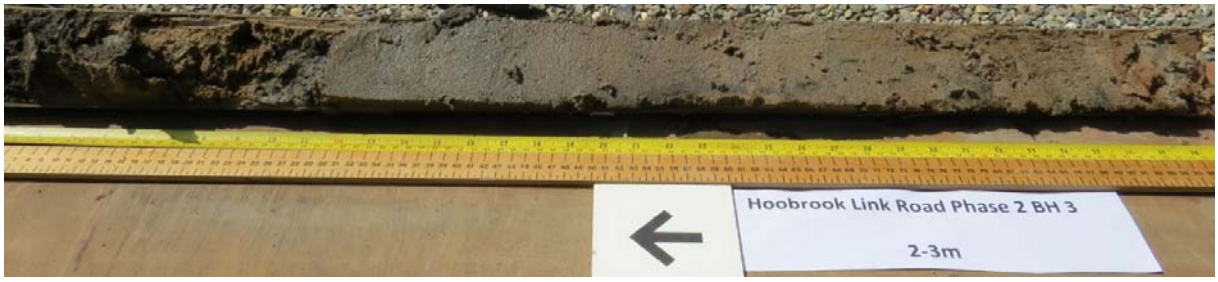


Plate 19 Phase 2 BH3 2–3m (Photo: A Howard)

Plate 20 Phase 2 BH3 3–3.2m (Photo: A Howard)

Plate 21 Phase 2 BH4 0–1m (Photo: A Howard)

Plate 22 Phase 2 BH4 1–2m (Photo: A Howard)

Plate 23 Phase 2 BH4 1–2m (Photo: A Howard)

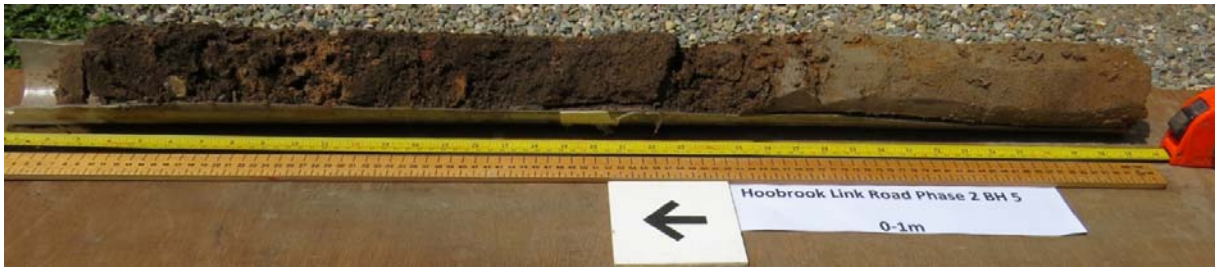


Plate 24 Phase 2 BH5 0–1m (Photo: A Howard)

Plate 24 Phase 2 BH5 1–2m (Photo: A Howard)

Plate 24 Phase 2 BH5 2–3m (Photo: A Howard)

Plate 24 Phase 2 BH5 3-4 (bag of sediment) (Photo: A Howard)

Appendix 1 Borehole Descriptions

Phase 1, by Andy Howard

AH1 0–1m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retention.	0–0.18m
1a	Alluvium	Friable, fine silty sand. Dark brown (7.5YR 3/2). Structureless but with occasional fine Bunter pebbles. Between 38-42cm, a horizon of silty clay horizon is evident within the unit (flood horizon?). Clear, sharp base.	0.18–0.60m
1b	Made ground	Black, oxidised clay with abundant tightly packed modern material (modern glass, coal, slag, plastic, tin foil).	0.61–1.0m

AH1 1–2m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retention.	0–0.19m
1b	Made ground	Black, oxidised clay with abundant tightly packed modern material (modern glass, coal, slag, plastic, tin foil). Includes large Bunter pebble clasts, matrix-supported and occasional modern root fragments. Notable bitumen/diesel oil odour. Clear basal contact.	0.20–0.52m
2	Alluvium	Massive, stiff olive green grey silty clay. Notable brick fragment at 58cm. Notable gleying and iron pan mottling throughout. Isolated charcoal fragment at 96cm	0.53–1.00m

AH1 2–3m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retention.	0–0.30m
2	Alluvium	Olive grey, stiff, silty clay. Massive. Intensely oxidised from 44–48cm where rootlets are also notable. Between 50–54cm the unit is increasingly sandy with manganese precipitation providing a blackened appearance. Gradational lower contact.	0.31–0.54m
3	Terrace Sand	Strong brown fine to medium sand. Becoming medium to coarse sand after 86cm. Significant oxidation between 75–82cm giving unit an orange tinge. Oxidation picks out weak planar cross-bedding. Between 82–88cm, significant manganese precipitation.	0.55–1.00m

