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and dissemination of archaeological
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Relevant beyond the Roman period? Approaches to the Investigation, Analysis and Dissemination of Archaeological Investigations of the Rural Settlements and Landscapes of Roman Britain

Michael Fulford and Neil Holbrook

Archaeology has been firmly embedded in the British planning systems for over a quarter of century, and development-led fieldwork is now by far the largest source of new information available to researchers. Custom and practice in the way that such work is conducted has evolved over this time, yet methodological innovation has been surprisingly limited. Using the data gathered in a major survey of the rural settlement of Roman Britain, this paper explores some themes in the way that commercial work is undertaken and seeks to open up a long-overdue debate about professional practice in a development-led context.

Introduction

There has been an explosion in the amount of archaeological fieldwork undertaken in Britain since 1990, almost entirely due to the increase in work generated in response to proposals for various kinds of development. The publication of Planning Policy Guidance Note 16 (Archaeology and Planning; commonly abbreviated as PPG 16) in England in November 1990, and comparable guidance in Wales in 1991 and Scotland in 1994, enshrined the principles that preservation of archaeological deposits *in situ* was the preferred outcome on development sites, but, where this was not required by the planning authorities, developers should pay for the costs of archaeological investigation, post-excavation analysis and publication. This changed the ground rules, for the so-called 'rescue' work of the preceding decades operated on a very different basis and with considerably less funding (Jones 1984). The essential tenets of the guidance contained in PPG 16 and its Welsh and Scottish analogues have remained little altered in their successor policies, although the current guidance in England places an obligation on local authorities not just to require developers to record deposits that are to be destroyed, but also to advance understanding of the significance of the heritage assets in a manner proportionate to

their importance and the impact of the development (National Planning Policy Framework paragraph 141). This is heartening, as archaeological investigation should always be about furthering understanding, not simply a mechanistic recording exercise. That said, it is difficult to detect any noticeable change in the way that commercial archaeology has been conducted since the introduction of the Framework in 2012.

Given the resources devoted to commercial archaeology in the UK (probably in the order of £150–£300 million per annum; Landward Research 2016, 23) it is surprising that there has been comparatively little formal research and testing of the methods utilised in the investigation of archaeological sites in a development-led environment. Field methodologies have developed organically on little firm evidential basis and with almost no critical review of their utility and effectiveness. What methodological review there has been has tended to focus on evaluation techniques, that is to say the prospection methods by which sites are discovered and their extent and potential assessed, or guidance directed towards specialist topics such as faunal remains (Champion et al. 1995; Darvill et al. 1995; Hey and Lacey 2001).

Over the last decade the authors have been involved in a major project examining the contribution that commercial archaeology has made to the study and understanding of the Roman period in Britain. Following an initial pilot study (Fulford and Holbrook 2011), the full project commenced in 2012 and aimed to realise the research potential of development-led Roman archaeology in England and Wales. The project had a number of strands, of which by far the largest concerned a study of the Romano-British countryside utilising the very considerable quantities of new data that accrued from developer-funded work since 1990. The results of this study, ground breaking in its scope and evidential base, have been disseminated via an on-line data base hosted by the Archaeology Data Service (Allen et al. 2016) and three monographs to be published between 2016 and 2018 (Smith et al. 2016; Allen et al. 2017; Smith et al. forthcoming). A second strand to the project was concerned with a review of how past work on rural settlements can be used to inform new approaches to the collection and analysis of data in the future, and it is this theme with which the present paper is concerned. The project team is in an unique position to address this issue as the time invested by the researchers (around ten person years)

interrogating c.3500 grey literature and published reports relating to c.2500 individual sites, the great majority of which derive from work done after 1990, is likely to be a once-in-a-generation event. The grey literature reports considered in this study were selected on the basis of the abstracts compiled by the Archaeological Investigations Project (AIP), supplemented where available by the results of searches at local Historic Environment Records (HERs). A decision was made at the outset to exclude sites where work had not progressed beyond trial-trench evaluation, unless these results were provided with further contextualisation (for instance if they were related to a geophysical survey or cropmark plot). All of the selected site reports were interrogated in detail by the project team, and as many fields as possible within the database completed. Whilst some sites undoubtedly fell through our net (the AIP, for instance, has never claimed to be a fully comprehensive listing of all work done), thanks to the active support for the project from every single HER in England and Wales we believe our dataset to be as comprehensive as is reasonably possible. While the abstracts contained in the AIP were of variable quality, in the vast majority of cases they served their purpose in signposting sites of potential interest. We therefore believe that our sample of grey literature and published reports allows us to evaluate nationwide contemporary professional practice in the excavation, analysis and reporting of work on Romano-British rural settlements.

