Historic England

The Role of the Human Osteologist in an Archaeological Fieldwork Project

Summary

Human skeletal remains are a rich source of evidence about our past, and scientific advances are rapidly increasing the data available. The excavation and treatment of human remains involves ethical sensitivities and legal considerations over and above those in other areas of archaeology. The involvement of a human osteologist is therefore central to the success of an archaeological project involving human remains. This guideline is a replacement for the 2002 English Heritage document 'Human Bones from Archaeological Sites: Guidelines for Producing Assessment Documents and Analytical Reports'. It describes the Project Osteologist's role, from project planning to dissemination of results and archiving of remains. The intended audience is human osteologists, project managers and other professionals involved in archaeological fieldwork projects that yield human remains.

This document has been written by S. Mays (Historic England), M. Brickley (McMaster University), N. Dodwell (Oxford Archaeology) and J. Sidell (Historic England).

This edition published by Historic England, September 2018 in association with The British Association for Biological Anthropology and Osteoarchaeology. This document replaces Human Bones From Archaeological Sites: Guidelines for Producing Assessment Documents and Analytical Reports' (Mays *et al*., 2002).

Please refer to this document as:
Historic England 2018 *The Role of the Human Osteologist in an Archaeological Fieldwork Project*. Swindon. Historic England.

HistoricEngland.org.uk/advice/technical-advice/archaeological-science/human-remains-advice/

Front cover
Two Middle Bronze Age burials uncovered during excavations south of Stonehenge. Composite figure derived from photogrammetry.

Contents

Introduction

Human skeletal remains are frequently encountered on archaeological sites ranging from post-Mediaeval burial grounds containing thousands of interments, to prehistoric sites yielding single burials or small groups of remains. Human remains are rich sources of information, and their treatment involves specific legal and ethical considerations. A human osteologist is a key member of any fieldwork project involving human remains.

This document replaces 'Human Bones from Archaeological Sites: Guidelines for Producing Assessment Documents and Analytical Reports' (Mays *et al*., 2002). Its preparation has been prompted by a number of important developments that have occurred since 2002. Some of these are associated with how archaeological fieldwork projects are justified and implemented in the developer funded sector, and some relate specifically to the study and treatment of human remains.

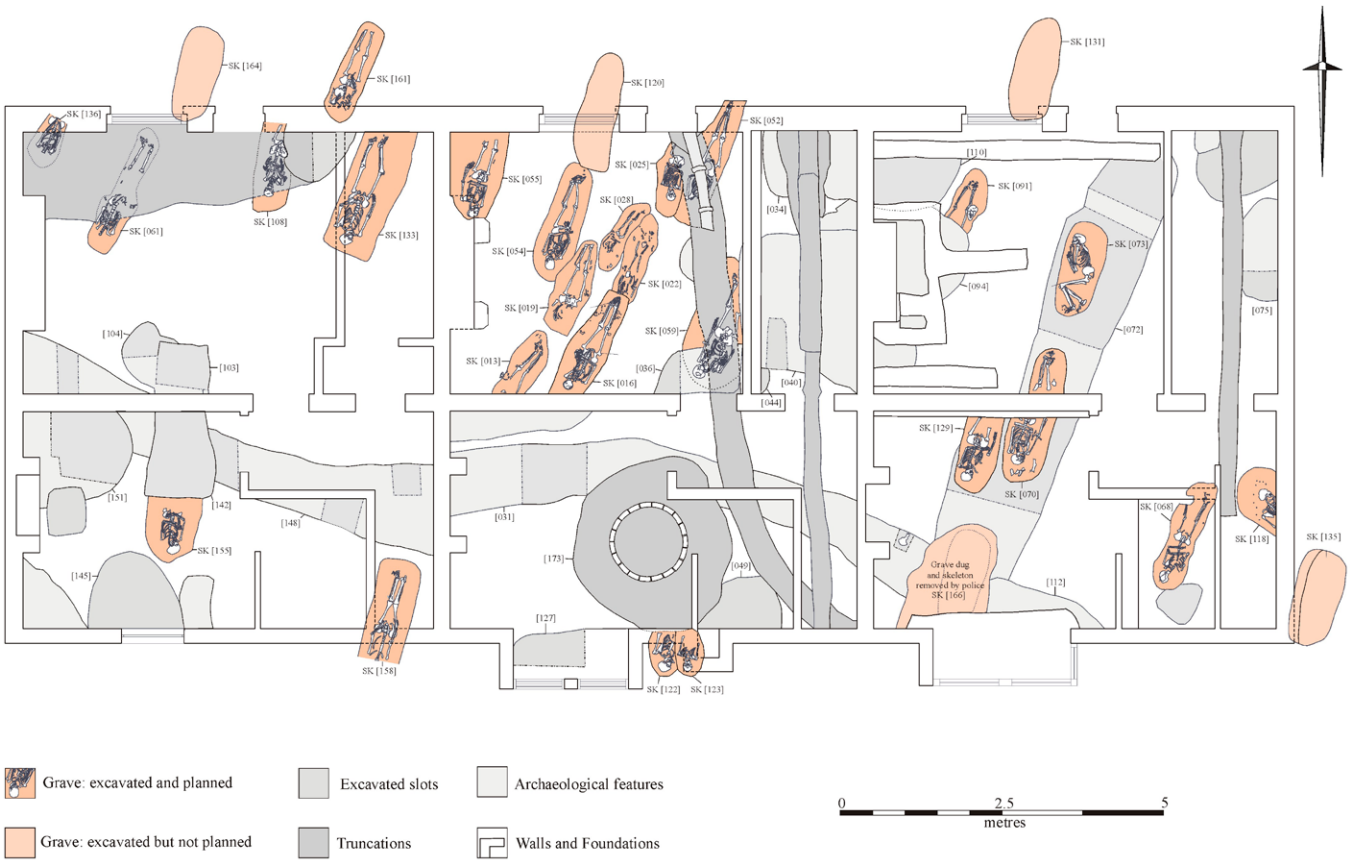

Figure 1
Draft plan of part of a Roman cemetery.

Since 2012, developers have discharged their archaeological responsibilities in accordance with the National Planning Policy Framework (NPPF) (MHCLG, 2018). In the NPPF, archaeological works must be justified in terms of balancing the significance of the heritage asset against the harm caused by a development. In parallel to government planning guidance, English Heritage promoted Regional Research Frameworks, researched and compiled by the archaeological community. They are used to focus research endeavour and identify gaps in knowledge, and are an important tool when designing archaeological projects.

In 2008, English Heritage (now Historic England) published Management of Research Projects in the Historic Environment ("MoRPHE") (Historic England, 2008). This replaced the earlier Management of Archaeological Projects (2nd edition) (or "MAP2") guidance, and sets out a common framework for the organisation of archaeological and other heritage projects. In 2014, the Chartered Institute for Archaeologists published a series of guidelines giving more detailed standards for conducting the different phases of an archaeological fieldwork project (CIfA, 2014a-e).

The last 15 years have seen methodological innovations that have greatly enhanced the potential of human remains to provide information about our past. Human remains occupy an increasingly important position in archaeological discourse, and these innovations are now being adopted into developer-funded

Figure 2
Some Roman burials under excavation.

Figure 3
A burial in a stone lined grave.

site-based archaeology. There have also been important alterations in the legal frameworks for the treatment of human remains (Mays, 2017). Ethical debates regarding the treatment of human remains of British origin have increased in prominence. Osteologists have developed their own codes of ethics via the British Association for Biological Anthropology and Osteoarchaeology (BABAO, 2010a,b), and have been increasingly active in advocating ethical approaches to the scientific study and other aspects of the treatment of human remains. In 2005, the Advisory Panel on the Archaeology of Human Burials in England (APABE) was formed, with a key aim to promulgate policy regarding all aspects of the treatment of human remains from archaeological sites in England; osteologists play an active role on the Panel.

This guideline encompasses the role of the osteologist throughout an archaeological fieldwork project. The intended audience is osteologists and other professionals involved in archaeological projects yielding human remains.

1 The Archaeological Fieldwork Project

An archaeological fieldwork project requires the creation of a team to work together for the duration of a project (Historic England, 2008: 12) in accordance with an approved Written Scheme of Investigation (WSI, see below). Each team member should have a clearly defined role, which may be managerial or technical. Technical staff will include those directly responsible for excavation of the site, as well as scientists and other professionals with expertise in the various classes of archaeological materials likely to be encountered. When human remains are anticipated, a human osteologist (hereafter termed the Project Osteologist), normally with relevant qualifications at least to Masters level, should be included in the project team from the outset. Ideally the Project Osteologist will have experience of excavating burial grounds, to help them to fully understand issues surrounding preservation, recovery and recording, and the range of associated items that may be encountered, such as remains of coffins or grave goods. They should contribute to the WSI, framing research questions, determining recovery and sampling techniques, specifying the form of reporting at all stages, and guide archive deposition.

