Archaeological watching brief of Pershore Weir Turbines, rear of Bridge Street, Pershore, Worcestershire

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

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Author: Graham Arnold, garnold@worcestershire.gov.uk
Contributors: Suzi Richer, Elizabeth Pearson and Andrew Mann
Illustrator: Carolyn Hunt
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Archaeological watching brief of Pershore Weir Turbines, rear of Bridge Street, Pershore, Worcestershire

Graham Arnold

With contributions by Suzi Richer, Elizabeth Pearson and Andrew Mann

Summary

An archaeological watching brief was undertaken of the groundworks associated with the construction of Pershore Weir Turbines, rear of Bridge Street, Pershore, Worcestershire (NGR SO 9527 4574; WSM 49796). It was undertaken on behalf of Renewables First, who undertook the excavation, construction and installation of a new leat from the River Avon, including relocation and distribution of excavated soil; provision of two hydroelectric screw turbines, associated generator housing and laying of cable from generator to Pershore Leisure Centre. A planning application was submitted to Wychavon District Council.

A typical soil profile was seen through most of the areas monitored, with occasional waterlogged clays. An old river channel filled with organic-rich material was observed during the excavation of the turbine trench, orientated north-east to south-west. A column sample and spit samples for radiocarbon analysis were taken. There were also pockets of very dense mollusc deposits within the area of the new leat that connected to the existing river Avon. The dominant species was *Dreissena polymorpha*, the Zebra Mussel, which was probably introduced into the UK in the early 1820s.

A radiocarbon date of 385 to 165 cal BC was obtained from the upper deposit of the palaeochannel, indicating a Middle Iron Age date for silting up of this feature. It was not possible to date the lower deposits.

Plant macrofossil assemblages were of low significance for interpretation of the surrounding environment, although there is tentative indication of a change in environment from the earlier to later channel fills, despite the small size of the assemblage's low species diversity.

The pollen remains in the uppermost sample (0.5m deep), are regarded as having medium significance for understanding the wider Iron Age environment, due to their well-preserved and anthropogenic nature. However, the preservation and of the lower samples indicated that the pollen may well have been transported. This, coupled with the problems of obtaining dated material from the lower profile, means that drawing any meaningful, local interpretation is not possible for the site and the pollen assemblage can be considered to have low potential.

No further finds, features or archaeological deposits were found in the area apart from post-medieval and later material relating the manuring and agricultural usage of the land.

Report

1 Background

1.1 Reasons for the project

An archaeological watching brief was undertaken of the groundworks associated with the construction of the Pershore Weir Turbines, rear of Bridge Street, Pershore, Worcestershire (NGR SO 9527 4574). It was commissioned by Renewables First Ltd, who has undertaken the excavation, construction and installation of a new leat from the River Avon, including relocation and distribution of excavated soil; provision of two hydroelectric screw turbines, associated generator housing and laying of cable from generator to Pershore Leisure Centre. A planning application was submitted to Wychavon District Council (reference W/13/0626).

The proposed development site was considered to include heritage assets and potential heritage assets, the significance of which may be affected by the application.

The project conforms to a brief prepared by Mike Glyde, Historic Environment Planning Officer (WCC 2013) and for which a project proposal (including detailed specification) was produced (WA 2013).

The project also conforms to the *Standard and guidance for an archaeological watching brief* (IfA 2012), *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage 2010) and *Standards and guidelines for archaeological projects in Worcestershire* (WCC 2010).

2 Aims

The aims and scope of the project were to observe and record archaeological deposits, and to determine their extent, state of preservation, date and type, as far as reasonably possible within the confines of the proposed groundworks scheme. The brief indicates that significant deposits may be defined as those likely to be of palaeo-environmental nature.

The aims of the environmental assessment were to determine the state of preservation, type, and quantity of environmental remains recovered from the site. This information will be used to assess the importance of the environmental remains.

In particular, the following objectives were identified:

- To establish a chronology for the palaeochannels deposits (contexts 405 and 409).
- To establish whether there was any environmental evidence for the use of the site.

3 Methods

3.1 Personnel

The project was undertaken by Graham Arnold (BA MSc), who joined Worcestershire Archaeology in 2009 and has been practicing archaeology since 2004. Andy Walsh (BSc MSc CAIfA), Mike Nicholson (BSc) and Tim Cornah (BSc) assisted with the fieldwork. The project manager responsible for the quality of the project was Tom Vaughan (BA, MA, CAIfA). Illustrations were prepared by Carolyn Hunt (MIfA). Suzi Richer (BSc, MSc PhD), Elizabeth Pearson (MSc, CAIfA). Andrew Mann (BA, MSc) contributed the environmental analysis.

3.2 Documentary research

Prior to fieldwork commencing a search was made of the Historic Environment Record (HER). Although there were no listed heritage assets within the proposed site area, there was considered to be the potential for unrecorded palaeoenvironmental deposits.