Our project is one of a number of so-called 'Big Data' archaeological projects that have been undertaken over the last decade or so. The pioneering survey was Richard Bradley's review of prehistoric Britain which showed just how much value could be extracted from the grey literature reports that result from commercial investigations (Bradley 2006; 2007). His work demonstrated that henceforth it could not be considered academically acceptable for large-scale synthesis just to rely on conventionally published accounts, and that investigations only reported in grey literature had also to be considered for a meaningful picture to be obtained. Other projects have followed, concerned with a variety of periods and themes, for example the English Landscapes and Identities Project which analysed change and continuity in the English landscape from the middle Bronze Age to the Domesday survey (Green et al. 2017), and the Fields of Britannia which looked at the influence that the landscape of Roman Britain had on its early medieval successor (Rippon et al. 2015). Such projects required bespoke methodologies to be developed in order to

deal with large data sets of variable quality and consistency: data cleaning is not an option when dealing with millions of record fields. The theory behind these Big Data projects is that by working with such a richness of data new patterns and insights will emerge that are simply not discernible with smaller samples or at more local levels. These benefits will therefore outweigh any weaknesses or biases contained in individual records (Cooper and Green 2016). Concerns about how to incorporate the results of commercial investigations into synthesis, and thus harness their full research dividend, are not solely a British concern, as similar issues are faced across large parts of Europe (Haselgrove et al. 2012; Bradley et al. 2016).

From the outset of our project we have been conscious of the importance of considering not just the outcomes of developer work, but also the methods used to acquire this knowledge. It was a standing topic at a series of eight regional meetings held at various locations in England and Wales between 2013 and 2015. As the data collection phase of the project neared its close, we produced a set of short review papers which examined current practice in commercial archaeology and made recommendations for improvement. These papers considered the following themes: field investigation and reporting methodologies (Neil Holbrook; Stewart Bryant); contextualisation of results (Stephen Rippon); ceramics (Jane Timby); other artefact categories (Tom Brindle); faunal remains (Martyn Allen); archaeobotanical evidence (Lisa Lodwick) and funerary practice/oste archaeology (Rebecca Gowland and John Pearce). These papers are available on the internet at <http://www.cotswoldarchaeology.co.uk/developer-funded-roman-archaeology-in-britain/methodology-study/> and were used to inform a meeting at the University of Reading on 14 September 2016. The purpose of this paper is to highlight some of the key themes that arose from both the meeting, and the vigorous email correspondence that it generated. We hope that this dialogue will influence the way in which future site investigations are approached.

The rest of this paper is concerned with a discussion of some of the methods prevalent in contemporary commercial practice in the UK. At the outset, however, the point needs to be made that the methodology adopted for a field investigation should not sit in a vacuum: methods should be designed to address the research questions which underpin the work in the first place. A piece of development-led archaeological

work is undertaken in accordance with a Written Scheme of Investigation (WSI) which has been approved in advance by the local planning authority. The WSI sets out the research questions that the investigation intends to address, the methods that will be used to collect the requisite evidence in the field, and the post-excavation techniques that will be used to analyse the findings. It is commonplace for the research objectives to be framed with reference to a variety of published research strategies or agendas (some cover specific geographic regions, others particular themes). Most research strategies are necessarily conceived at a fairly high level, and accordingly are not particularly detailed or nuanced. However, generic research questions often tend to result in off-the-shelf procedures and methods, thus perpetuating the norm of existing practice. Commercial work also usually has very tight programmes which provide little time to step back and review emerging results or consider whether the methods conceived at the start of the project are still the best ones available in the light of the archaeology now apparent. The contrast with research-motivated investigations which frequently occur for a set season each summer could not be more marked. In a commercial environment where time equals money in a very explicit fashion, everything invariably happens in the quickest way possible. This speed of investigation often hinders the involvement of University-based academics who, despite a personal willingness to collaborate, have many other prior calls on their time.

One of the main benefits of the present project is that by setting out in detail the current state of knowledge at a national level, it permits new, more focussed, research questions to be developed for different types of rural settlements in different parts of the country. As will be apparent in the following sections it is not a case that we simply need more data per se; rather the emphasis should be on the quality of data retrieved. Whilst some fairly basic research questions can now be considered to be reasonably well answered in those parts of Britain that have experienced plenty of development, and thus associated archaeological work, in other areas where there has been much less construction this is manifestly not the case. For instance what might be argued to be redundant information pertaining to Romano-British rural settlements in Cambridgeshire will have much greater significance in lowland Lancashire where many fewer sites have been investigated. Of course, the wealth of available data in Cambridgeshire allows for much finer-grained research questions to

be formulated there, and should encourage methodological innovation to address them. Thus the variable state of knowledge about the rural landscape in different parts of the Roman province should in turn drive the methods to be adopted for an investigation.