Documents exist to provide advice on best practice regarding human remains, covering:

- Excavation of remains (McKinley & Roberts, 1993)
- Post-excavation processing (Mays, 1991)
- The study of crypts and vaults (Cox, 2001; Elders *et al*., 2010)
- Dealing with large burial grounds (Mays *et al*., 2015)
- Standards for post-excavation recording of remains in the preparation of analytical reports (Brickley & McKinley, 2004; Mitchell & Brickley, 2017)
- Care of archives of human remains in museums (Swain *et al*., 2005)
- Considerations pertinent to destructive sampling of remains (Mays *et al*., 2013)
- Scientific, ethical and legal aspects of the treatment of human remains from Christian burial grounds (Mays, 2017)

Phase	General purpose	Key considerations for burial ground archaeology	Role of human osteologist
Project planning: desk-based assessment	Assess, from existing records, the nature, extent and significance of the historic environment within a specified area	■ Total number of burials in burial ground ■ Proportion likely to survive ■ Proportion impacted by the proposed development ■ Likely condition of buried remains ■ Date & organisation of burial ground ■ Any specific ethical issues	An osteologist should be consulted on the likely significance of remains, and may advise on the most useful documentary source material pertaining to the burials
Project planning: Evaluation	To 'ground-truth' the conclusions of the DBA and to provide additional information on the nature of the archaeological resource within the specified area using intrusive and/or non-intrusive fieldwork	■ Preparation of a detailed WSI ■ Establish permissions for fieldwork from MoJ or CofE as appropriate ■ Fieldwork to establish: the vertical and horizontal extent of burials; density of burials; preservation of buried human remains and associated material culture; dating and phasing; burial ground layout ■ Report on fieldwork and finds	The Project Osteologist should: ■ Contribute to the WSI ■ Advise on permissions needed ■ Be present on site when human remains are encountered to advise on recovery, recording, and post-excavation processing ■ Provide a report on the human remains recovered
Main fieldwork phase (excavation)	To record and examine the archaeological resource in the specified area within a framework of defined research objectives identified in a Project Design	■ To uncover and record burials ■ To recover human remains and associated material culture ■ To take environmental samples as appropriate ■ To conduct post-excavation processing of human remains	The Project Osteologist should: ■ Contribute to the Project Design ■ Be present on site when human remains are encountered to advise on their recovery, recording, and post-excavation processing
Assessment	To evaluate the potential of the fieldwork data and excavated material to contribute to knowledge and to identify what further work may be necessary at the analysis phase	To integrate the assessments on the various materials contributed by project team members into a fully costed and time-tabled analysis phase, encapsulated in the form of an updated project design	The Project Osteologist should: ■ Prepare an assessment report on the human remains ■ Contribute to the updated project design regarding research questions, analysis and publication
Analysis	To carry out the work specified at the assessment phase	To integrate the reports on the various materials contributed by project team members into a publication report on the burial ground	The Project Osteologist should: ■ Contribute an analytical report on the human remains
Dissemination and archiving	To steer the site report through to publication and to deposit the data and finds achives with suitable holding institutions	Publication of cemetery report. Archiving / reburial of human remains and associated material culture.	The Project Osteologist should: ■ Provide data and metadata for archiving ■ Contribute to retention policy ■ Ensure the human remains are ready for archiving / reburial

Figure 4
Stages of an archaeological fieldwork project on a burial ground.

Figure 5
A Late Bronze Age skeleton found in a well.

In addition, some general archaeological guidelines feature subsections specific to human remains (eg David *et al*., 2008: Campbell *et al*., 2011; Historic England, 2015).

The documents listed above should be consulted as appropriate prior to and during fieldwork projects. However, every project is different, and expert advice from a Project Osteologist will ensure these general guidelines are appropriately applied. All projects involving human remains should have input from an osteologist. For larger burial grounds there may be a team working under a lead osteologist.

Figure 6
Skull from the burial found in the well.

2 Project Planning

Following NPPF, increasing emphasis is being placed on explanation of significance of heritage assets, in order to ensure archaeological investigations are included and justified in schemes which deliver public benefits (MHCLG 2018: section 16, paragraphs 189-199). Heritage assets may either be designated, for example burial grounds within scheduled monuments, or undesignated. Understanding and explaining significance are covered in Conservation Principles (English Heritage, 2008). This document describes how to identify the contribution a site or heritage asset can make through its value, be that evidential, historic, communal or aesthetic. This is both a scholarly and a public-facing approach, seeking to understand not only empirical values, but also who values a site, and why. Experienced osteologists with clear knowledge of specific regions, periods, faith groups or local communities are particularly well-placed to articulate these values.

The evidential value of an archaeological site is a key component of its significance. It will depend upon the totality of the archaeological evidence. Most sites with human burials also contain non-burial archaeology, and both must be taken into account. Material culture of death, such as grave goods, coffins, other organic materials and grave markers, is important, but unless site conditions mean that their survival is minimal, the human remains are the key aspect.

The ability to demonstrate the significance of a site through its values will underscore its importance, helping planners weigh the harm of the development against the public and heritage benefits accruing from the scheme. Public benefits will be identified by the local authority. Heritage benefits of excavation, analysis and public outreach should also be demonstrated through clear articulation of significance. Expert advice from an experienced osteologist is essential if the significance of human remains impacted by a development is to be accurately characterised.

Most fieldwork projects are subject to competitive tender. To enable projects to be costed as accurately as possible, detailed information on the site's history is needed. A clear brief should be sought from the commissioning body, with oversight from the local authority if they are providing planning advice. Advice from other agencies such as Historic England should be sought if, for example, the site is a scheduled monument. It is important at this stage to consider whether the human remains will be archived or reburied after the project. Costs for archiving can vary significantly from museum to museum, and reburial is often expensive too. Other aspects of the project such as field recording, processing, health and safety, publication and deposition of the digital archive should also be identified. This will clarify costing, areas of risk, and provide a degree of certainty for the client.

2.1 Desk-based assessment

Research aimed at characterising a heritage asset is critical, ideally before any development proposal is finalised and submitted for planning permission. Desk-based assessment is normally requested in advance of groundworks by the County Archaeologist or other archaeological monitor and prepared within the context of Regional Research Frameworks. Research will draw upon knowledge gleaned from previous fieldwork on the site, or others nearby or of similar character. Information from a wide range of historic sources (early maps, parish registers etc.) will also be

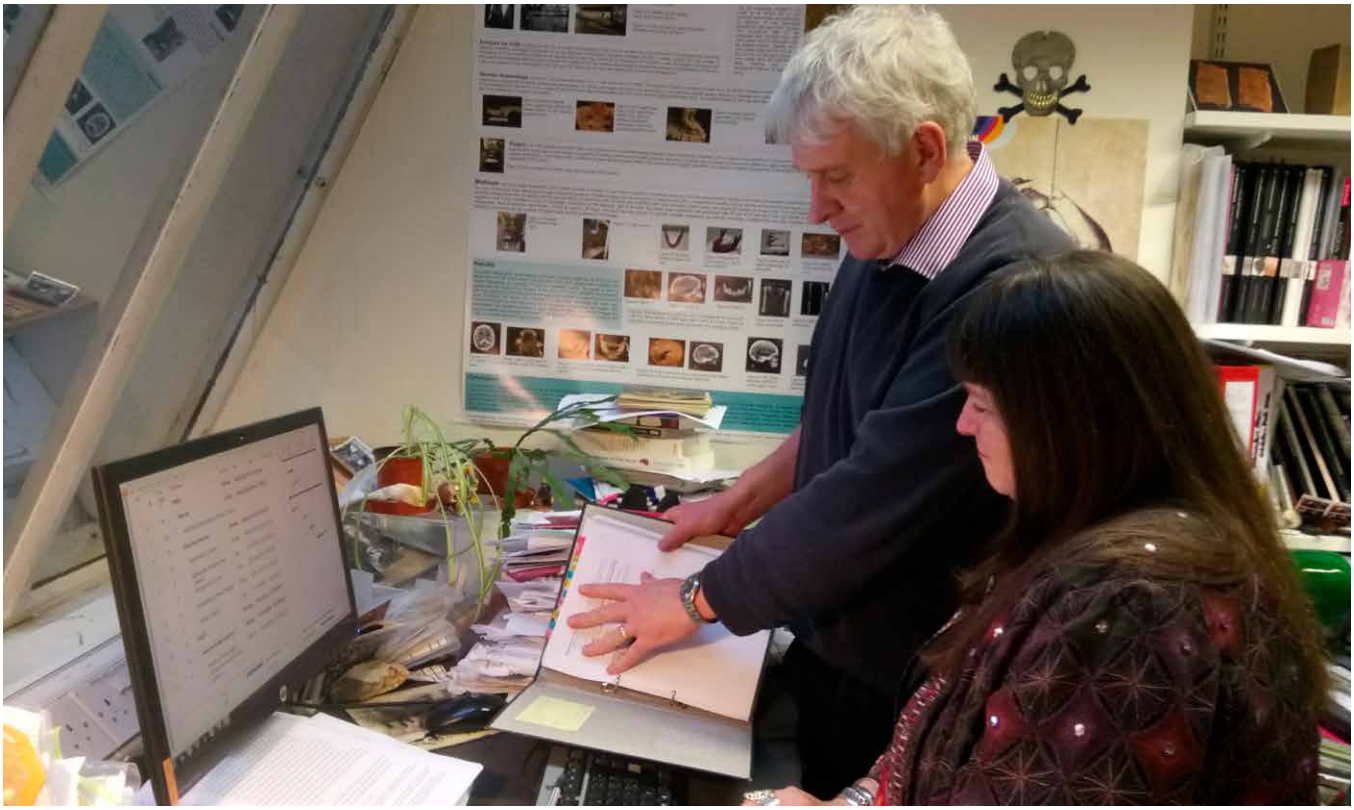

Figure 7
Desk-based assessment.

included. Desk-based assessment is often undertaken by archaeologists who specialise in this type of research, but advice from an osteologist may be critical on matters including:

- The likelihood of human remains being encountered
- The potential density and number of burials on the site
- The likely nature, survival and condition of remains
- The likely research potential of any remains that might be recovered
- The quality and significance of any previous osteological work on the site
- Potential health and safety risks (for instance, lead coffins)
- The historic sources particularly relevant to the skeletal remains
- Specific ethical issues that might arise

2.2 The Written Scheme of Investigation

The WSI is central to all archaeological projects. It sets out the current understanding of the site and area, development proposals and their impacts, and the approach to undertaking the archaeological project. The research questions will be identified, and linked to the Regional Research Framework, which clarifies how the fieldwork will contribute to wider understanding of the past. The WSI is likely to be central to any planning permission granted, and will be written into archaeological planning conditions which must be complied with and satisfied before they are discharged.