3.3 Fieldwork strategy

A detailed specification has been prepared by Worcestershire Archaeology (WA 2012).

Fieldwork was undertaken between 5 December 2013 and 19 June 2014. The site reference number and site code is WSM 49796.

The monitored areas amounted to just over 7,500m². The location of the excavations is indicated in Figures 1 and 2.

3.4 Structural analysis

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

3.5 Artefact methodology,

Only unstratified 19 ^{h} century material was recovered during the topsoil stripping of the site areas for the access tracks, compounds and leat area. These were not retained. No other artefacts were observed during the deeper excavations.

3.6 Environmental archaeology methodology, by Suzi Richer

3.6.1 Sampling policy

Samples were taken according to standard Worcestershire Archaeology practice (2012a). A monolith (sample 3) was taken, and adjacent spit samples through a sequence of palaeochannel deposits observed during the excavation of the turbine trench, orientated north-east to south-west (Trench 4). A total of 10 samples (each of 10 to 40 litres) were taken from the site (Table 1).

Pollen sub-samples were taken from context 409 from the monolith (sample 3). The context consisted of a dark brown–black clayey peat, which was deemed to be the most likely context for pollen survival.

3.6.2 Radiocarbon dating, by SUERC and Suzi Richer

In total three samples were submitted for radiocarbon dating. All samples were from short-lived, non-aquatic species. This type of selection reduces the probability of the sample having a high inbuilt age. No sources of contamination or non-contemporaneous carbon were evident during the fieldwork or during the subsequent assessment.

Three samples were dated by Accelerator Mass Spectrometry (AMS) at the Scottish Universities Environmental Research Centre (SUERC) in 2013. The calibrated date ranges have been calculated using the maximum intercept method (Stuiver and Reimer 1986), and are quoted with end points rounded outwards to ten years. These ranges have been calculated using OxCal v.4.2 (Bronk-Ramsey 2009) and the current internationally-agreed atmospheric calibration dataset for the northern hemisphere, IntCal13 (Reimer *et al* 2013).

3.6.3 Pollen analysis, by Suzi Richer

Three samples were submitted to the laboratories of the Department of Geography and Environment at the University of Aberdeen for chemical preparation following standard procedures, as described by Barber (1976) and Moore *et al* (1991).

Each sample was rapidly scanned to assess the preservation and concentration of pollen grains and to gain a rapid impression of the dominant vegetation. A GS binocular polarising microscope was used at x400 magnification. Identification was aided by using the pollen reference slide collection maintained by the Service, and the pollen reference manuals by Moore *et al* (1991) and Beug (2004). Nomenclature for pollen follows Stace (2010) and Bennett (1994).

3.6.4 Macrofossil remains, by Elizabeth Pearson and Andrew Mann

For the two spit samples from the palaeochannel, a sub-sample of 1 litre was processed by the wash-over technique as follows. The sub-sample was broken up in a bowl of water to separate the

light organic remains from the mineral fraction and heavier residue. The water, with the light organic faction was decanted onto a 300mm sieve and the residue washed through a 1mm sieve. The remainder of the bulk sample was retained for further analysis.

The sample from context (505) was processed by flotation using a Siraf tank. The flot was collected on a 300mm sieve and the residue retained on a 1mm mesh. This allows for the recovery of items such as small animal bones, molluscs and seeds.

The residue was fully sorted by eye and the abundance of each category of environmental remains estimated.

3.6.5 Discard policy

Samples will be discarded 6 months following the submission of this report unless a request is made to retain them.

3.7 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

The site area is on the floodplain for the river Avon. The solid geology consists of the Blue Lias Formation and Charmouth Mudstone Formation, a sedimentary bedrock overlain by a superficial deposit of the Bretford Sand and Gravel Member (BGS 2014). The HER search revealed no recorded heritage assets in the study area. The brief indicated that the potential for archaeological remains was unknown, but probably limited. However there was considered to be a very high potential for palaeoenvironmental deposits due to extensive modifications to the river channel over time (WCC 2013).

4.2 Current land-use

The site is currently a floodplain adjacent to the river Avon and is rough grassland and meadow (Fig 1).

5 Structural analysis

The trenches and features recorded are shown in Fig 2. The results of the structural analysis are presented in Appendix 1.

5.1.1 Phase 1: Natural deposits

The natural sands and gravel deposits were found at 13.20-13.50m AOD, 1.50- 1.80m below the modern ground level, with a number of alluvial gleyed clays above this.

5.1.2 Phase 2: Prehistoric deposits

A palaeochannel (406), 5.00m in width, found during the excavation of the Turbine Chamber (Trench 4) had a sondage cut through it measuring 2.00m and a monolithic sample taken, together with spit samples at varying depths for further analysis (Plates 2-4). The palaeochannel had four distinct fills of peat and alluvial, gleyed clays.

5.1.3 Phase 3: modern deposits

Topsoil and subsoil across the site contained occasional modern glass and porcelain fragments. These were noted but not retained. This is typical of manured pasture land.