This paper does not seek to be prescriptive or dogmatic about what methods should or should not be used on site, but rather hopes to open up a long-overdue debate about practice in development-led archaeology. While our project has focused on the period from c.100 BC to AD 500, we believe that some of the themes explored below will also have applicability to late prehistoric and medieval sites in those parts of the country where artefacts are reasonably abundant site finds during these periods. Regional variation is also major factor within the Roman period, with considerable differences in the use of material culture in the countryside (Allen et al. 2017). In the past regional variation in Roman Britain has often been considered a product of the local environment (the upland – lowland zone for instance), but it is now clear that cultural choices were also a fundamental factor behind the variability apparent in the archaeological record. Some of the points made below are only likely to be applicable to those parts of the country where artefacts are plentiful on rural sites, and it is accepted that very different approaches may be required in those regions where this is not the case. In these areas establishing that occupation of a site occurred during the Roman period can be problematic without an extensive programme of radiocarbon dating (Hodgson et al. 2013 is a good example of what can be achieved). While we argue for the adoption of better standards in commercial archaeology, we fully accept that in some circumstances nationally prescribed methods are not appropriate. Our aim is to identify some broad principles, whilst recognising that how these are applied in particular locations will always be a matter for local decision making.

In summary a greater emphasis should be placed on the formulation of well thought-out research designs that drill down into important detail and which actively target the collection of new information that may provide fresh insights into both the specific site under investigation, and render these data capable of comparison with sites elsewhere. The devil will normally be found in the detail but, for instance, the application of a particular scientific technique could well be a better use of resources

than the excavation of endless ditch sections. Commercial archaeology needs to get away from a tick-box mentality and concentrate instead on value-for-money approaches which tell us something new, and thus maximise the public benefit that accrues from a particular investigation.

The evolution of field methodologies since the 'rescue era'

Sampling has invariably been a necessary approach to the excavation of rural settlements and landscapes, as in virtually no case has there been sufficient resources for the total excavation of all archaeological deposits on a site of any scale, and, even if there were, the research value of total excavation has not been demonstrated. Sampling strategies have most commonly been used to establish the proportion of enclosure or field ditches to be examined through hand excavation. The determinants behind the sampling are usually two-fold: first to enable a stratigraphic sequence to be developed (i.e. demonstrate that enclosure A is earlier than enclosure B), and, secondly, to allow the recovery of assemblages of artefacts and biological evidence (although there are no commonly accepted criteria for what constitutes a sufficiently large assemblage of such material from Romano-British rural sites for 'valid' conclusions to be drawn; see below). In the rescue era of the 1970s and 80s the level of sampling was invariably tied to the time and labour available rather than any more empirical approaches to determining strategy. Even ambitious attempts at 'total' archaeology inevitably fell short of that impossible ideal (Champion 1978, 208). For instance at the Iron Age enclosure of Gussage All Saints, Dorset, where the principal constraint was finance rather than any impending development, 70% of the ditch silts were removed and the excavator stated 'we are reasonably confident that those areas remaining unexcavated were largely devoid of artefacts' (Wainwright 1979, 3). At Mucking, Essex, the situation was more drastic, and far more the norm in rescue conditions, as investigation was unable to keep pace with the encroachment of gravel quarrying, and so some parts of the site received much less detailed investigation than others (Lucy and Evans 2016, 15–16).

Greater formalisation was brought into the way that archaeology was conducted as a requirement of the planning process with the introduction of PPG 16 in England in

1990. No longer was it solely the choice of the excavator on how to prioritise available resources for a site investigation. Rather, a new system developed where a curatorial archaeologist (usually employed by a local authority) set a brief for a proposed investigation, and this stipulated the sampling fractions to be employed (such as 10% of ditch fills, 50% of pits and postholes, etc). Part of the drive for these prescriptive requirements was the advent of competitive tendering in commercial archaeology which PPG 16 ushered in, and thus a desire on the part of curatorial archaeologists to provide a clear brief that competing organisations could cost against. These sampling minima were drawn from practice that had developed during the rescue era, but were also heavily influenced by the concept of 'reasonableness' enshrined in planning policy. Local planning authorities have always been mindful that their requirements can be challenged as excessive or out of proportion to the archaeological importance of the site to be investigated, or the perceived value of the development. Over the last quarter century this situation has become familiar in Britain, although there can be considerable variation in the approaches and methods required in different local authority areas. In some cases this is explicable by the nature of the local archaeology, but in others the variation seems to be driven by the health of the regional economy or local traditions (and personalities!), and thus not necessarily related to the archaeological site in question. Undoubtedly a major factor behind this variation is the reduction in curatorial service provision over the last few years which has led to many curatorial archaeologists working in virtual isolation, or such posts being graded at a relatively junior level.