The Project Osteologist should collaborate on the preparation of the WSI, contributing to the understanding of the significance, research questions, and methods, including whether any remains are to be preserved *in situ*. They should write the method for assessing the human remains, and should agree, in consultation with the project team (including the client and local authority archaeologist or other archaeological monitor) whether the skeletal remains are to be retained or reburied (and where), and what paper and digital records are to be archived, and where. They should identify early on any novel scientific techniques that may potentially be useful, to enable costs and partnerships to be established. Finally they should propose forms of publication and possibilities for public engagement. During the project, the WSI will need to be revisited, therefore the Project Osteologist should advise on any updates relating to the human remains.

2.3 Evaluation

Field evaluation is important to assess the nature and significance of a site, and understand the risks of development. Thorough evaluation provides robust data on ground conditions, preservation and density of burials, waterlogging, and the depth and extent of the archaeological horizons (Mays *et al*., 2015: 8-9). Thorough evaluation normally requires excavation of burials to the base of the archaeological sequence within the trenches. This is necessary to fully understand the nature, scale, date-range and preservation of the archaeological deposits. Without these data, it is difficult to adequately understand the significance of the archaeology and the risks associated with the proposed development. Failing to excavate to the base of the archaeological sequence may mean that basic issues, such as density and preservation of burials on a site are inadequately understood.

Figure 8
On-site liaison involving the Project Osteologist during evaluation of a burial ground.

It is acknowledged that common practice, particularly in smaller, less complex rural sites, has been to establish the presence of burials but not to excavate them. This approach will provide some information, but unless burials are lifted it is often impossible to assess their cultural context, date and osteological features, and hence determine their archaeological significance. As with more complex sites, leaving burials *in situ* may also preclude reaching the base of the archaeological sequence, with the risks that this entails.

Increasingly, partial or complete preservation of archaeological remains as part of a development is seen as a major way in which the construction impacts on a heritage asset can be mitigated (Historic England, 2015). Foundation design is key. In burial grounds, retention of part of the area may involve excavating some skeletons in advance of piles, ground beams, rafts or slabs, with other remains left between or below these foundations. The feasibility of this can be assessed during the evaluation phase, but it would require the agreement of the Ministry of Justice or Church of England, as appropriate.

In addition to characterising the significance of the burials and other archaeological deposits, the evaluation should also identify the vulnerability of the archaeology to physical damage and other degradation by the development. Issues include loading and vibration (both long term and during construction), and alterations to ground conditions. Advice and data may be available from other members of the client team, such as the engineer or groundworks contractor. The intended future use of the site is also important. For example, it is unlikely to be desirable to leave burials *in situ* in residential developments where they could be subject to uncontrolled future disturbance by digging in gardens or minor building works. The establishment of the likely significance of the remains will shed light on other relevant factors such as the loss of information due to permanent buildings precluding access to the archaeology in the long term. Knowledge of the nature and significance of the archaeology revealed through evaluation will help to determine whether the risks inherent in preserving remains *in situ* are worth taking.

2.4 Permissions

Undertaking fieldwork and development on any site will require a variety of permissions. Some of these, such as planning permissions and Scheduled Monument Consent, may be needed regardless of whether human remains are present. When human remains are involved, further permissions are needed. Depending upon the site, these should be sought from the Church of England or the Ministry of Justice (Mays, 2017). The Project Osteologist will be able to advise the project team and provide information in support of these applications, particularly on the significance of the assemblage. This will be needed in statements of significance for planning permission, Scheduled Monument Consent, and Ministry of Justice permissions, and may be needed in applications to the Church of England. The application forms for Ministry of Justice permission require details of intended storage, analysis, and archiving / reburial of the remains.

For an archaeological site yielding human burials, retention of the human remains long term in a museum or other institution as a research archive is key to mitigating the impact of the development on the heritage asset. In most projects, this is the preferred option, but in some cases there may also be a desire from the Church or other interested parties that the remains be reburied. In such cases, negotiation and compromise will be needed. For remains from Christian burial grounds, a solution might be deposition in a redundant or partially redundant church. If such solutions are to be successfully implemented, it is essential that they be pursued at an early stage so that adequate funding and logistical arrangements can be put in place (see Sect. 6.2). The Project Osteologist should be a key player in such negotiations, liaising with the Project Manager as appropriate.

3 Excavation

Prior to excavation, the Project Osteologist should advise on specific health and safety issues associated with human remains and related materials, for example risks associated with working with soft tissue and lead coffins. They should also have been closely involved in developing the protocols to be used for on-site recording and recovery of human remains, set out in the WSI. Recovery strategies should ensure adequate retrieval of small bones, calcified fragments (for example, arterial plaques, bladder stones etc) and small artifacts. This will normally require wet-sieving and sorting of soil retrieved from the base of the grave after lifting the skeleton. Detailed strategy will depend upon the specific nature of the soil and buried remains at the site in question, but recovering basal grave soil in three sub-samples, corresponding to the head, torso and leg/foot area, helps preserve information as to the approximate location in the grave of recovered material. Infant remains may be block lifted. Cremation burials should normally be lifted as whole earth samples. On-site recording systems should facilitate the association of artifacts and environmental samples with the burial from which they came.

For some very large burial grounds, a decision may be taken to archaeologically record and subsequently analyse only a subsample of the total number of burials. Input of the Project Osteologist is essential in such cases to ensure that the size and composition of the subsample is adequate (Mays *et al*., 2015).

The Project Osteologist should help ensure safe transport of excavated remains off site. They will normally have set the protocols required for the post-excavation processing of remains (washing, drying, marking, packing (Mays, 1991)). In order that an effective assessment (Section 4) can be carried out, post-excavation processing of the remains normally needs to have been completed. This should include processing of soil samples from grave fills, and deposits of cremated bone, normally by wet-sieving, and separation of bone from extraneous matter by sorting. Remains retrieved from soil samples from grave fills should be bagged separately, and boxed with the skeleton with which they are associated.

During fieldwork, the Project Osteologist should either regularly visit or, in the case of larger cemetery excavations, be permanently present on site. When large numbers of burials are anticipated, the Project Osteologist will likely wish to make a short presentation to site staff (a 'toolbox talk') at the start of the excavation concerning the procedures for excavating and recording the burials, and explaining the importance of adhering to the practices outlined in the WSI. The WSI should be kept under review in case changes in ground conditions, circumstances of fieldwork, or amendments to the development demand alterations to procedures.

Depending on the nature of the site and the development, it may be appropriate, with the agreement of the client, to undertake public engagement. This is increasingly recognised as an important aspect of the heritage benefit accrued through development. Public interest in burial grounds and skeletal osteology is often intense, and engaging audiences is a vital part of the archaeological process. This may be done through a variety of means, including site visits, and disseminating information via print, broadcast and social media. Public engagement needs to be carefully and sensitively planned, and the Project Osteologist is likely to play a key role.

Figure 9 (top)
Excavation of a post-Mediaeval burial ground.

Figure 10 (bottom)
An Anglo-Saxon burial under excavation.

Screening of excavations from casual view by passers-by is a standard condition on most permissions to excavate archaeological burials. However, this does not mean that the site should not be visited by the public. Sites may be open to casual visits via platforms or walkways, or to visits by conducted tour. In either case, visitors should be made aware that human remains may be visible. A balance is required between informing and engaging the public in archaeology and the sensitivities associated with human remains, as well as issues of security and safety that pertain to any archaeological site.

The use of print and broadcast media has long been part of public engagement in archaeology, and continues to be the case today. Many archaeologists are experienced in dealing with print, television or radio journalists, but care is needed, not only in live interviews, but also more generally as it is not usually possible to exert editorial control once an interview has been given. Social media is playing an increasing role but needs to be handled extremely carefully. Human remains, as well as being of great interest, can shock and distress people. Social media can be difficult to control once messages have been released, and there is a danger that images may be disseminated indiscriminately, manipulated or presented out of context. The Project Osteologist should advise on the use media platforms, and on what scientific information and images to release, and at what stage of a project.

Figure 11
Lifting an urned cremation burial from a Roman cemetery.

4 The Assessment Phase

The aim of the assessment phase of an archaeological project is to evaluate the potential of the fieldwork data and excavated material to contribute to archaeological knowledge, and in this light to identify what further analysis is necessary. During this phase, members of the project team undertake the assessment of the different types of remains recovered during fieldwork. The assessment weighs the evidence against the original research questions for the project, as identified in the WSI or Project Design, and considers the potential of the assemblage to investigate those questions. The original research questions may need to be revised in the light of the nature of the excavated material, and new ones may be identified.

To ensure that strands of evidence are brought together to maximise their potential, there should be communication between team members. This will probably involve project team meetings, as well as more informal liaison. Following this process, the various team members can revise their draft assessments, which will then be used by the Project Manager to update the project design. The assessment documents are not normally published but are usually part of the documentation submitted to the Local Authority and are also retained as part of the site archive.