5.2 Environmental analysis, by Suzi Richer and Elizabeth Pearson

The environmental evidence recovered is summarised in Tables 1-4.

5.3 Radiocarbon dating, by SUERC and Suzi Richer

Context and sample number	Laboratory code	Material	$\delta^{13}C$	Radiocarbon Age BP	OxCal calibrated age (95.4% probability or 2 sigma)
(405) <6>	SUERC-56304 (GU35448)	Charred plant: *Triticum* sp.	−23.1 ‰	2193±39	385–165 cal BC
(405) <10>	(GU35449)	Waterlogged plant remains: *Ranunculus acris*/*repens*/*bulbosus*		Failed on AMS	
(405) <9>	(GU36326)	Waterlogged plant remains: *Rumex* sp (seed and bracts) and 1 x seed *Solanum nigrum*		Failed to provide sufficient CO^2	

Table 1: Radiocarbon dating results

Results

The results are conventional radiocarbon ages (Stuiver and Polach 1977) for the three samples submitted are listed in Table 1. However, only one sample provided a measurement, two samples failed on AMS and providing insufficient CO^2. The ages have been calculated using the reported $\delta^{13}C$ (AMS) values measured by conventional mass spectrometry. The calibrated date ranges for all samples are given in Table 1.

Discussion

Initially, two samples were submitted for dating from towards the top (sample 6, context 405) and bottom (sample 10, context 409) of the palaeochannel fill. An Iron Age date of 381–165 cal BC (SUERC-56304) was obtained from sample 6. Sample 10 failed on AMS and the replacement sample (sample 9) also failed, but this time due to insufficient carbon.

No comparative artefactual material was recovered for dating; therefore we can only suggest that the palaeochannel fill is prehistoric in date. The channel had largely been filled in by the mid-late Iron Age, but it is unknown when it was originally active, or when it started the process of infilling.

5.4 Pollen analysis, by Suzi Richer

The results of the pollen analysis are summarised in Table 2.

Preservation

Pollen was preserved in all three sub-samples from sample 3; however the abundance of pollen deteriorated with depth. The upper samples (0.5m) exhibited excellent preservation, however pollen grains from 0.7 and 0.9m showed signs of mechanical damage (folded and broken) and obscuration. In particular, some grains were crumpled/folded suggesting physical transport of the pollen grains, drying out, or that the sediment had been compacted and water extruded (Delcourt and Delcourt 1980). The abundance and preservation of pollen was best in the upper sample, perhaps indicating that this had not been subject to same drying or compaction as the lower samples.

Vegetation information

The samples were only rapidly scanned, which means that only tentative observations can be made concerning the vegetational history of the site.

Overall, the taxa present across the sequence are indicative of a meadow/open grassy environment (grasses, dandelion), with water close-by (sedges, alder and willow) and which

became increasingly anthropogenic through time (*Cerealia*-type pollen). Pollen from *Cerealia*-type was present in the middle and upper samples (0.7 and 0.5m), but increased in frequency at the top; this is also consistent with the plant macroremains where free-threshing wheat was identified in context 405 (0.20–0.25m) towards the top of the sequence.

Disturbed/trampled ground is also indicated by the presence of dock and ribwort plantain in the upper sample (0.5m), which may also be indicative of people or grazing animals being present in the vicinity. The presence of the coprophilious fungal spore (*Sodaria*-type) in the middle sample (0.7m), also suggests that animals (herbivores), likely to be cattle or sheep, were present.

Sample	Context	Pollen present	Pollen abundance	Pollen preservation	Pollen and non-pollen palynomorphs (NPPs)
0.5m	409 - Palaeochannel	Y	Avg–high	Excellent	Pollen: *Alnus,* ***Cerealia*-type,** **Poaceae**, *Rumex,* ***Rananuculus acris*-type**, Cyperaceae, **Brassicaeae**, *Circium, Trifolium*-type, *Cichorium intybus*-type, *Quercus, Plantago lanceolata, Galium.* NPPs: microcharcoal.
0.7m	409 - Palaeochannel	Y	Low–avg	Avg - some folded and some obscured	Pollen: **Poaceae**, *Rananuculus acris-type, Cerealia*-type, Brassicaeae, ***Alnus***, *Plantago lanceolata, Cichorium intybus*-type. NPPs: *Sodaria*-type, micorcharcoal
0.9m	Palaeochannel	Y	Low–avg	Avg - some broken and obscured	Pollen: **Poaceae**, *Cichorium intybus*-type, *Rananuculus acris*-type, Cyperaceae, *Salix*, *Alnus*, Brassicaeae. NPPs: micorcharcoal

*Table 2: Summary of the pollen and NPP assemblages, taxa in **bold** are dominant in the sample.*