AH1 3–4m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		Only partial retention of core (sandy)	0–0.45m
3	Terrace Sand	Brown medium sand. Massive, well sorted. Merging base.	0.46–0.63m
3	Terrace Sand	Olive grey medium sand. Significant iron panning and reduction. Small Bunter clast at 78cm. Clear irregular base.	0.64–0.81m
3	Terrace Sand and Gravel	Medium to coarse pebbly sand. Bunter pebbles. Clayey and with some vague bedding structure. Deep red colour (7.5 YR 4/4 – reddish brown).	0.82–1.00m

AH2: 0–1m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retention	0–0.10m
1b	Made Ground	Fibrous modern vegetation root matt adhering to friable brown loam (7.5YR 3/3). Occasional small fragments of coal and slag. Gradational basal contact.	0.11–0.20m
1b	Made Ground	Brown sandy silt, friable. Occasional medium-large clasts, sub-rounded and fractured quartz and quartzite from the Bunter Pebbles Beds. All clasts are matrix-supported. Occasional small fragments of iron-panning and/or corroded metal, giving the unit an orange tinge. Overall colour is 5 YR 3/3. Occasional modern root fragments within unit. Sharp, clear base.	0.21–0.52m
1b	Made Ground	Stiff clayey silt with abundant iron concretions and manganese nodules giving the unit a rusty colour. Overall 5YR 3/3 (dark reddish brown). Occasional, large, matrix-supported Bunter pebbles. Clear, sharp basal contact denoted by underlying unit becoming friable and less stiff.	0.53–0.70m
1b	Made Ground	Degraded, friable fine sand, but with elements of consolidation; reminiscent of Triassic bedrock. Fragment of modern thin, clear glass noted at 76cm. Occasional, matrix-supported, small to medium Bunter Pebbles. Clear, sharp basal contact. 2.5YR 4/8.	0.71–0.90
1b	Made Ground	Brown silty loam (7.5YR 3/3) with occasional small Bunter Pebbles.	0.91–1.0m

AH2 1–2m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retained.	0–0.40m
1b	Made Ground	Orange brown gritty loam, friable. Common modern debris includes: roof tile, plastic toy soldier, slate, asbestos, plastic roof sheeting, slag, wood. Between 63-70cm, notable iron panning. Clear, sharp base.	0.41–0.70m
1b	Made Ground	Very dark grey silty clay (10YR 3/1). Humic, but with no visible macroscopic plant remains, though there are occasional small rootlets. Soil development on former floodplain surface? The core has a large piece of wood wedged into the side of it, which looks like a tanalised stake. Merging, gradational base.	0.71–0.79m
2	Alluvium	Dark brown silty clay (7.5YR 3/2). Slightly friable, frequently mottled with iron pan and manganese. Notable coal fragements at 86cm. Merging, gradational base	0.80–0.89m
2	Alluvium	Strong brown stiff silty clay (7.5YR 5/8). Structureless, but intensely mottled with iron pan as well as gleyed.	0.90–1.00m

AH2 2–3m

Main deposit description

	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retained.	0–0.18m
2	Alluvium	Light olive grey, stiff silty clay (5Y 6/2). Occasional fine modern rootlets throughout, but with roots around 42cm picked out by manganese staining along root channels. Overall, structureless but with occasional iron mottling. Clear, gradational base.	0.19–0.63m
2	Alluvium	Very dark greyish brown, sandy, silty clay (2.5Y 3/2), Humic but no visible macroscopic remains. Clear, irregular base.	0.64–0.65m
2	Alluvium	Light, olive grey, stiff silty clay with notable patches of fine to medium sand and occasional specks of organic material (unidentified vegetation). Clear sharp base.	0.66–0.86m
3	Terrace Sand	Light brown, well sorted medium to coarse sand (7.5YR 6/3). Clean, structureless	0.87–1.00m

- 2 SAMPLES TAKEN at 2.63-2.64cm and 2.64-2.65cm.

AH2 3–4m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No core retained.	0–0.37m
3	Terrace Sand	Light brown medium to coarse sand (7.5YR 6/3). Structureless. Clear gradational base.	0.38–0.85m
3	Terrace Sand and Gravel	Dark red, fine to coarse sand gravel (Bunter pebbles). Clast supported, structureless, clayey.	0.86–1.00m

Appendix 2 Borehole Descriptions

Phase 2, by Andy Howard

BH3 0–1m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
1b	Made Ground	Light reddish brown matrix-supported medium to coarse sandy gravel. Dominated by quartzite. Abundant modern rubbish in core, tanalised wood fragments at 28cm and charcoal at 48cm. Gradational lower contact.	0.00–0.60
1b	Made Ground	Black, matrix-supported clayey fine to medium gravel. Core contains abundant modern rubbish including gauze like bandage material and foil packaging. Unit has strong petrochemical smell (diesel oil?).	0.60–1.00m