The aim of an osteological assessment is to produce a document including factual data about the assemblage (quantity, nature and condition of remains) and whether the material is sufficiently significant to merit further study and if so, what should be done, how long it will take, and what it will cost. It may also flag up opportunities for dissemination of results beyond the excavation report to a broader readership. The aim of an assessment is not to generate data that will form the basis of scientific analysis. It is not a shortened or preliminary version of an osteological report. No detailed analytical study should be undertaken in the assessment phase. Assessment documents will usually be fairly brief – no more than a few sides of A4 paper.

4.1 Information needed to produce an assessment

To produce an adequate osteological assessment it is necessary both to look at the human remains themselves and to study relevant site and context information supplied by the Project Manager.

The information needed for assessment will probably include the following:

- A copy of the WSI and project design
- A brief account of the nature of the site (often called a site narrative)
- Records of contexts yielding human remains, together with a list of what these contexts are (eg inhumation burial, spread of burnt bone, urned or unurned cremation burial)
- Details of which contexts represent disturbed or truncated material
- A provisional dating and phasing of contexts yielding human remains
- Plans showing the location of burials or other deposits of human remains
- Photographs and/or drawings of inhumation burials *in situ*
- Details of the recovery methods used (eg details of sieving protocols)
- Details of associated finds (eg grave goods, presence of a coffin or other relevant information)
- For cremated bone, weight of bone recovered from each context

4.2 The assessment document

The first part of an assessment report should comprise factual data about the assemblage, describing the quantity and provenance of the skeletal material and the general condition of the remains.

4.2.1 Quantifying the material

For articulated burials, the number of individuals can generally be ascertained from the field records, and their completeness can often be assessed from the site photographs or drawings. These initial records can be augmented simply by looking into the boxes of bone. For larger assemblages the approximate completeness of burials might be tabulated, as shown in the example below. A note of whether key areas for sex and age determination and other studies, such as the skull or pelvis, are preserved may also be also useful. For cremated bone, remains from each context should be quantified by weight following sieving and sorting.

Table 1. Skeletal completeness

Approx. completeness					
	>75%	~75%	~50%	<25%	total
N	45	40	14	4	103

If burials can be sub-divided by phase, it is important to quantify the material by phase so that the feasibility of investigating changes in various classes of osteological data over time can be determined.

4.2.2 Condition of the material and nature of the assemblage

Notes should be made on the general condition of the bone, as this will influence the information that can be gained from an assemblage. This part of the assessment needs to be conducted by examination of the skeletal remains, either of the entire assemblage or, in the case of larger assemblages (more than *c* 100 burials), perhaps of a sub-sample of it. Questions that might be considered include: are the bone surfaces so eroded that much pathological information is lost;

and are most crania too broken or incomplete for measurements to be taken from them? With damaged crania, the extent of reconstruction that is worthwhile will depend upon the research questions for the project and whether the condition of the material permits this to be done accurately. Attempting to piece together fragmented crania is time-consuming; the emphasis should be on careful recovery during fieldwork and on careful packing to minimise breakage. For cremation burials, assessment of fragmentation is useful. This might lead to statements such as 'most fragments <10mm long' or 'many fragments >30mm'.

It is useful to note the approximate proportion of skeletons showing evidence of pathological lesions sufficiently complex to demand detailed discussion, photography, radiography or other imaging, or the application of other analytical techniques. Skeletons with signs of diseases such as tuberculosis, leprosy or syphilis will normally merit this sort of attention, whereas in most instances more common conditions, such as osteoarthritis, cribra orbitalia and simple fractures, will not. It is also worth noting the approximate ratio of adults to juveniles in the assemblage because this will affect the strategy for, and amount of, any analytical work that is proposed. For example many non-metric traits and measurements routinely recorded for adult remains cannot be recorded on juveniles, and many of the more frequent disease conditions, such as osteoarthritis, are rarely manifested before adulthood.

It is not normally necessary for the purposes of an assessment to attempt to make more precise estimates of age or to evaluate sex. It is normally sufficient to indicate the extent to which this is likely to be possible given the state of the remains. However, there are exceptions. For example, for a Mediaeval religious site, it may be useful to gain an impression of the sex ratio of the burials as this may shed light on whether they are likely to be nuns / brethren or else lay benefactors of the monastic house, and this in turn will affect the research questions that are appropriate.

4.2.3 Potential of the assemblage

After the precis of the factual data, there should be a brief note summarising the potential of the collection for further study at the analysis phase. This should include the potential of the assemblage to address research questions specified in the WSI, and any new questions that have been formulated in the assessment phase. In this light, what further work on the remains (if any) that is merited at the analysis phase should be described. The potential of an assemblage for analysis is affected by the interplay of various factors (Mays, 2017: 43-44):

Size. Other things being equal, a large assemblage is generally of greater potential because patterning in data is more readily detected with larger numbers of individuals. However, the cumulative value of small assemblages should not be forgotten, particularly for locations and periods from which large cemeteries do not exist. For example, this is the case in most of the prehistoric period in Britain – only by carrying out adequate work on small assemblages will we be able to build up a picture of prehistoric human skeletal biology.

Skeletal preservation. Clearly, more scientific data can be extracted from complete and well-preserved skeletons than from poorly surviving material. It is worth noting, however, that gross bone preservation may not be a good indication of the viability of biomolecular analyses. In some regions, soil conditions mean, in general, that bone survival is poor. In such instances, despite the limitations it imposes, poorly preserved material will need to be studied if we are to learn anything about regional palaeopopulations from their physical remains.

The value of disarticulated material. Most scientific work involves relating different types of data to one another at the individual level. For example, to study skeletal growth we need to have data both on bone size and on age at death; for the study of physique and stature we need to consider measurements of males and females separately; and for the adequate diagnosis of bony pathologies we generally need to study both

Figure 12
Excavating an urned cremation burial in the laboratory.

lesion morphology and the distribution of lesions in the skeleton. With disarticulated material we cannot combine data in this way. Historic period cemetery excavations, particularly from the Mediaeval period onward, generally produce significant quantities of disturbed, disarticulated skeletal material. This is a lesser priority than the study of the articulated skeletons and is not usually considered worthy of study at the analysis phase.

In prehistoric periods, and sporadically from later eras, human remains were sometimes deposited not as articulated skeletons but as partially articulated or disarticulated bones. Although obtaining and analysing data pertaining to demography, disease and other aspects is more difficult than with articulated skeletons, analysis of this kind of material is important for our understanding of how people in the distant past treated their dead. By posing appropriate research questions, and collecting suitable data, we can ensure that our studies are orientated to maximise the insights into this area.

Dating. Human remains are an important source of material for radiocarbon dating. In unaccompanied burials, radiocarbon dating may be the only means of providing a date for the interment and associated archaeological features. When accompanying artifacts are present, radiocarbon determinations may help confirm or increase the resolution of dating suggested on typological grounds. In cases where burials cut one another or else have stratigraphic relationships with other features that yield datable material, Bayesian analysis of results may help enhance the precision of dating using

radiocarbon. Clearly, the tighter the dating of an assemblage, the greater its value, and when larger collections can be split into chronological phases their research value is enhanced.

Special assemblages. Some assemblages are of particular value because they are unusual in some way. One such is mass graves, which contain interments deposited at the same time or over a very short period of time, and often reflecting a common cause of death, for example battle, massacre or epidemic infectious disease. In the historic period these can sometimes be associated with particular events, and in general they enable studies with specific focus, such as techniques of combat or the ways in which disease epidemics impacted earlier communities. Another type of special assemblage is that for which biographical information – such as name, age, date of death – is available from grave-markers or coffin-plates, and can be associated with individual skeletons. Such assemblages are essentially restricted to the post-mediaeval period. As well as contributing significantly to our knowledge of post-mediaeval populations, they also enable us to test existing osteological methods and to devise new ones. In this way such assemblages increase the quantity and reliability of data potentially available from skeletal remains in general.

4.2.4 Proposals for further study

Although decisions need to be made on a case-by-case basis, in general if dating, contextual information and skeletal survival are adequate, most osteologists would consider that even small assemblages are worthy of some further study in the analysis phase.

If an assemblage is thought to be of sufficient potential to merit study beyond assessment, the problems to be investigated through the study of the human remains at the analysis phase should be set out in the assessment document. The problems might be research questions from the project design or they might be questions that become apparent during the assessment phase.

Larger assemblages are in general more likely to make significant contributions to research questions identified in the project design, and further research directions are likely to suggest themselves more readily at the assessment phase than is the case with smaller collections of material. For larger assemblages, statements such as the following might emerge:

Differences in activity patterns between monastic brethren and layfolk will be investigated by comparison of humerus diaphysial morphology between burials from the monks' burial ground and from lay burials within the church.

Even for smaller assemblages, efforts should be made to focus work on archaeological research questions if this is possible. For example:

There are several decapitated burials of Romano-British date. The age and sex of the affected individuals, the character and location of the cut-marks on the cervical vertebrae, and the position of the skulls in the graves, will be discussed in the light of previous work on this class of burials. This part of the proposed work will contribute significantly to the study of ritual practices at the site, a question identified as a priority in the project design.

Or:

For the four late Saxon burials, which are apparently unassociated with any formal cemetery area, comparisons will be made with findings reported from other groups of late Saxon interments found in non-cemetery contexts in an attempt to shed light on reasons for this unusual burial practice.

For some small assemblages, however, it is difficult to address specific research questions, even though the material might still be considered to merit some further work beyond assessment. In such instances, statements such as the following are adequate:

For the four cremation burials, weight of bone, estimations of mean fragment size, bone colours (to aid estimation of firing temperatures), minimum numbers of individuals in each burial and, where

Figure 13
Some teeth from a Neolithic burial, photographed prior to sampling for dental calculus.

possible, age and sex will be recorded. Aspects of pyre technology and cremation rituals will be discussed and placed in their temporal and geographic conterxt. Attempts will be made to diagnose any pathological changes encountered, and any artefacts or animal bone will be extracted and passed to the appropriate members of the project team.