5.5 Plant macrofossil analysis, by Elizabeth Pearson

Context	Sample	Spit/Sub-sample	Feature type	Period	Sample volume (L)	Volume processed (L)	Residue assessed	Flot assessed
401	2		Sub-soil	undated	10	0	No	No
405	1				40	0	No	No
405	4	0.05 - 0.10m	palaeochannel	Iron Age or later	10	0	No	No
405	5	0.10 - 0.15m	palaeochannel	Iron Age or later	10	0	No	No
405	6	0.20 - 0.25m	palaeochannel	Iron Age or later	10	1	Yes	Yes
409	7	0.35 - 0.40m	palaeochannel	Iron Age or later	10	0	No	No
409	8	0.40 - 0.45m	palaeochannel	Iron Age or later	10	0	No	No
409	9	0.55 - 0.60m	palaeochannel	Iron Age or later	10	0	No	No
409	10	0.60 - 0.70m	palaeochannel	Iron Age	10	1	Yes	Yes
409	11	0.65 - 0.70m	palaeochannel	Prehistoric	1	0	No	No
505	12		Layer (mollusc rich)	undated	40	40	Yes	Yes

Table 3: List of environmental samples

	Family	Common name	Habitat	405	409
Spit depth (m)				**0.20 – 0.25m**	**0.65 – 0.70m**
Latin name					
Charred plant remains					
Triticum sp (free-threshing) grain	Poaceae	free-threshing wheat	F	+	
Waterlogged plant remains					
Ranunculus acris/repens/bulbosus	Ranunculaceae	buttercup	CD	++	+
Rubus sect *Glandulosus*	Rosaceae	bramble	CD		+
Alnus glutinosa (fruits)	Betulaceae	alder	CE	++/+++	
Brassica nigra	Brassicaceae	black mustard	ABF		+
Polygonum aviculare	Polygonaceae	knotgrass	AB	+	
Rumex sp	Polygonaceae	dock	ABCD	+/++	
Atriplex sp	Amaranthaceae	orache	AB	+++	
Sambucus nigra	Caprifoliaceae	elderberry	BC		+
Schoenoplectus tabernaemontani	Cyperaceae	club-rush	E	+	+
Carex sp	Cyperaceae	sedge	CDE	+/++	
Carex sp (2-sided) nutlets	Cyperaceae	sedge	CDE		+

Table 4: Plant remains from palaeochannel deposit

Key:

Habitat	Quantity
A= cultivated ground	+ = 1 - 10
B= disturbed ground	++ = 11- 50
C= woodlands, hedgerows, scrub etc	+++ = 51 - 100
D = grasslands, meadows and heathland	
E = aquatic/wet habitats	
F = cultivar	

Small assemblages of waterlogged plant remains were recovered which were low in species diversity (Table 4). Little interpretation was possible, other than that a mosaic of grassland, shrub vegetation (elderberry and bramble), disturbed or cultivated ground and wet bankside vegetation (sedges) was present in the vicinity or at the edge of the channel. Alder fruits were moderately abundant the towards the top of the channel, which suggest development of alder carr, and possibly abandonment or infilling of the channel.

Buttercup (*Ranunculus acris/repens/bulbosus*) nutlets were extracted from a spit towards the base of the sequence (0.65 to 0.70m) and submitted for radiocarbon dating.

A sample at 0.20 – 0.25m (context 405, sample 6; SUERC-56304 (2193,39)) was radiocarbon dated to 385 to 165 cal BC at 95.4% probability, indicating an Iron Age date for the upper part of the channel.

6 Synthesis, by Graham Arnold, Suzi Richer and Elizabeth Pearson

The brief indicated the potential for environmental evidence in the form of former watercourses of the River Avon, due to the location of the site on the River Avon flood plain. The palaeochannel found in the south-west corner of the development, was 2.00m below the current ground level and lay on a north-east to south-west alignment, similar to an old ox bow of the river. A radiocarbon date of 385 to 165 cal BC was obtained from the upper deposit of the palaeochannel, indicating an Iron Age date for silting up of this feature. It was not possible to date the lower deposits.

The samples contained a variety of plant macrofossils and pollen species. However, the plant macrofossil assemblages were of low significance for interpreting the surrounding environment, although there is a tentative indication of a change in the environment from the earlier to later channel fills, despite the small size of the assemblages low species diversity, from disturbed or cultivated ground and wet bankside vegetation, later developing with alder carr woodland.

The pollen remains in the uppermost sample (0.5m), are regarded as having medium significance for understanding the *wider* Iron Age environment, due to their well-preserved and anthropogenic nature. However, the preservation of the lower samples indicated that the pollen may well have been transported. This, coupled with the problems of obtaining dated material from the lower profile, means that drawing any meaningful, *local* interpretation is not possible for the site and the pollen assemblage can be considered to have low potential.

Despite abundant evidence of molluscs on site within deposits (4010 and 505), it was considered that the samples did not warrant analysis as they were from intrinsically undated deposits. A rapid assessment by Andrew Mann identified the dominant species as *Dreissena polymorpha,* the Zebra Mussel which was probably introduced into the UK in the early 1820s (Kerney 1999). It attaches itself to stones or other hard surfaces in clean, well-oxygenated waters and is heavily gregarious.