BH3 1–2m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
1b	Made Ground	Black, matrix-supported clayey fine to medium gravel. Core contains abundant modern rubbish including gauze like bandage material and foil packaging. Unit has strong petrochemical smell (diesel oil?).	0.00–0.40m
2	Alluvium	Orange, grey brown silty, fine to medium sand. Grey colour caused by patches of silt gleying. Notable modern black root penetrating unit at 70cm. Merging base.	0.41.–0.75m
2	Alluvium	Stiff, homogenous, silty clay. Inorganic. Orange brown in upper 5cm, but grey and gleyed below this point. Notable patches of iron and manganese precipitation.	0.76–1.00m

BH3 2–3m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		Collapsed material from previous core (clayey sand).	0.00–0.30m
3	Terrace Sand	Light grey brown, medium to coarse, structureless sand. Occasional patches of manganese precipitation.	0.31–0.95m
3	Terrace Sand	Mixed layers of red brown and grey sand, medium to coarse. In some parts the sand is more clayey and hence has a banded appearance.	0.96–1.00m

BH3 3–3.2m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		No retention in core.	0.00–0.68m
3	Terrace Sand	Dark brown, medium to coarse pebbly (pea gravel) sand. Gradational base.	0.31–0.95m
3	Terrace Gravel	Reddish brown, clast-supported, coarse sandy gravel. Predominantly sub-angular quartzite.	0.96–1.00m

BH4 0–1m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
1a	Made Ground	Dark brown fine to medium clayey sand. Friable. Large clasts at 25-30cm, matrix-supported quartzite and other weathered Triassic sandstone throughout. Clear sharp base.	0.00–0.48m
1a	Made Ground	Mixed unit of orange brown fine to medium sand. Friable and with charcoal fragments. Sharp base.	0.49–0.60m
1a	Alluvium	Stiff, grey, gleyed silty clay. Oxidised orange brown in upper part. Homogenous. Merging base.	0.61–0.80m
1a	Made Ground	Grey brown, fine to medium sand, becoming increasingly coarse with depth, especially below 90cm. Structureless. At 95cm, a large metal blade was located in the core (Stanley knife style).	0.81–1.00m

BH4 1–2m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		Collapsed material from previous core (medium to coarse sand)	0.00–0.72m
3	Terrace Gravel	Reddish brown, medium to coarse clast supported gravel. Predominantly sub-rounded and sub-angular (fractured) quartzite.	0.73–1.00m

BH5 0–1m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
1a	Made Ground	Dark brown medium sand, friable with abundant f-m clasts of weathered fine sandstone. Notable charcoal at 46cm and 60cm. Merging gradational base denoted by colour and textural change.	0.00–0.62m
2	Alluvium	Stiff, grey, gleyed homogenous sandy clay with some iron and manganese mottles. Merging gradational base.	0.63–0.90m
3	Terrace Sand	Orange brown medium to coarse sand, friable.	0.91–1.00m

BH5 1–2m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
		Collapsed material from previous core..	0.00–0.30m
3	Terrace Sand	Light brown medium sand with bleached patches and iron panning, structureless.	0.31–0.90m
3	Terrace Sand	Brown medium sand,	0.91–1.00m

BH5 2–3m

Main deposit description

Unit	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
3	Terrace Sand	Collapsed material from previous core..	0.00–0.50m
3	Terrace Gravel	Light brown medium sand with bleached patches and iron panning, structureless.	0.51–0.60m
3	Terrace Gravel	Brown medium sand,	0.61–0.78m
3	Terrace Gravel	Reddish brown, fine to medium pebbly sand (quartzite clasts). Sharp base.	0.79–0.90m
3	Terrace Gravel	Reddish brown coarse sand.	0.91–1.00m

BH5 3+ m (bag of sediment due to lack of core retention

Main deposit description

Unit 3 – Terrace gravel. Bag contained reddish brown, medium to coarse, clean sand and gravel dominated by quartzite pebbles.

Appendix 3 Technical information

The archive (site code: WSM 67035)

1 External specialist report

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

Summary of data for Worcestershire HER

WCM 67035 (event HER number)

P4355

Methods of retrieval	Yes/No
Hand retrieval	
Bulk sample	
Spot sample	
Auger	Yes (Boreholes)
Monolith	
Observed	

Type	Preservation	Date (note 1)	Specialist report? Y/N (note 2)	Key assemblage? Y/N (note 3)
Bone – amphibian	Not decayed Dessication Charring Mineralisation Anaerobic/anoxic - waterlogged Anaerobic/anoxic - not waterlogged			
Environmental deposit – alluvium		Holocene	Y	N

Type	Preservation	Date (note 1)	Specialist report? Y/N (note 2)	Key assemblage? Y/N (note 3)
Environmental deposit – sand and gravels		Upper Palaeolithic–early Mesolithic	Y	N
Environmental deposit – soil		Post-medieval, Modern	Y	N