There are few examples over the last 27 years of evidence-based research on field investigation methodologies, and the over-riding tendency has been to stick with the norm (despite the fact that those norms have virtually no empirical under-pinning). Methodological experimentation has been surprisingly limited because when budgets or resources are under pressure in a commercial environment, it is always easier to stick with the tried and trusted. In the few cases where experimentation has occurred a couple of common factors can be identified. First is the context of a long-running project where commercial competition has been completed at an early stage and an archaeological contractor has been selected who will have a lasting involvement in the site. Second, the quantity of archaeology to be investigated is both considerable

and extensive (indeed frequently much greater than expected at the start of the project), and thus the application of standard techniques will be prohibitively expensive. In these circumstances a partnership approach between the archaeological contractor and the curatorial archaeologist to get the best archaeological outcome can lead to innovative approaches. Successful examples of innovation include Colne Fen, Cambridgeshire, where two complex settlements were excavated over ten years in advance of gravel quarrying (Evans et al. 2013) and the Terminal 5 project at Heathrow Airport, London.

The investigations covering 75 ha in advance of the construction of Terminal 5 between 1996 and 2007 pioneered an innovative 'iterative' approach to excavation strategy (Andrews et al. 2000; Framework Archaeology 2006; Framework Archaeology 2010). Curiously the project had little legacy, despite the wide profile that it enjoyed and the professional debates it generated. Few practitioners were unaware of the project, even if they did not necessarily sign up to its philosophy. The Terminal 5 methodology was developed to fit with the ethos of the overall construction project: up-front development and innovation was encouraged, and funded, but in return for an expectation that the archaeological contractor would aspire to continuous improvement. The client wanted the best archaeological outcome, but at a reasonable price. The approach adopted was explicitly research driven, and it cascaded down from broad over-arching questions of landscape utilisation and site chronology to more specific research questions which drove the sampling strategy and identified locations where the most detailed investigation was to take place. The overall project philosophy was concerned with answering research questions about the site and its context, with particular emphasis on interpretation during excavation (as opposed to during post fieldwork analysis) and the creation of historical narratives as the work progressed. The lack of legacy of the Terminal 5 project is most likely because the front-end investment of resources evident there was not applicable or viable with smaller investigations of shorter duration. Certainly the Terminal 5 project has not materially changed the way that the vast majority of sites are investigated within the planning system. This is unfortunate as there is much to commend an approach that reacts to what is being discovered during an on-going investigation, rather than sticking rigidly to a strict and prescriptive brief written before a spade went in the ground. There can be a danger that the WSI becomes a

strait-jacket which leads to excavation by rote and an obsession on sampling fractions for different feature types, and thus serves to inhibit a more thoughtful approach. Technological advances now make the daily updating of site plans relatively easy to achieve. What is more difficult to realise is the availability of adequate numbers of specialists to regularly assess the potential of emerging artefact and ecofact assemblages, and thus provide the crucial feedback to drive and inform site strategy. This approach was an important facet of the Terminal 5 project, although even there the availability of specialists was a problem, and today commercial pressures seem increasingly to militate against specialists coming out of the laboratory and inputting on site into the formulation of the evolving site investigation strategy.

We must also not forget that development-led investigations sit within a contractual framework with a client who is paying for the work in order to satisfy their planning obligations. All developers crave cost certainty, and are understandably reluctant to enter into open-ended agreements for archaeological work. An iterative approach that offers little in the way of a cap on costs at the outset will be treated with suspicion, and is unlikely to be welcomed by those who foot the bill. It will not be easy, but the profession should try and move towards a more creative and intelligent approach to investigation which involves the curatorial archaeologist (on behalf of the planning authority), the investigating organisation and the client (or their representative consultant). In some cases such a collaborative approach to strategy formulation already exists, with variation to the pre-existing WSI agreed on site in the light of emerging discoveries. But one person's decision to reduce sampling of a certain type of feature in order to focus attention elsewhere can in another person's view be corner-cutting to reduce costs. We have some way to go if we are to overcome the suspicion and mistrust that has developed in some quarters of the commercial archaeology sector over the last few decades.