For most assemblages, comparisons should be made with published reports on material from other sites. This might simply be to put the results from the material under study in context, or particular comparisons might be needed to help fulfil specific research aims, as in the examples above. A detailed list of site reports to be used for comparative purposes is not required as part of the assessment document, but it is useful to give some idea of the sorts of comparisons that might be made.

Details of the proposed analytical work should be given. Often the basics can be summarised by citing a published osteological report. A statement such as this might be used:

Age and sex determinations, and metric and non-metric traits will be recorded as in Mays (2007), and pathological changes will be examined and possible diagnoses suggested.

Details of any other aspects to be recorded should also be given. A few sentences showing how the recording strategy is related to the overall aims of the work should also be included, particularly for large assemblages or where novel techniques are proposed.

4.2.5 Biomolecular and other laboratory analyses

Traditionally, site-based reporting work on human remains has relied upon visual examination of the material, backed up by measurement, and perhaps radiography to aid the interpretation of some pathological conditions. Recent years have seen the rise of biomolecular analyses and of the application of advanced medical imaging techniques, such as CT scanning, in the archaeological study of human remains.

Isotopic and DNA analyses of bones and teeth are now fairly well established. The former may shed light on diet and mobility of people in the past; the latter on genetic relationships and study of infectious disease and well as permitting sex identification when traditional skeletal morphological techniques do not (eg in child skeletons) (Mays *et al*., 2013). These sorts of studies increasingly feature in archaeological site reports.

Recently, genomic, proteomic and microscopic study of dental calculus (mineralised dental plaque commonly found adhering to teeth in ancient skeletons) has demonstrated potential to provide new insights into diet, health, environment and occupation in the past (Sect. 7.1). Computed tomography and other imaging techniques are sometimes used to help visualise changes due to disease or injury. For burnt bone, spectroscopic methods are providing insights into firing of bone in cremations. It is important to note that these newer techniques augment rather than replace traditional osteological methods: data from traditional osteological study is normally needed to provide context for biomolecular and other evidence, and to enable optimal selection of skeletons for these additional analyses.

Although the Project Osteologist is unlikely to be expert in all / any of the techniques discussed in the previous paragraph, they are likely to be better informed on these matters than non-osteologists, and are likely to have contacts among those directly involved in research in these different areas. The techniques used for study of an assemblage should to a large extent be determined by the questions to be investigated, and this applies no less to the recently developed analytical techniques described above than it does to the more traditional methods. Biomolecular techniques are destructive, so they should only be used when research questions cannot be adequately addressed using non-destructive methods. The Project Osteologist should recognise where biomolecular and other laboratory analytical techniques might potentially be applied to answer research questions pertinent to the project and, in liaison with the Project Manager, seek further advice from appropriate sources. The Project Osteologist should ensure that decision-making regarding the removal of samples for destructive analyses complies with current guidelines (Mays *et al*., 2013) and that any necessary additional permissions have been obtained.

If a decision is made that biomolecular or other laboratory analytical work would be useful, then the assessment should propose that they be used. The number and type of samples to be analysed, who is to conduct the analysis, and the costs involved should be clearly explained, either as a subsection to the osteological assessment or in a separate assessment prepared by the laboratory specialist(s). Since a third party will perform these analyses, there will need to be close liaison between the Project Osteologist and the laboratory staff who will carry out the work.

Some laboratories provide stable isotopic analyses on a commercial basis, but techniques are advancing all the time and not all procedures may be available on those terms. DNA, proteomic and medical imaging techniques are not normally offered on a commercial basis; they are normally carried out as a collaboration, and the cost implications of this to the project will vary. No samples of bone or teeth should be removed for destructive analysis until the updated project design, containing the osteological assessment document with the planned work and costings, has been approved, and the skeletons in question have been adequately recorded at the analysis phase by the Project Osteologist.

4.2.6 Costings and timings

An estimate of the amount of osteologist's time, and hence the cost required to conduct the proposed programme of work should be given. Other costs, for work done for a fee, should be itemised. As well as biomolecular or other destructive analytical work, extra costs would include the production of radiographs, photographs, illustrations and other images. Costs of correspondence and liaison with third parties carrying out biomolecular or other work should be included. When scheduling work for the analytical phase, account should be taken of the order in which tasks need to be done (eg osteological recording, and perhaps imaging / casting of specimens, prior to removal of samples for destructive work). An estimate of the approximate word-length and number of images in the proposed analytical report should be given.

What constitutes a reasonable time estimate for osteological work at the analysis phase of a project for a particular size of assemblage varies greatly, depending upon the nature of the material and the work to be carried out on it. As an approximate rule of thumb, for inhumation burials, a maximum of a day's worth of time per skeleton should cover all osteological recording and analysing and writing a report. So, for example, for 20 articulated, fairly complete and well-preserved skeletons, the costs for producing a report should be a maximum of 20 x (the daily rate for osteological work). Costs over and above this level would need to be clearly justified at assessment (Mays, 2017: 41).

4.2.7 Curation and storage

Attention should have been given at the project planning phase (and tendering phase, where appropriate) to provision for the long-term curation of the project archive. However, it is only at the assessment phase that the significance and research potential of the human remains will become fully apparent. This will enable firmer recommendations on the desirability of long-term archiving of remains to be given, and this should form part of the osteological assessment.

In the Ministry of Justice application forms for authority to excavate human remains, submitted in advance of fieldwork, it needs to be stated whether, following completion of the fieldwork project, the human remains will be stored in a museum or similar institution (and if so, which one), reburied, or whether this is not yet known (Mays *et al*., 2017). It is recognised that the intended fate of the remains as stated on the forms may well need to be revised in the light of what was actually found on site; Ministry of Justice agreement is needed for this, but this is normally forthcoming.

5 The Analysis Phase

The Project Manager, or other senior archaeologist leading the preparation of the site report(s), will combine the assessments for the different classes of artefacts and ecofacts, with assessments that detail the amount of other work that needs to be done into an updated project design (UPD) for the analysis phase. The UPD outlines the potential of all material to address original research questions, identifies any new research questions which have come to light during the assessment, and presents an overall way forward. This should include summaries of significance and the requirement for analysis and publication, including a publication synopsis.

The purpose of the analysis phase is to examine and record the archaeological resource within a framework of agreed research objectives identified in the UPD. The Project Osteologist will implement the analyses on the human remains recommended in the UPD and will produce an analytical report describing the findings. This will normally form the post-excavation archive report on the remains, and an edited version of this will form the publication text on the human remains that appears in the published site report.

The exact format of the published osteological report will depend upon the nature of the assemblage, the site archaeology and the place chosen for publication (eg as a journal article, monograph, or other form). The most usual format is for the osteological report to be a separate section, while the results are integrated, as appropriate, into other sections of the fieldwork report. The more important the assemblage, and the more relevant the osteological results are to broader archaeological questions, the greater will be the impact of the findings from the human remains on the conclusions of the fieldwork report. The analysis phase also results in the production of a data archive consisting of copies of the primary data, together with radiographs, photographs and other images.

5.1 The purpose of the osteological report

An osteological report compiled at the analytical phase of an archaeological fieldwork project normally has both a problem-orientated element, in which data is generated to address specific research questions, and a descriptive component, in which data is generated in order to characterise the skeletal biology of the buried population. More specifically, the purpose of the osteological report is to:

- Shed light on research questions pertinent to the skeletal remains, the site from which they come, and the time period and region in which it is situated
- Make osteological data available to the wider scientific community
- Alert other researchers to the existence of the archived skeletal remains
- Act as a guide for researchers wishing to study the archived remains

The main rationale for the report is the first of these. Focusing osteological reports toward important research questions helps to ensure the centrality of study of human remains within reports on archaeological sites.

5.2 The readership of the report

It follows from the above that the readership for an osteological report is likely to be two-fold. Firstly, there are archaeologists, and perhaps researchers who are not osteologists, who will read the report for the light it may shed on general archaeological and scientific questions. Secondly, there is a readership, primarily osteologists, who might read it for its contribution to archaeological and other research questions but will probably use it primarily for the data it contains.

Reports should be written with an archaeological but non-osteologist readership in mind. They should be as free as is practicable from technical jargon, and should be written concisely in clear, simple language.

5.3 The content of the osteological report

The detailed content of the report will depend to a great extent upon the nature of the material and the research questions to be investigated and should reflect the strategy formulated at the assessment phase. Nevertheless, reports should normally contain information on the following aspects:

- Quantity and nature of the material:
    - For inhumation burials, an inventory of bones and teeth present in each burial should be recorded, and approximate skeletal completeness and the state of preservation for each burial noted
    - For deposits of cremated bone, weight of remains and some measure of fragmentation should be given, and a note made of bone colours
- Demography (age and sex)
- Normal variation (metric and non-metric aspects of the cranial and post-cranial skeleton, including estimates of stature)
- Abnormal variation (injury and disease of the bones and teeth)
- Any biomolecular analyses

5.4 The structure of an osteological report

To some extent, the structure of the report will depend upon the precise nature of the material described and the aims of the work. Nevertheless, as is generally the case with scientific research papers, most osteological reports should consist of the following parts: introduction, methods, results (in the main body of the text and also perhaps as an appendix), discussion, and summary / conclusions.