No further significant archaeological deposits were found during the watching brief.

6.1 Research frameworks

The Archaeology of the West Midlands: A Framework for Research (Hurst 2011, 120-1), and mirrored by Pearson (2002) sets out two specific agendas for dealing with palaeoenvironmental evidence:

8. There is also a need for more productive environmental work, and this would be more likely to occur if the focus expanded from gravel sites to include other geologies. Environmental sampling should be carried out routinely for plant macrofossils as an integrated archaeological practice, including, in appropriate circumstances, sampling for pollen, as even the negative or poor evidence will be of significance for future reference.
9. There is a need to assess the potential of localised natural peat deposits for landscape reconstruction research, based on pollen analysis in particular, as these deposits are not only valuable, but increasingly vulnerable to disturbance. It would be advisable for survey projects to assess the potential for this sort of localised survival, so that these deposits are appropriately managed for the future through their inclusion in the HER (Hurst 2011, 120-1).

The project dealt with these by identifying and analysing peat deposits and the associated palaeoenvironmental deposits. Although radiocarbon testing did not recover a date from the earliest deposits it has proved that the channel was silting up during the Middle Iron Age, and an abundance of environmental data was retrieved, although the preservation of the pollen and macro-fossils meant that the deposits had low potential and interpretation of the lower sequence was not possible.

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.

An archaeological watching brief was undertaken of the groundworks associated with the Pershore Weir Turbines scheme, rear of Bridge Street, Pershore, Worcestershire (NGR SO 9527 4574; WSM 49796). It was undertaken on behalf of Renewables First Ltd.

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No further finds, features or archaeological deposits were found in the area apart from post-medieval and later material relating the manuring and agricultural usage of the land.

8 Acknowledgements

Worcestershire Archaeology would like to thank the following for their kind assistance in the successful conclusion of this project, Nancy Preston and Jeremy Aston (Renewables First Ltd) and Mike Glyde (Historic Environment Planning Officer, Worcestershire County Council).