Of course not all innovation proves in retrospect to have been successful, and there are undoubtedly risks in deviating from the norm, although we would maintain that such risks are worth taking more often. For instance exploration of an extensive later prehistoric and Romano-British landscape near Daventry, Northamptonshire, was investigated through a series of discrete excavations undertaken by different

organisations. In one area an innovative project design was formulated which considered the site from the viewpoint of the human body; both the viewpoints of the archaeologists in 1997/8 and those inferred for the Iron Age inhabitants. The idea was to interpret the site and all its contents in terms of the five human senses and discussion of these sensory themes was encouraged throughout the period of fieldwork and post-excavation analysis (Hughes and Woodward 2015, 2–7, 109–23). More typical, familiar, approaches were adopted at the other areas examined, although with varying degrees of sampling and in one case a strategy was dictated that prioritised Neolithic features rather than Iron Age ones (Masefield 2015). The differing approaches and sampling strategies evident at these excavations hinder an overall appreciation of the landscape (Chadwick 2016), and a fragmentation of approach is an oft-repeated criticism of commercial archaeology.

The methods by which rural settlements are excavated will inevitably vary, and we are categorically not calling for all sites to be dug in the same way. That would be utterly stifling and counterproductive. Rather there is a case for more thought, innovation and flair to be shown in the way that investigations are designed and executed. That would make for a more invigorated research direction for Romano-British rural studies – and generate reports that are more interesting to read! While the role of the curatorial archaeologist is critical in maintaining standards on behalf of the local planning authority that imposed the requirement for work in the first place, it would be encouraging if we could reach a situation where professional esteem, peer pressure and client recognition are also drivers for quality.

Aspects of contemporary field practice

As there has been so little research and development into archaeological field techniques over the last few decades, this is an area crying out for investment to enable past practice to be evaluated and new evidence-based recommendations to be formulated. Two examples serve to highlight some of the areas where research and development could usefully be directed. In both cases the methods are far from new; quite the contrary they are tried and tested ones that seem to have fallen out of contemporary fashion, despite their value for furthering interpretation and understanding having been previously recognised. The mechanical removal of

topsoil and subsoil to reveal underlying features cut into the natural subsoil has been the norm on greenfield archaeological sites since the 1960s. The efficiency of this approach is obvious, but of course it does sever the relationship between those artefacts contained in the topsoil and the underlying structural features. In the past fieldwalking was a standard technique to prospect for archaeological sites in most parts of the lowland Britain, and this produced a quantification of the artefact content of the topsoil and yielded information on chronology and site status (for example Ford 1987). But fieldwalking has now been almost entirely superseded by geophysical survey (principally magnetometry) as the default prospecting-technique. Geophysical survey is not only less labour intensive, and thus cheaper, than fieldwalking, it is also more flexible as it is not dependent upon an arable landuse and the relatively restricted window after ploughing, but before crop growth is too advanced. The higher costs of fieldwalking compared to geophysics derive not only from the labour-intensive requirements of line walking, but also because it recovers artefacts that need to be cleaned, documented, identified and prepared for long-term curation in a museum. Conversely advances in technology have now made the cost per hectare of magnetometry considerably cheaper in real terms than twenty years ago, and in commercial projects in rural environments it is used almost to the total exclusion of other geophysical techniques. One senses that the level of expertise required to interpret the results of magnetometry is also less than it was, especially where interpretation of anomalies is overtly 'objective'. Alternative geophysical techniques such as resistivity and radar are slower and may require greater interpretative expertise; accordingly they are more expensive than magnetometry and are consequently used less often.

There are undoubtedly restrictions on the interpretative value of surface artefact collections as they are not always representative of the sub-surface archaeology. Nevertheless systematic, surface collection (especially where this also involves the controlled use of a metal detector) has the potential to yield significant information as the first stage in the mitigation programme on known sites. For instance it is conceivable that the latest artefacts on a heavily plough-damaged site may largely exist in the topsoil, and analysis of the proportions of finds from stratified contexts/surface cleaning will underestimate the prevalence of late material (cf. Evans 2012). Artefact scatters in fields beyond a settlement core might also reflect

