APPENDIX 1

INTRODUCTION AND GUIDE TO THE DIGITAL RESOURCE

By Tim Evans

The final project database has been archived with the Archaeology Data Service (ADS). This will ensure that the data is securely archived in the long term. In addition, access to the dataset is provided by a specially designed web interface, available at: http://dx.doi.org/10.5284/1030449

The interface comprises three sections.

1. Online database query
All tables from the original Access database used by the project team have been replicated in Oracle (the object-relational management system used by the ADS). A web interface to the database has been constructed that allows the following functionality.

1.1 An index level keyword search
Keywords from the following fields within the database have been indexed and stored in a stand-alone application:

- Site Summary
- Author/Organisation
- Site Name

This is particularly useful for searching within the site summary, a rich entry-level description of the site. So, for example, Site 41035 ‘The Dog Hole, Haverbrack (Cumbria)’ has the following description:

‘The Dog Hole cave, formerly the “Fairy Hole”, a limestone cavern in south Cumbria, excavated in 1912 and again in 1956. Finds recovered seem to span mainly the 2nd to 9th centuries AD and include pottery, Roman bronze bracelets and finger rings, an iron axe head, and iron brooch and studs, some jet beads, and the remains of at least 23 individuals. E Fowler suggests a broad date range for the finds from the 1st century BC to the 2nd/3rd century AD, whilst M. Guido suggests glass beads may be of 5th–9th century AD in date. Animal remains include cattle, pig, sheep and horse, some with butchery marks. Numerous deer antlers were also present, and some were seemingly associated with the human remains, as well as the remains of at least two Red Deer. No clear stratification was found, and no trace of any occupation layer, but three distinguishable zones were noticed: Zone A: Accumulation of human and animal remains of 2nd–9th century AD, possibly washed in from shallow graves and settlements in the vicinity (or ritually deposited?). Zone B: At some time between the 5th and 9th century a large quantity of dog remains in association with those of pig and sheep are suggested as evidence for its use as a dog’s den (though, again, a votive function should not be discounted). Zone C: Numerous cast deer antlers were deposited, suggesting the use of the cave as a store (as interpreted in the report, but perhaps also used ritually). Interpretations of how the material accumulated varies between deliberate deposition and “wash-in” from elsewhere (though given the location within the cave and the evidence from other cave sites the former interpretation perhaps seems more likely).’

This record would be returned for any searches on ‘Jet’, ‘butchery marks’, ‘deer antlers’ or ‘votive’. Although this is an unstructured search, it allows a more generic and serendipitous exploration of the dataset.

1.2 Structured search
This replicates the majority of fields used within the project database, most of which have used controlled vocabularies established by the project team. The form can be used to construct queries as detailed as required, for example:

Minor site type = ‘farmstead’ and non-domestic structure = ‘corn dryer’.

Search terms can include multiple selections, so for example the query above could be appended to:

Minor site type = ‘farmstead’ and non-domestic structure = ‘corn dryer’ and non-domestic structure = ‘mill’

As from Spring 2017, the structured search will also incorporate the capacity to search the specialist tables:

- Brooches
- Burials
- Coins
- Other finds
- Plant remains
• Pottery
• Zooarchaeology (including faunal ageing)

These will allow a user to further refine queries regarding settlement, or to focus on specific facets of the artefactual or ecofactual record.

The search interface also allows the user to search for details about the archaeological event, including:
• The type of event, for example ‘excavation’ or ‘evaluation’
• The name of the excavator or organisation responsible for fieldwork
• Whether the database record has a grey literature source
• Whether the database record has been recorded in the OASIS system

In addition, there is also a capacity to search for records with HER identifiers that have been recorded by the project team. This can be done very broadly, for example a search for all records from an area with these identifiers, or even for a particular ID if known.

For example, the record of 14038 Withington (Gloucestershire) covers a well-known villa site recorded in Gloucestershire HER as Monument 2146.

1.3 Results page

Any search will return a results page with the query parameters clearly stated. Any positive matches are displayed via a small Web Mapping interface, allowing users to see the distribution of their results as points on a series of historical and modern maps. Clicking on a point will return the site name and a link to the full database record.

The page also has a function to export the results of the search as a delimited text file, allowing re-use on a local machine. Fields in the export include:
• Project ID
• County – Region – Site name
• Easting and Northing (6 digit OS grid-reference)
• Occupation dates
• Rural settlement form
• Site summary
• Associated identifiers – for example HER IDs

1.4 Full record

The full record returns all fields from all tables from the project database on a single page. This page also includes all the bibliographic references used by the project team: traditional published sources and grey literature. Grey literature sources include the Digital Object Identifier (DOI) for the report as held in the ADS Library of Unpublished Fieldwork reports.

In addition, a large number of records also include scans of useful site plans derived from the grey literature and published sources. Permission statements from the latter are included with the relevant image.

The record page includes a small interactive map to provide historical and geographical context. It also includes the option to see all records from the project database in the same map, and to view details for those records if required.

2. Web Mapping Interface

A series of exports from the database have been exported to Web Mapping Services (WMS) and incorporated into a larger stand-alone mapping interface.

These WMS layers allow a user to see all sites, or focus on specific site types such as ‘funerary sites’ or ‘Salt production sites’. From Spring 2017, WMS layers for major facets of the artefactual evidence will also be available, allowing a user to view the distribution of specific burial rites or classes of brooch.