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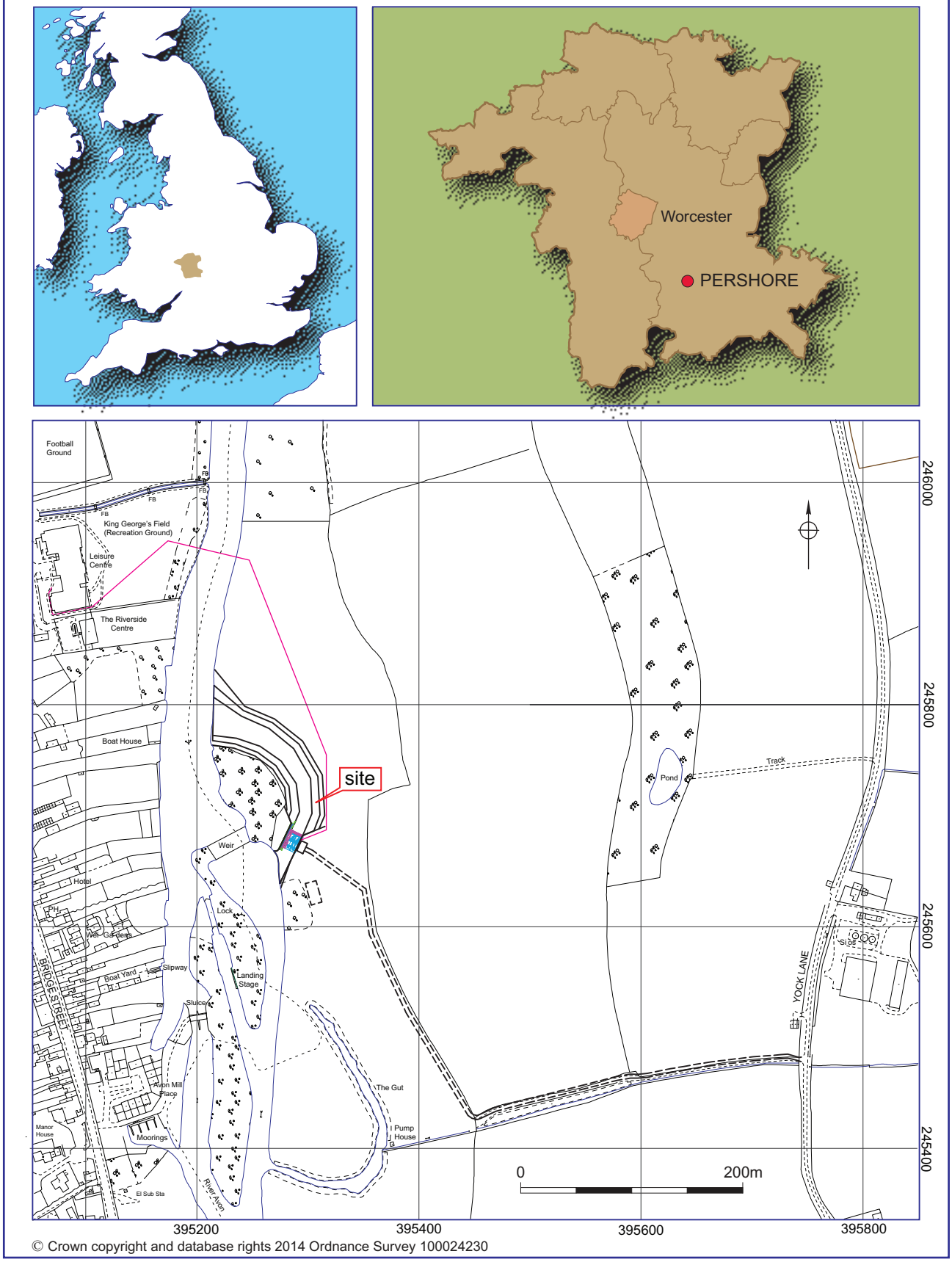
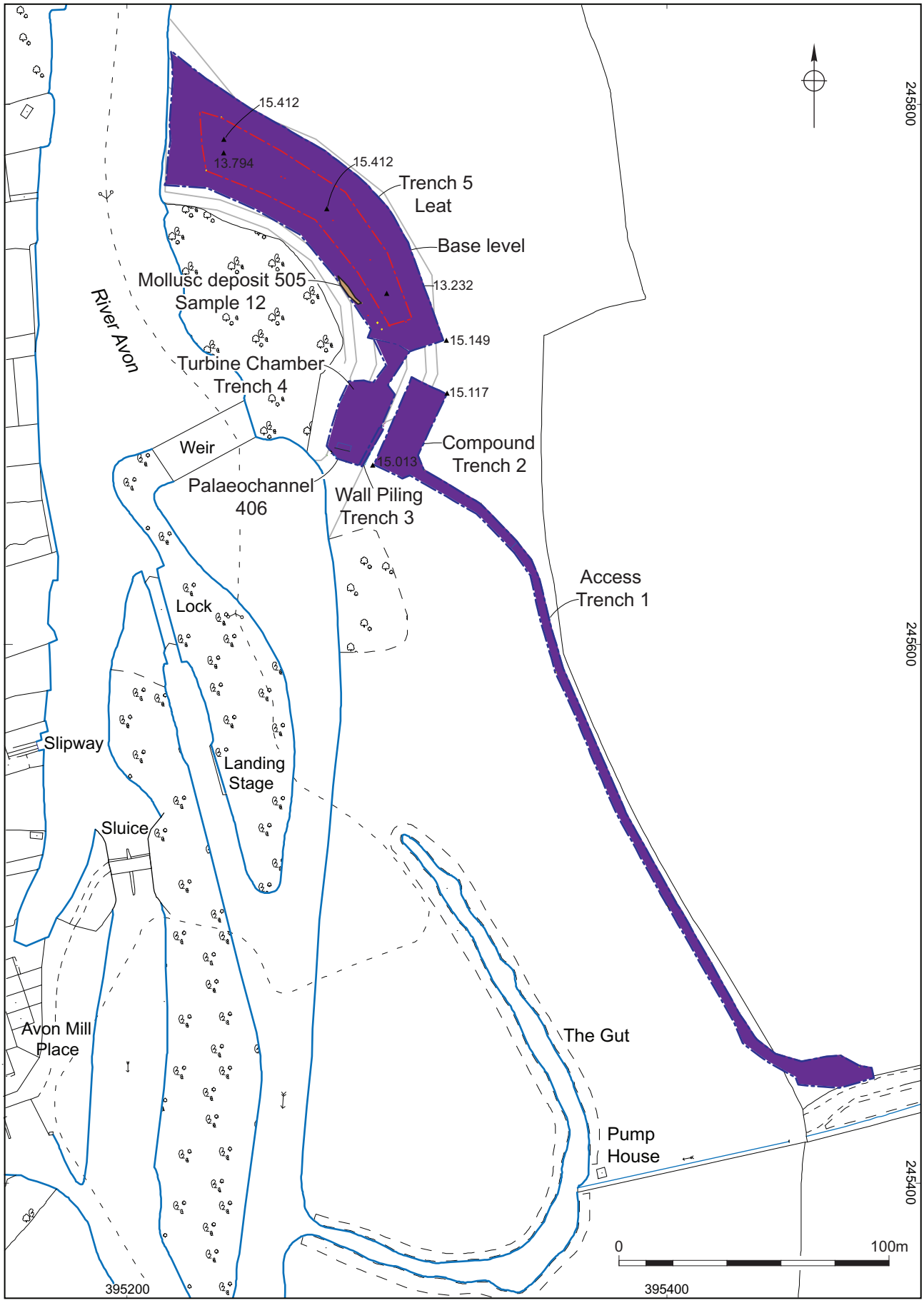
Figures