manuring practices and serve as a proxy for arable land use. Fieldwalking will only be justifiable, however, where there is good reason to believe that the quantities of artefacts likely to be retrieved render the effort expended worthwhile, and critical evaluation of the value and cost-effectiveness of the data recovered will be required. This could be ascertained either during the evaluation phase or on the basis of previous work in the vicinity (it is likely to be the case over large swathes of southern and eastern England where artefacts are common; Smith et al. 2016, fig. 12.4). Bespoke, final ploughings of sites ahead of excavation to facilitate this approach, as occurred at Colne Fen (Evans et al. 2013, 188) might be considered, but in reality such opportunities will doubtless be rare. More widespread might be opportunities for extensive fieldwalking programmes in areas where strategic developments are planned. Land for such development is often allocated many years in advance of the start of development, so there could be opportunities for surface-collection programmes, perhaps utilising volunteers from the local community, which could form part of the programme to evaluate the archaeological potential of the proposed land-take. Of course in many cases the best approach would be to use both fieldwalking and geophysics as complementary techniques.

In situations where there is a substantial build-up of topsoil there might even be a case for its removal in shallow spits with finds collected from the surface of each planum in small grids and the locations of metal-detected finds recorded by GPS. That approach will allow recovered artefacts to be related to the site plan exposed in the subsequent excavation, and thus concentrations in the planum to be related to underlying buildings for instance. This method was undertaken in small-scale test trenching at Nettleton and Rothwell, Lincolnshire (Willis 2013), but seemingly has not occurred to date at larger open area projects. It goes without saying that care should be taken when topsoil and subsoil are being removed by mechanical excavator to ensure that any horizontal stratigraphy is not inadvertently removed without record, and that it should not automatically be assumed that only negative features cut into natural will survive in arable areas. Romano-British timber buildings often only leave ephemeral traces, and their locations may on occasions have been lost due to 'hard' machining (Evans et al. 2013, 24). That said, the hand removal of the base of the topsoil over several hectares would be prohibitively expensive and in the vast majority of cases not repay the effort expended. Artefact concentrations recognised

through fieldwalking could indicate the locations of buildings or middens, however, and thus identify areas where particular care should be taken during machining.

Another facet of contemporary field practice that is remarkably little used is the spatial plotting of artefacts and ecofacts across an excavated area to assist in interpretation (Evans 2012 is a notable exception). For instance plotting the differential densities of artefacts and ecofacts in different parts of ditch systems could yield insights into the uses of enclosures and sub-enclosures (settlement; stalling of stock; arable processing, etc). While this might seem obvious, instances of this approach in a commercial environment are comparatively rare (Colne Fen is one example; Evans et al. 2013), although there are more examples in research-driven investigations (as for instance at Hayton, East Yorkshire, where the range of items plotted and the thoroughness of the approach is particularly noteworthy; Halkon et al. 2015). It is also disappointing that there are hardly any examples of projects where the quantities of artefacts recovered per standard volume of feature fill have been used as a basis for measuring differences, yet this is a standard technique in archaeobotany and work in a research context shows the potential (Fulford and Holbrook 2011, 16; Eckardt 2006; Millett 2006; 2007, 75–84). Rapid recording of the profile of an excavated section with a GPS-based surveying kit now renders it relatively easy to calculate the volume of an excavated slot across a feature, and thus enable calculations such as kg of pottery per m³ to be produced. Ground-based laser scanning, or lidar or photogrammetric survey data obtained from drones, might be other methods of rapidly determining the volumes of excavated features. Comparative volumetric data are essential if the relative abundance or scarcity of artefacts between different types of site, or different regions, are to be understood and significance appreciated.

Analysis and dissemination

An important conclusion of this project is the need to record key pieces of information which are essential for a full understanding of the site and its methods of investigation. Examples include a precise statement of the total area excavated; sampling and retention strategies employed (both on site and during analysis); detailed descriptions of the analytical methods adopted, and quantifications of the

total recovered assemblages of finds and environmental remains. The latter are necessary if the reader is to gain a clear appreciation of whether a reported absence is significant, or rather simply a product of the methodology employed. An example might be whether soil samples were checked with a magnet for metal-working debris such as hammer scale. If they were, greater confidence can be placed on the absence of such material. It is important, therefore, to be just as explicit on the methods that were not used as those that were. As already mentioned it is now apparent that the controlled use of a metal-detector during an excavation is a major determinant on the quantity of coins and other types of metalwork recovered. Comparison of the artefact assemblages from two neighbouring excavations could be highly misleading if a metal-detector was used on one but not the other. A set of mandatory information along these lines should be regarded as an essential component of all future reports. If constraints on space do not permit the inclusion of this information in a final publication, the Post-Excavation Assessment Report might be an appropriate alternative location for much of this detail, but, if so, that report must be made available via the Archaeology Data Service Grey Literature Library or other recognised repositories. There has been a tendency to regard the Post-Excavation Assessment as redundant once a final report has been published but, if it is the only document that contains a quantification of the total site assemblage, then it has a continuing value on a par with the published account, which will often be of a more summary nature.