Introduction. The purpose of the introduction is to acquaint a reader with the material upon which the report is based. It should summarise the approximate amount of material (eg number of inhumation or cremation burials examined), its date and the type of contexts from which it derives (eg cemetery, settlement, barrow). In addition, the quality of the evidence should be considered; this might entail a discussion of recovery methods, whether a cemetery was excavated in its entirety, taphonomic factors pertaining to the site and other relevant information. Some of this information might be available elsewhere in the site report, but its repetition in the introduction to the bone report will help the reader to form a quick impression of whether the human remains are likely to be of interest without having to wade through the whole site report. For larger assemblages, the questions to be addressed in the report should be set out so that the reader has an idea of the rationale guiding the work.

Methods. The methods used should always be described so that a reader can understand the way in which results were obtained. Methods should be described in the publication text. References to descriptions held in the project archive or to unpublished sources are not sufficient. For commonly used techniques, reference to a standard work will suffice. This is likely to be

Figure 14
Examining bones in a laboratory.

the case for most techniques for inferring age at death and sex, most measurements and non-metric traits, and the recording of some common pathologies. This will lead to simple statements, such as:

In adults, age at death was estimated using dental wear (Brothwell, 1981: Fig. 3.9) and sex was evaluated using dimorphic aspects of the pelvis and skull (Brothwell, 1981: 59-63).

In the skulls, measurements were taken according to Brothwell (1981: 79-83) and the non-metric variants of Berry and Berry (1967) were recorded.

Stature was estimated from long-bone lengths using the 'White' formulae of Trotter & Gleser (1952)

Osteoarthritic changes were identified and recorded using the criteria of Rogers & Waldron (1995).

For more complex or lesser-known techniques a fuller description, together with references, if appropriate, should be given.

Results. The results section will list, tabulate and perhaps present graphically, data generated using the methods described in the previous section. It will also describe, and perhaps illustrate with photographs or radiographs, individual cases showing the more unusual variants and pathological changes and, where possible, will discuss possible causes for them. Images help to make a report more reader-friendly, but they do add to the expense of publications, so they should be selected with care. The aspects that should normally be covered in a bone report have been listed above, but particular care should be taken to present all data on which conclusions and inferences depend, so that any interpretations offered can be evaluated by a reader.

With small numbers of burials (fewer than *ca.* 15-20) results can simply be presented skeleton by skeleton. In such circumstances it is usual to give data on skeletal completeness, preservation, age, sex, stature and on the more important pathologies or skeletal variants. The data might be presented as separate paragraphs for each burial, or partially or entirely in table format. Lists of measurements and non-metric traits could be given in an appendix.

With larger assemblages, burial-by-burial lists of results become too cumbersome for organising the main text of the report. The data need to be summarised. For nominal or ordinal data, presentation should normally be in table form, showing, for example, age and sex data (numbers of males and females, numbers in different age groups) and prevalence rates of lesions or common pathological conditions. For numeric data (eg measurements or stable isotope determinations), measures of central tendency (eg the mean) and spread (eg the standard deviation) should be given, along with the numbers upon which they are based. For most variables, summary data should be given for the sexes separately. If numbers are large, it might be useful to present data in a graph, so that the reader can gain a quick visual impression of trends or patterns. Graphs should be in addition to, and not a substitute for, tabular presentation or summary statistics; for example, data on male and female stature might be presented as bar charts (Figure 15), but means and standard deviations should also be given for each sex (for example, see table 2).

Table 2. Summary statistics for stature (cm)[1]

Males			Females		
N	*mean*	*sd*	*N*	*mean*	*sd*
169	168.8	5.7	119	157.8	5.1

[1]***N*** = number of individuals; ***sd*** = standard deviation

Prevalences of common pathological conditions should always be presented quantified by individual: that is as the number of skeletons showing a given condition or attribute divided by the total number of skeletons for which observations can be made. For example, cribra orbitalia is a condition manifest as pitting of the orbital roofs. It may be an indicator of anaemia or other conditions. It is generally bilateral if it occurs at all. Therefore its prevalence should be expressed relative to the number of individuals showing one or both orbits intact. This means that as well as noting when the condition is present in a skeleton, cases where it is absent need to be distinguished from those where it cannot be scored because the orbital roofs are missing. Similar considerations apply to other common pathological conditions, bone lesions and non-metric variants.

For dental diseases such as caries or ante-mortem tooth loss, prevalences should be given with respect to total teeth (or tooth positions in the case of tooth loss) as well as according to the presence or absence of these conditions in individuals with jaws or teeth present. Similarly, frequent pathological conditions that may affect more than one bone, such as fractures, should be quantified with respect to total bones in the assemblage, as well as giving the frequencies for individuals. Prevalences for individuals are needed in order to conduct statistical analyses: observations on several bones or teeth from a given individual cannot be considered independent for statistical purposes, so frequencies reported with respect to total bones or teeth do not form a valid basis for statistical significance testing

As most archaeological skeletons are to a greater or lesser extent incomplete, the number of individuals with a given skeletal disease is likely to be significantly underestimated, because diseased as well as undiseased elements might not survive. The degree to which the proportion of affected individuals is under-estimated increases with decreasing skeletal survival. Expressing frequencies with respect to total bones (or teeth) overcomes this difficulty and provides a check on patterns expressed with respect to individuals when two assemblages (or sub-samples of a single assemblage) are compared. An inventory of bones and teeth should be compiled for each individual skeleton as part of the osteological

recording process, and these can be used to provide total counts of elements for assemblages.

For the more unusual pathologies there should be concise description of lesions, together with photographs or radiographs if appropriate, and this should then provide a basis for diagnosis. For example:

Skeleton NA197 (male, 50+ yrs, phase 1–2). There is extensive destruction (lysis) of the right acetabulum and subchondral bone (Figure 16). The margins of the lytic area are fairly smooth trabecular bone. Radiography indicates no sign of sclerosis. There is post-depositional damage to the head of the right femur, but it is clear that there was some ante-mortem lytic activity. There is some well remodelled sub-periosteal bone on the femoral neck and in the region of the lesser trochanter. The vertebral column and sacro-iliac joints are normal. The presence of a lytic lesion showing little perifocal reactive bone at a major joint is suggestive of tuberculosis. Septic arthritis and brucellosis are differential diagnoses but are less likely options. The lack of signficant bone regeneration argues against septic arthritis. Brucellosis is more difficult to exclude but severe alterations at the hip in the absence of spinal or sacro-iliac lesions would be atypical.

Many larger reports consist of a main text plus an appendix containing a catalogue of burials, so that osteological observations can be linked to particular skeletons. This is particularly useful to osteological researchers using the collection after the report has been published, as it helps

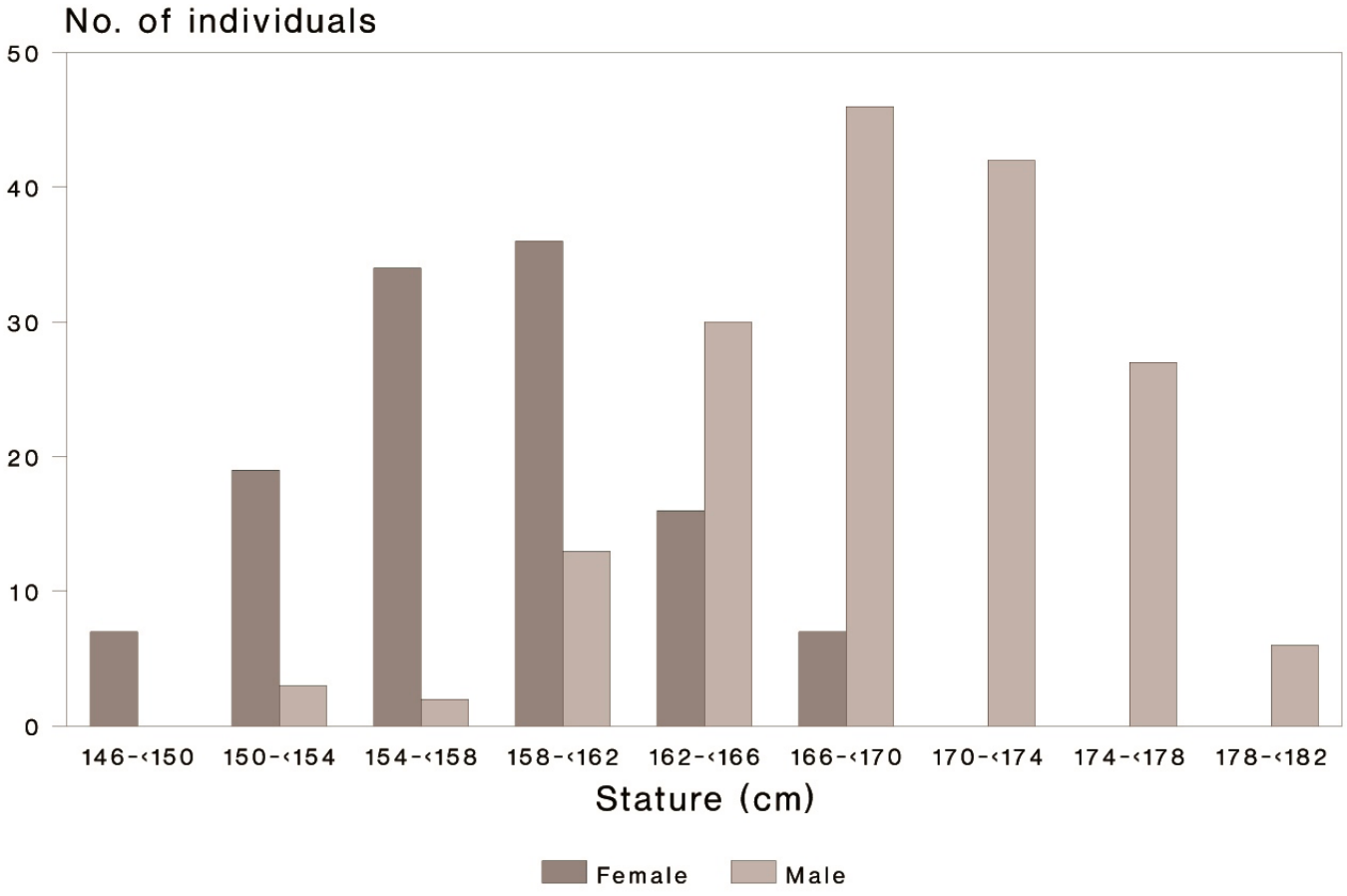

Figure 15
Bar chart showing stature data.