Location of the site *Figure 1*



Trench location plan

Figure 2

Plates

Plate 1 Topsoil strip for compound, Trench 2

Plate 2 Palaeochannel (406) location looking west

Plate 3 Peat deposit in palaeochannel (406) section

Plate 4 Section across palaeochannel (406) after undertaking monolith and spit samples; view south

Plate 5 Topsoil strip for leat channel (Trench 5), view south

Plate 6 Leat channel (Trench 5) complete, view north

Plate 7 Mollusc spread (505) in Trench 5, south-west corner

Appendix 1 Trench descriptions

Main deposit descriptions

Trench 1
Site area: Access track
Maximum dimensions: Length: 150m + Width: 4.00m Depth: 0.15m
Orientation: N-S – see plan figure 2

Context	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
100	Topsoil	Friable, humic, dark orangeish brown silty clay with frequent roots and vegetation. Contains glass, becoming more greyish brown into main field	0 – 0.15m
101	Natural	Compact, cohesive brownish red sandy clay with moderate sandstone, pebbles and sub angular gravels.	0.15m+

Trench 2
Site area: Compound
Maximum dimensions: Length: 35.00m Width: 15.00m Depth: 0.12 – 0.80m
Orientation: NE - SW

Context	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
200	Topsoil	Mid slightly greyish brown clayey silt	0 – 0.38m
201	Alluvium	Light brown silty clay. Very clean. Few inclusions apart from occasional charcoal flecks and two pieces of clay pipe and one heavily abraded cbm observed – not retained.	0.38 – 0.80m

Trench 3
Site area: Piling trench southeast of turbine
Maximum dimensions: Length: 7.50m Width: 1.00m Depth: 2.00m (1m visible due to water table)
Orientation: NE - SW

Context	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
300	Topsoil	Mid slightly greyish brown clayey silt – same as 200	0.0 – 0.52m
301	Alluvium	Light brown silty clay. Very clean. Sterile	0.38m - 1.50m
302	Natural	Compact yellow and orange sandy gravel with occasional blue grey gleyed clay alluvium. Seen in spoil heap. Water table a 1m below ground level.	1.50 – 2.00m

Trench 4

Site area: Turbine Chamber Area
Maximum dimensions: Length: 25.00m Width: 16.00m Depth: 3.00m max
Orientation: NE - SW

Context	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
400	Topsoil	Mid slightly greyish brown clayey silt with occasional darker patches due to humic content from tree roots at west edge – same as 200	0.00 – 0.52m
401	Alluvium	Light brown silty clay. Very clean. Sterile. Getting more yellow and sticky / cohesive with depth	0.38 – 1.50m
402	Alluvium	Reddish orange silty clay with occasional gravels in SE facing section of trench. Underlies humic alluvium 401	0.50 – 1.00m
403	Alluvium	Blue grey gleyed clay from waterlogging with frequent manganese and brown mottling.	1.50 – 2.00m
404	Natural	Compact yellow and orange sandy gravel	1.80 – 2.00m
405	Peat deposit	Upper layer of peat in palaeochannel. Soft blackish brown with blue grey mottling. Frequent inclusions of wood and roots.	2.20 – 2.40m
406	Cut of Palaeochannel	Orientated SE –NW. 5.00m wide. C. 10m visible. Concave sides with gradual break of slope and a flat base.	2.00 – 3.00m
407	Clay deposit	Slightly peaty grey gleyed clay beneath peat 409	2.90 – 3.00m
408	Layer	Dark orangeish brown clay sealing palaeochannel	2.00 – 2.20m
409	Peat	Very dark black peat in main body of palaeochannel	2.40 – 2.90m

Trench 5

Site area: Leat from river to turbine topsoil strip and full depth
Maximum dimensions: Length: 150.00m Width: 30m Depth: 0.50m - 2.00m max
Orientation: N-S - see Figure 2

Context	Classification	Description	Depth below ground surface (b.g.s) – top and bottom of deposits
500	Topsoil	Mid slightly greyish brown clayey silt with plastic, modern hardcore, porcelain and modern rubbish,	0.00 – 0.38m
501	Subsoil	Soft light brown silty clay. Sterile. Occasional pebbles and pockets of sandy gravels.	0.20 – 1.90m
502	Made ground	Light brown clay creating bank in SW corner of trenches. Frequent tree roots.	0.00m - + 0.30m
503	Alluvium	Blue grey gleyed clay in north end close to river. Under water table.	1.90 – 2.50m +
504	Natural	Reddish orange silty clay underlying 501 in South end of trench. Same as 402	0.50 – 1.00m+
505	Layer	Deposit of molluscs in SW corner of channel. Sampled. 3m x 1,5m spread.	0.60m

Appendix 2 Technical information

The archive (site code: WSM 49796)

The archive consists of:

5	Context records AS1
6	Field progress reports AS2
2	Photographic records AS3
139	Digital photographs
1	Drawing number catalogues AS4
3	Scale drawings
1	Sample records AS17
1	Sample number catalogues AS18
2	Flot records AS21
1	Pollen score sheet AS35
6	Trench record sheets AS41
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

Summary of data for Worcestershire HER

Environmental analysis

Context and sample number	Laboratory code	Material	$\delta^{13}C$	Radiocarbon Age BP	OxCal calibrated age (95.4% probability or 2 sigma)
(405) <6>	SUERC-56304 (GU35448)	Charred plant: *Triticum* sp.	−23.1 ‰	2193±39	385–165 cal BC
(405) <10>	(GU35449)	Waterlogged plant remains: *Ranunculus acris*/*repens*/*bulbosus*		Failed on AMS	
(405) <9>	(GU36326)	Waterlogged plant remains: *Rumex* sp (seed and bracts) and 1 x seed *Solanum nigrum*		Failed to provide sufficient CO^2	

Table 1: Radiocarbon dating results

Sample	Context	Pollen present	Pollen abundance	Pollen preservation	Pollen and non-pollen palynomorphs (NPPs)
0.5m	409 - Palaeochannel	Y	Avg–high	Excellent	Pollen: *Alnus,* ***Cerealia*-type,** **Poaceae**, *Rumex,* ***Rananuculus acris*-type**, Cyperaceae, **Brassicaeae**, *Circium, Trifolium*-type, *Cichorium intybus*-type, *Quercus, Plantago lanceolata, Galium.* NPPs: microcharcoal.
0.7m	409 - Palaeochannel	Y	Low–avg	Avg - some folded and some obscured	Pollen: **Poaceae**, *Rananuculus acris-type, Cerealia*-type, Brassicaeae, ***Alnus***, *Plantago lanceolata, Cichorium intybus*-type. NPPs: *Sodaria*-type, micorcharcoal
0.9m	Palaeochannel	Y	Low–avg	Avg - some broken and obscured	Pollen: **Poaceae**, *Cichorium intybus*-type, *Rananuculus acris*-type, Cyperaceae, *Salix*, *Alnus*, Brassicaeae. NPPs: micorcharcoal

Table 2: Summary of the pollen and NPP assemblages, taxa in ***bold*** *are dominant in the sample.*

Context	Sample	Spit/Sub-sample	Feature type	Period	Sample volume (L)	Volume processed (L)	Residue assessed	Flot assessed
401	2		Sub-soil	undated	10	0	No	No
405	1				40	0	No	No
405	4	0.05 - 0.10m	palaeochannel	Iron Age or later	10	0	No	No
405	5	0.10 - 0.15m	palaeochannel	Iron Age or later	10	0	No	No
405	6	0.20 - 0.25m	palaeochannel	Iron Age or later	10	1	Yes	Yes
409	7	0.35 - 0.40m	palaeochannel	Iron Age or later	10	0	No	No
409	8	0.40 - 0.45m	palaeochannel	Iron Age or later	10	0	No	No
409	9	0.55 - 0.60m	palaeochannel	Iron Age or later	10	0	No	No
409	10	0.60 - 0.70m	palaeochannel	Iron Age	10	1	Yes	Yes
409	11	0.65 - 0.70m	palaeochannel	Prehistoric	1	0	No	No
505	12		Layer (mollusc rich)	undated	40	40	Yes	Yes

Table 3: List of environmental samples

	Family	**Common name**	**Habitat**	**405**	**409**
Spit depth (m)				**0.20 – 0.25m**	**0.65 – 0.70m**
Latin name					
Charred plant remains					
Triticum sp (free-threshing) grain	Poaceae	free-threshing wheat	F	+	
Waterlogged plant remains					
Ranunculus acris/repens/bulbosus	Ranunculaceae	buttercup	CD	++	+
Rubus sect *Glandulosus*	Rosaceae	bramble	CD		+
Alnus glutinosa (fruits)	Betulaceae	alder	CE	++/+++	
Brassica nigra	Brassicaceae	black mustard	ABF		+
Polygonum aviculare	Polygonaceae	knotgrass	AB	+	
Rumex sp	Polygonaceae	dock	ABCD	+/++	
Atriplex sp	Amaranthaceae	orache	AB	+++	
Sambucus nigra	Caprifoliaceae	elderberry	BC		+
Schoenoplectus tabernaemontani	Cyperaceae	club-rush	E	+	+
Carex sp	Cyperaceae	sedge	CDE	+/++	
Carex sp (2-sided) nutlets	Cyperaceae	sedge	CDE		+

Table 4: Plant remains from palaeochannel deposit

Key:

Habitat	Quantity
A= cultivated ground	+ = 1 - 10
B= disturbed ground	++ = 11- 50
C= woodlands, hedgerows, scrub etc	+++ = 51 - 100
D = grasslands, meadows and heathland	
E = aquatic/wet habitats	
F = cultivar	