Turning to the methods by which analysis is undertaken, given the great number of Romano-British rural settlements that have now been excavated (c.2500 in our database) it is of paramount importance that the results from one investigation are capable of being compared with those of another, and data from separate interventions aggregated to enable higher-level synthesis. For this to occur the finds and environmental evidence need to be recorded to nationally accepted standards to maximise value. This might seem self-evident, but experience gathered in the project indicates that it is not always the case. The situation is particularly acute with the most ubiquitous of site finds, pottery. Despite a plethora of guidelines, minimum standards and recommendations for best practice produced over the last three decades, the failure of some specialists to utilise the National Roman Fabric Collection descriptions in their work frustrates attempts to include sites in synthesis.

For other categories of artefact there is still in some cases no single, universally accepted, classification scheme, and, in designing the Roman Rural Settlement Project on-line database, decisions had to be made on which schema to adopt for recording relatively common artefacts such as coins and brooches. Once again usage of different schemes (or worst of all, no classification system at all) hinders inter-site comparison, and the classification scheme adopted by the project does at least provide a base standard from which to go forward. The situation with biological remains is somewhat better, with greater adherence to nationally recognised standards, although debate still rages over on-site strategies for the collection and processing of bulk samples for the recovery of plant macrofossils. On some sites with apparently low environmental potential, current guidelines can be perceived as overly onerous.

There has been much debate on minimum assemblage sizes for the different categories of artefacts and ecofacts. Just how large a sample is required to facilitate inter-site comparison and inclusion within synthesis? Understandably most specialists are unwilling to commit themselves to bold statements on absolute numbers; the contextual association and geographic location of the site are key determinants, and prevent hard and fast rules. For instance 100 body sherds of a locally-made storage jar have very different interpretative value to a similar-sized assemblage which contains pottery from a range of sources and in a variety of vessel types. The location of the site is also crucial as there are very marked variations in the quantities of artefacts recovered from rural settlements in different parts of the Roman province, and the effect of the local burial environment on the preservation of biological remains can also be profound (Allen et al. 2017). All are agreed, however, on the importance of not treating the Roman period as a single entity and lumping all the material together. Much more value attaches to discrete assemblages that can be related to defined chronological site phases or, with smaller assemblages, selected groupings thereof (such as early, middle and late Roman).

It remains to consider the ways in which the results of investigations are disseminated. Presentation of data in a high level of detail in a print-published form is increasingly only possible for monographs where there is flexibility in length. Many

journals are no longer willing to publish full-length specialist reports with their accompanying data tables and instead ask for a synthetic summary which picks out the main conclusions. This has resulted in an increasingly common, although not universally welcomed, twin-track approach to dissemination: a summary report in a journal which presents the main findings and conclusions, with an accompanying, grey literature report available on the internet that contains all necessary detail. Sometimes rather than a single pdf report, specialist data are made available as individual downloadable files (spreadsheets such as Excel for instance). There can be advantages to the latter approach as this allows the specialist researcher to re-order data and amalgamate results from a number of different sites without the need for manual re-keying. This approach may be particularly profitable with finds, environmental and osteological data, which are often presented in similar, but not always identical, formats. Extraction of information from pdfs for incorporation within large-scale analysis and synthesis can be a time consuming and laborious process, although new data processing methods such as natural language-processing may hold potential (Green et al. 2017, 248). The definitive publication, whether print or digital, should always contain a summary of the quantified data so as to act as signpost to the on-line archive for the interested researcher. That way even the smallest intervention, if properly recorded, should be capable of providing some quantified data that are capable of integration and use within wider synthesis.