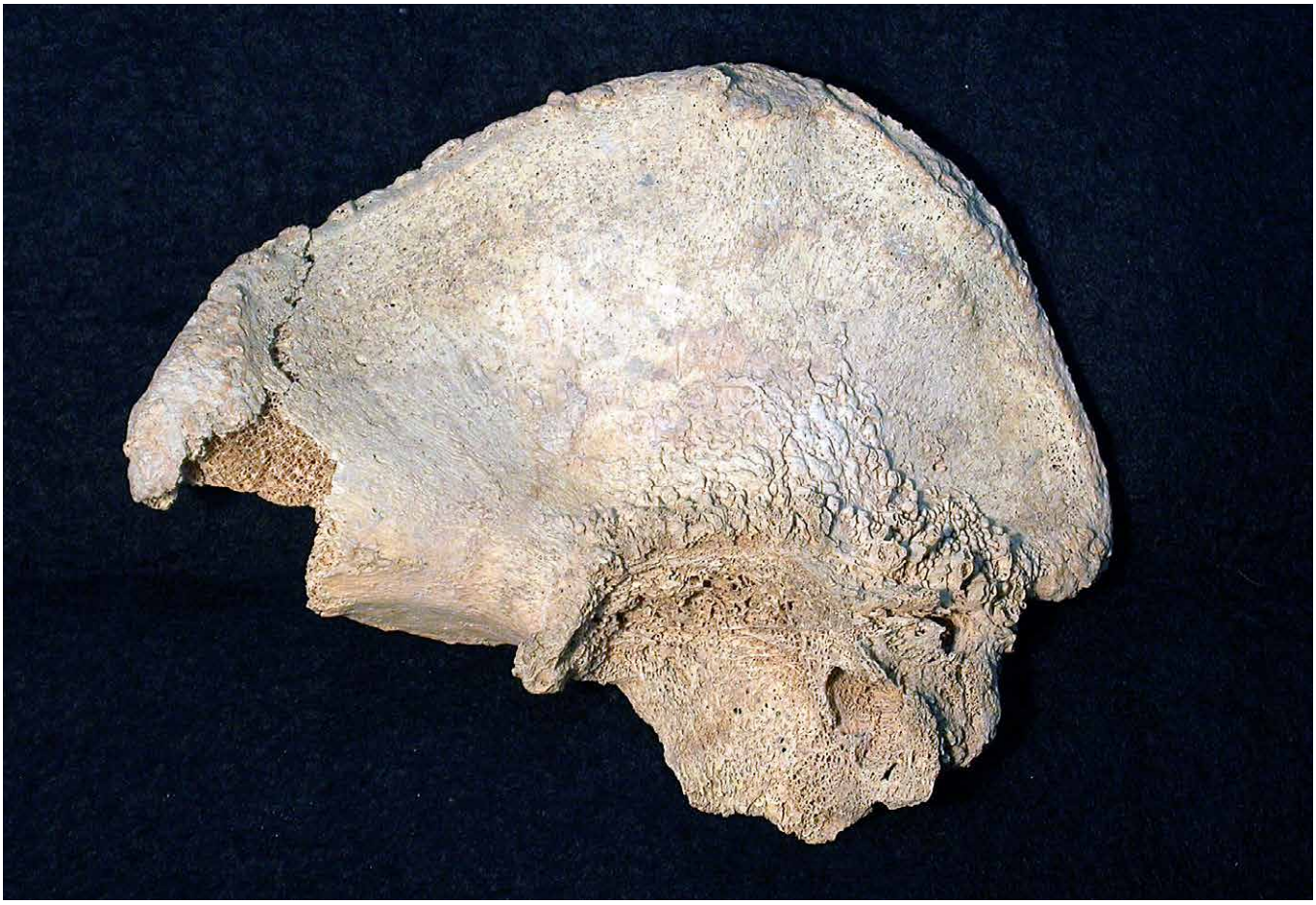

Figure 16
Right ilium of burial NA197, showing destructive changes at the acetabulum, probably due to tuberculosis.

them to identify particular skeletons of interest. The contents of the burial catalogue vary somewhat, but they generally comprise skeletal completeness, sex, age, stature and the presence of any noteworthy pathological conditions or variants. It may also be useful to include basic contextual data, such as phase, location of the burial or presence of a coffin. For deposits of cremated bone the type of deposit (eg urned burial) and whether the context was truncated might be specified. The appendix should also include detailed descriptions of pathological findings in individual burials. Other burial-by-burial details, such as lists of measurements and non-metric traits, often remain in archive (where they may be accessible online) rather than forming part of the publication text.

Analysis and discussion. In this section, the quantitative data should be analysed and interpreted. If the data appear to show patterning, statistical tests should be conducted to validate that patterning. For example, if a sex imbalance is claimed, it must be shown to be statistically significant. Similarly, patterning in disease prevalence rates or differences in stature within a burial group should be verified using appropriate statistical tests. Statistically significant results are more likely to be obtained with large assemblages, but there are statistical analyses that can validate some patterns in small assemblages (eg 5-10 burials). For fewer burials, the material should simply be described and broader inferences avoided. Once patterning in the data has been validated, any interpretations offered should be supported by clear lines of reasoning with suitable references.

The effect of age must be taken into account when interpreting disease prevalences. In general,

skeletal pathologies represent a cumulative record of insults suffered during life; assemblages with a higher proportion of older individuals tend (other things being equal) to show a greater prevalence of lesions. In addition, some diseases, such as osteoarthritis, generally only occur in older adults. With some exceptions (eg scurvy, rickets), disease in infants and young children rarely causes bone changes, so the presence of large numbers of these young individuals in an assemblage will tend to "dilute" the prevalence of most pathological conditions.

There should usually be some discussion of funerary practices. For cremations, these might include facets of pyre technology, such as firing temperatures or evenness of burning of remains, or the amount of bone that was collected from the pyre for deposition.

Comparative data from other sites should be discussed in the analysis/discussion section of the report. Comparative data should be carefully chosen in order to put the results into context or to address more specific questions.

Conclusions / summary. Particularly for longer reports, it might be difficult for the non-osteologist reader to judge which findings are the most important. A final section should therefore draw together the major findings and conclusions.

5.5 Biomolecular studies

Reports on biomolecular studies may be integrated into the osteological report, under joint authorship with the Project Osteologist, or else may be presented as separate reports, under the authorship of those who undertook the work. In the case of the former, the Project Osteologist should liaise closely with the authors to ensure optimal integration of the biomolecular work with the other studies on the remains. Whichever option is chosen, the format of the reports on the biomolecular studies should normally resemble the five-part structure described above for osteological reports.

5.6 Inclusion of the osteological report in the project publication

When the osteological report has been completed, and the text edited by the Project Osteologist for publication, the main author of the site report will collate it with other components of the publication text. It is usual for a site yielding significant numbers of burials for the results from the study of the human remains to be drawn upon in the overall discussion and conclusions sections of the publication text. The Project Osteologist should liaise closely over any parts of the main publication text that draw upon the findings of the osteological report so as to avoid errors of fact and interpretation. Generally, the client and archaeological monitor will have seen and approved the assessment document and proposals for publication, and whilst they may take a keen interest in the final publication text, they are unlikely to have any input. An independent and suitably qualified academic referee should be invited to comment on the text to provide oversight and constructive criticism. The Project Osteologist and authors of biomolecular reports might need to make revisions and also they should proof-read their contributions before publication. Timings and costings for these tasks need to be built into the UPD.

6 Dissemination and Archiving

Publication options include article(s) in academic journals for smaller sites; larger sites may require monograph publication. Web-based publication is increasingly used to make the detailed data available with combined hard copy publication of the main text of the overall report. Digital data should be deposited with the Archaeological Data Service who will ensure its long-term curation and availability. When the project forms part of the planning process, and is subject to a planning condition, reports should be made available within a timetable agreed with the local authority archaeological curator. Public engagement in the form of lectures and exhibitions should also be considered, as should 'popular' publications, in order to communicate the results to a broader audience.

The archive is one of the principle products of an archaeological project. Traditionally, data archives have taken the form of paper records but, for projects conducted today, they are mainly or entirely digital. Creation of a stable, ordered and accessible digital archive of data generated by a project, and physical archive, including the human remains, is a key means by which the archaeological impact of a development is mitigated. At the project planning stage, contact should be established with suitable repositories willing to accept archaeological archives; alternatively, appropriate temporary storage should be identified. The costs involved should be ascertained at an early stage to avoid compromising the budget at the end of a project. An important role of the Project Osteologist is to provide specific advice to the Project Manager to ensure that the digital archive (and any paper records), and the physical archive of the human remains, are presented in good order to the repositories.