The project data can be viewed against other WMS layers provided by national agencies and other research projects, these include:
• The Digital map of the Roman Empire, based on the Barrington Atlas of the Greek and Roman World, and created by Johan Ahlfeldt.
• Topographical data provided by the Ordnance Survey
• Data from the British Geological Survey (BGS)
• Known Roman monuments including road network and major settlements in England, created from National Record for the Historic Environment (NRHE) data held within the ADS' Archsearch database
• Known Roman monuments including road network and major settlements in Wales, based on data provided by Clwyd Powys Archaeological Trust, Dyfed Archaeological Trust, Gwent and Glamorgan Archaeological Trust and Gwynedd Archaeological Trust.

The map functionality includes options to see details about a site, and to view the full record (see 1.4). The map also includes a basic filter based on date of occupation, allowing a user to see changes in site distribution over the study period.

3. Access to the files

From Spring 2017 the original project database will be made available as plain-text downloads from the web interface. This will allow full access to all the data used to create the query and map interfaces.
Throughout the volume, for purposes of exploring broad patterns in the spatial distribution of sites kernel density analyses have been undertaken using ESRI ArcMap 10.0 software. The calculation of kernel density estimates is an automated statistical method that can be used to explore spatial variation in point and line data in Geographical Information Systems, and it has seen considerable use in spatial studies of archaeological data (e.g. Brindle 2014; Richards et al. 2008; Robbins 2011). The approach is of benefit for visualising spatial patterns in large datasets where the density of points is not always clear, allowing comparison of the relative abundance of data. In this volume it has been of value for exploring variation in the distribution of excavated late Iron Age and Roman rural settlements, allowing comparison with the density of excavated sites of all other periods. The method has been employed on an ad hoc basis, where it has been felt that displaying the distribution of sites by density is more informative than displaying data as individual sites.

The technique works by producing a continuous smooth surface between points within a user-defined search radius, providing an average density value for each outputted raster cell. The value of the surface cells are greatest at each point’s location, reducing as the distance from the point increases, reaching zero at the limit of the specified radius distance from the point. The density of each raster cell is calculated in the programme by adding the values of all kernel surfaces where they overlay the raster cell centre (ESRI 2011). In ESRI’s ArcMap the kernel function is based on the quadratic kernel function described by Silverman (1986, 76, equation 4.5).

The size of the ‘kernel’ (or search radius) governs the number of sites that will be included in the density estimation, and the extent of the surface plot therefore depends on the spatial parameters used. All kernel density plots produced in this volume were created using a search radius of 20,000 km², with a cell display of 250.
Fig. A2.1. Distribution of excavated late Iron Age and Roman rural sites, shown as points and kernel density of excavated late Iron Age and Roman rural sites, produced using a search radius of 20,000 km² and a cell display of 250.
The analysis of material culture undertaken in this and the two subsequent volumes (and quantified in the online database) incorporates a set of twenty thematic finds categories, broadly based upon the functional groups of artefacts devised by Crummy (1983). The objects within these categories can, however, be wide ranging, and typical examples of the types of artefact within these broad groups are presented below. The table excludes the categories for coins, brooches, bracelets, finger rings and hairpins as, although there are a wide range of different forms of these types of object, the category titles are self-explanatory.

<table>
<thead>
<tr>
<th>Finds category</th>
<th>Typical object types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other dress accessory</td>
<td>ear ring, necklace fastener, pendant, dress pin, buckle, strap end, bead, button, toggle, gemstones</td>
</tr>
<tr>
<td>Toilet/cosmetic implement</td>
<td>ligula, ear scoop, nail cleaner, tweezers, probe, cosmetic mortar, palette, mirror, razor, comb, spatula</td>
</tr>
<tr>
<td>Military fittings &amp;</td>
<td>military fittings (e.g. baldrick terminal, vulva mount, caterpillar mounts, strap end, pelta mount, military buckle, etc.), armour, spearhead, arrow/projectile head, sword, scabbard fitting, dagger, shield, slingstone, armilla</td>
</tr>
<tr>
<td>weaponry</td>
<td></td>
</tr>
<tr>
<td>Writing equipment</td>
<td>stylus, seal box, seal box lid, wooden tablet, inkwell</td>
</tr>
<tr>
<td>Equine/transport equipment</td>
<td>hipposandal, horse shoe, linchpin, harness fitting, horse bit, wheel rim, terret ring, cart fitting</td>
</tr>
<tr>
<td>Religious object</td>
<td>figurine, miniature/model object, votive letter, leaf/votive plaque, priest’s regalia, altar, curse tablet/inscription, sculptural fragment, object with Christian symbolism</td>
</tr>
<tr>
<td>Lighting equipment</td>
<td>candlestick, lamp, lamp holder</td>
</tr>
<tr>
<td>Agricultural tool</td>
<td>ox goad, animal bell, pruning hook, sickle, scythe, spade sheath, rake prong, ploughshare, plough coulter, shears</td>
</tr>
<tr>
<td>Knife/tool</td>
<td>knife, cleaver, punch, chisel, saw, point, awl, cooper’s croze, hammer, anvil, axe, plane, drill bit, whetstone, rubbing stone, pounder</td>
</tr>
<tr>
<td>Household object</td>
<td>metal vessel, bucket fitting, furniture fitting, ladle, spoon, cauldron hanger, flesh hook, barrel binding</td>
</tr>
<tr>
<td>Security object</td>
<td>key (lift key, slide key, lever lock key), padlock fitting, lock bolt, latchlifter</td>
</tr>
<tr>
<td>Recreation object</td>
<td>die, gaming counter</td>
</tr>
<tr>
<td>Weighing object</td>
<td>steelyard, steelyard weight, balance, plumb bob</td>
</tr>
<tr>
<td>Textile processing</td>
<td>wool comb, spindlewhorl, loomweight, weaving tablet, needle, bobbin</td>
</tr>
<tr>
<td>Food processing</td>
<td>quernstone, millstone, pestle, mortar</td>
</tr>
</tbody>
</table>