Commercial archaeology has produced some excellent out-puts which showcase what can be achieved. These reports are characterised by a willingness to integrate structural, finds and environmental evidence in thoughtful and considered discussions. Once again large-scale infrastructure projects are to the fore. For instance, the investigations in advance of the expansion of Stansted Airport, Essex, resulted in a readable, considered monograph, while an on-line archive made the original data available for others to use (Framework Archaeology 2008; 2009). Much the same could be said of the report discussing the findings on part of the route of the High Speed 1 railway in Kent (Booth et al. 2011; Foreman 2009), and that concerned with the Wattle Syke settlement in Yorkshire is also of high quality (Martin et al. 2013). Good reports are not solely the preserve of large schemes, however; and exemplars deriving from smaller, more typical developments can be cited from many different parts of the country. For instance two reports from the Bedford area

are relatively concise; present the evidence in a way that makes it easy to extract salient data and compare them with other sites, and provide an appropriate, but not over-long, level of insightful discussion (Luke 2008; 2016). Similar comments also apply to certain reports from the Upper Thames Valley (for instance Powell et al. 2010; Smith et al. 2010), and there are many other excellent examples that could be cited. What is apparent across the literature, however, is a general lack of reflection on the success or otherwise of the approaches and methods adopted. In a commercial environment it is understandable that organisations are reluctant to highlight aspects of a project that could have been done better, yet it is through such operational experience that the discipline will move forward. Greater published reflection in excavation reports is to be encouraged.

Conclusions

The experience of the Roman Rural Settlement Project is that synthesis which draws from a large number of excavations requires good quality numerical data. The corollary is that published excavations without such associated data, which constitute the building blocks of the excavation narrative and the specialist report, will not feed substantively into wider synthesis. By good quality we mean data that are comprehensive and adhere to the highest standards of guidance recommended to report the relevant dataset from the excavation in question and its constituent material culture and environmental assemblages. While one avenue of dissemination of an excavation may remain as a synthesis published as printed monograph or journal article, it is essential that the underlying data are made available too. While some printed reports may be published with all the associated data relating to the excavation and specialist reports comprehensively tabulated, electronic publication of those data, preferably as downloadable files rather than pdfs, should be the norm for all excavations. This facet of dissemination should have equal weight with the production of the printed report. Indeed, an excavation report should not be considered as 'published' until electronic dissemination has been completed in parallel with the printed version.

While there are guidelines aplenty relating to the reporting and publication of many aspects of the material culture and environmental data recovered from excavations covering all periods of British archaeology, the rural settlement project has found that

these have not been followed with any consistency. For example, despite the successive publications of revised guidelines from the 1970s onwards advising on the processing and publication of Roman pottery, it was found that there was insufficient consistency among published pottery reports to facilitate synthesis beyond a quite basic level (Brindle in Allen et al. 2017). Given the amount of resource that is devoted to excavation and post-excavation, surely the time has come when such *guidelines* need to be replaced by *standards* agreed by the profession and monitored by the Chartered Institute for Archaeologists? This is not to suggest that ‘one size fits all’; the standards deemed appropriate to the recording and publication of an evaluation, for example, will not be the same as for a larger-scale excavation. Indeed the rural settlement project was selective in its approach, prioritising only those interventions of sufficient scale and quality to contribute to the addressing of one or more of the questions it posed (Smith et al. 2016, 8–15). Thus evaluations without follow-up excavation were not included. Rigidity is to be avoided: decisions at all stages between the writing of the research design to the post-excavation analysis will require the iterative exercise of professional judgement. However, once decisions are made, they should be followed by the implementation of the appropriate, specified standards.

However, a serious risk remains with the imposition of standards, that of fossilisation. It is essential for innovation to be encouraged as new questions are asked about our past and new techniques emerge which require different approaches in the field or the post-excavation laboratory. Some methodologies cry out for implementation at national level (and could well be applicable to other periods), for example: systematic recording of excavated volumes; consistent use of metal detectors; and greater use of radiocarbon dating, especially towards the dating of the beginnings and endings of all types of site. Although the rural settlement project has established a framework of eight regions across England and Wales (Smith et al. 2016, fig. 1.5), it is abundantly clear that there is much less information available for some regions, notably in the north and west, than in the Central Belt and South-East regions, where, thanks to the relative abundance of data, it has proved possible to undertake much more detailed characterisations of settlement, economy and society at the level of the *pays* or sub-region. In those areas where such studies have been possible a more nuanced approach will be required which builds on, rather than

simply repeats, what has already been achieved. This might well influence the approach towards the sampling of a settlement and its constituent components and the associated treatment of its finds.

Since the great majority of new knowledge of Britain's past since 1990 has been — and will be for the foreseeable future — generated through commercial archaeology, it is essential for commercial practice to embrace the approaches advocated here, and, looking forward, to develop new techniques. Although our observations on past practice and our recommendations for the future derive from a period-specific project, we believe that much of what we have reported here has relevance for the planning, execution and publication of archaeological fieldwork in other periods and cultures and, indeed, not just those confined to Britain.

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