6.1 Deposition of data archive

The purpose of the data archive is to provide permanently accessible data from the archaeological project. It supports research and collections management. Significant damage to archaeological collections accrues with repeated handling. For a skeletal collection, an accessible data archive helps to minimise the amount of handling by allowing researchers to select in advance the skeletons of interest to them. It may also provide data for comparative or synthetic works. All digital data should be accompanied by sufficient metadata to enable users to understand what has been recorded and the methods used. The digital archive may consist of data files, photographic, radiographic and other images, and should contain links to relevant contextual information, associated finds and environmental samples. A note of the existence of the data archive and its location should be added to the Historic Environment Record (HER).

6.2 Human remains: archiving and reburial

Important though the osteological report is, it must be remembered that no report, however carefully prepared, can substitute for the long-term retention of the skeletal remains themselves, and in any event this is not its purpose. It is impossible for an osteologist writing a report to predict what information future researchers, working on research projects as yet unformulated, might require. Therefore, the chances of an osteological report containing precisely the data that a researcher needs for his or her research project are minor. Although osteological reports form a useful basis for some synthetic and comparative work, almost all problem-orientated research in osteoarchaeology published in the international literature involves examination of skeletal remains themselves.

Changes in theoretical orientations of academic disciplines mean that new questions continue to be asked of archived remains, and methodological innovations enable new information to be obtained from old collections. Most well-excavated collections of skeletal remains have research potential beyond that realised in the initial study that forms part of the site report, and so curated collections of human remains are returned to time and again. In a scientific discipline, it is vital that future workers should be able to check the observations of earlier researchers so that errors and deficiencies may be remedied. Only the retention of the physical evidence, in the form of skeletal material, permits osteoarchaeology to retain this ability to be self-correcting which is a fundamental requirement of a scientific discipline.

Although proper archiving of human remains is normally a key means by which the impact of a development on a burial site is mitigated, it may present logistical difficulties. Shortage of space for archaeological archives in museums and other repositories has become a widespread problem, with commercial archaeological contractors

Figure 17
An archive of human remains.

sometimes being unable to deposit archives from completed projects because no museum or other repository is able to accept them. Human remains are space-hungry – for example a collection of ca. 2500 skeletons typically requires a storage space of about 150-200 cubic metres - so the problem is especially acute here. It is important to ensure that difficulties of this nature are not allowed to argue for reburial, which itself entails costs and possible logistical problems, and may not be feasible or appropriate in many cases (Mays *et al*., 2015). Other solutions are potentially available. One may be deposition of archaeological remains in deep storage in disused salt mines, a strategy that some local authorities have begun to implement. Environmental conditions in this type of deep storage would seem adequate for human remains. However, a tiered approach, whereby deposition of less commonly accessed parts of archives in deep storage permits more frequently consulted collections, such as human remains, to be retained in regular museum stores, may be more appropriate.

Currently in England, the secular burial laws are permissive toward retention of archaeological human remains long-term in museums or equivalent institutions (Mays, 2017), and public opinion is generally supportive of this. Although routine retention of skeletal remains for research purposes would be in keeping with general public attitudes, decisions need to be made on a case-by-case basis. In specific cases, local public opinion may favour re-burial of remains, as may the Church.

Ecclesiastical law controls the excavation of burials from land under Church of England jurisdiction (in practice usually churches or churchyards in current use). Permissions issued by the Church of England for excavation of burials generally stipulate reburial of remains, normally after some period during which scientific study is permitted. When this is the case, there is a tension between the desirability of retention of remains for research and a desire to see them returned to consecrated ground. In 2005, a working group convened by English Heritage (now Historic England) and the Church of England suggested that deposition of remains in un-used church buildings (which, theologically-speaking, remain consecrated) might be one solution (Mays, 2017). This would allow material to be retained in consecrated areas but at the same time it would continue to be available for study by *bona fide* scientific researchers. This has been implemented in some cases (Sect. 7.2), and it should be born in mind as a possibility when important skeletal collections are faced with the prospect of reburial. Failing this, efforts should be made, for important collections excavated under Church Faculty, to negotiate a reasonable time-interval (at least 10 years) between the publication of the skeletal report and reinterment, and (when it can be justified) to argue for renewal of the Faculty or other ecclesiastical permission when it expires to avoid curtailment of scientific research by premature reburial.

7 Case Studies

7.1 Integration of osteological and biomolecular studies

A fieldwork project was recently conducted close to Stonehenge in order to improve understanding of the archaeological resource of the Stonehenge World Heritage Site (WHS) in advance of infrastructure work in the area. It had been thought possible that human remains might be encountered, so a Project Osteologist was part of the Project Team from the outset, and contributed to the project design.

When human remains were encountered, the Project Osteologist liaised with the Project Manager to obtain the correct permission for their excavation and recovery and, taking into account ethical matters pertaining to the remains, advised on the likely importance of the burials and the desirability that they should be retained long-term in a museum rather than reburied. A total of four inhumations were recovered, one from the Middle Neolithic, immediately before the construction of Stonehenge, and three from the Middle Bronze Age, shortly after the monument ceased to be structurally modified. The Project Osteologist had input into the on-site recording and recovery methods, and helped supervise the post-excavation processing of the human remains (washing, drying, marking, packing).

A research aim of the project, identified by the Project Manager, was to use any human remains recovered to explore the burial record of the WHS, and to shed light on diet in association with evidence from faunal and archaeobotanical remains. During assessment, it was decided by the Project Osteologist that the overall approach to the study of the skeletons would be to attempt to craft osteobiographies, in which skeletal data are used to construct narratives of individual lives.

Figure 18
Excavations south of Stonehenge.

Specific objectives aimed to shed light on the following:

- What is the role of osteobiography in a biocultural approach to burial archaeology?
- Can variation in social identities suggested in osteobiography be associated with differential treatment in death?
- During the earlier Bronze Age there is ample evidence that many of those buried in the Stonehenge area originated from beyond Britain, but was this also true before and after the phase of monumentalisation?

As a result of team meetings convened by the Project Manager at the assessment phase of the project, it was agreed that the potential of stable isotopic analyses and study of dental calculus to contribute to these research aims, and to add to a growing corpus of skeletal data from the Stonehenge area, should also be explored. The Project Osteologist led the liaison between the project team and scientists at two different institutions. The aims were to:

- Determine the potential of these techniques to contribute to research at the site
- Optimise the sampling strategy so that the minimum of material would need to be destroyed in order to provide useful results
- Determine the costs of analyses
- Determine the timescale over which the work could be done and the way in which it would fit within the timeframe of the project as a whole

For the stable isotopic analyses it was decided that dental remains from each of the adult inhumations be analysed for oxygen and strontium stable isotope ratios in order to shed light on the geographic origins of the people. To maximise information yield, it was proposed that strontium isotopic analyses should be carried out by laser ablation. Dietary studies using carbon and nitrogen stable isotopes were conducted by subsampling dental hard tissues, and proteomic and microscopic analysis of the dental calculus were suggested. Taken together, these analyses would provide information on diet at different points in individual lives and would complement data from faunal and botanical material from the excavations. Fully costed programmes for the biomolecular work were provided to the project by the two scientific teams involved. These were included by the Project Osteologist in the overall assessment of the human remains. The proposed work was approved by the Project Sponsor and carried out at the analysis phase.

Figure 19
One of the Middle Bronze Age burials from the excavations south of Stonehenge.

Care was taken to programme in the necessary morphological studies before the biomolecular work was conducted, and before bone samples were taken for radiocarbon dating, which was also part of the analysis phase. The stable isotopic work and the work on the dental calculus was

undertaken as a collaborative project with the universities involved. The laboratory work on the dental calculus was carried out by a postgraduate student, under appropriate supervision, as part of a Masters dissertation.

At the analysis phase, the work on the human remains was reported in a series of four analytical reports, one written by the Project Osteologist, covering the osteological studies, and three others covering the radiocarbon dating, the stable isotope studies and the dental calculus work, contributed by teams from the laboratories that carried out the work.

A decision had been taken at assessment by the Project Manager to publish the results from the excavations as a series of separate journal articles covering different aspects of the work. The report dealing with the human remains was crafted by the Project Osteologist, integrating the information in the different reports. The result was a multi-author scientific paper submitted to an international archaeological journal. The original reports from the different laboratories were incorporated into the site archive. In addition, the format of the journal chosen for publication allowed them to be to be published as supplementary data, helping to ensure their long-term accessibility.

The research carried out on the Stonehenge remains did not attempt to be all encompassing, but was tightly orientated around agreed research objectives. This maximised cost-effectiveness, and for the biomolecular work, destruction was kept to a minimum. It was kept in mind that the remains were to be retained long term as a research archive, so that future workers, obtaining funding from research councils, might apply other techniques and gain further knowledge from the remains.

Figure 20
Recording one of the burials excavated to the south of Stonehenge.

7.2 The use of a redundant church to store a research archive of human skeletal remains

In the 1980s, the condition of St Peter's Church, Barton-upon-Humber, necessitated a programme of repair works. Integrated within this was archaeological excavation in the church and churchyard, which resulted in the recovery and post-excavation study of 2750 Mediaeval and post-Mediaeval burials. Prior to excavation, the understanding was that the human remains would be reburied on site following completion of the analysis phase of the project. However, the size and nature of the collection led to the recognition of its international importance, and that its loss to future research through reburial would be undesirable. St Peter's Church was no longer used for worship, and its care had passed to English Heritage who manage the site as a visitor attraction. The idea of storing the human remains in part of the church as a research archive was agreed in 2005 between English Heritage and the Parochial Church Council (PCC) of St Mary's, a nearby church still used as a place of worship. This was supported by the Church of England as part of a wider policy toward storage of archaeologically important human remains from Christian burial sites in redundant space in churches.

Funds had not been set aside in the Barton archaeological project for archiving the remains, but in Partnership with the Regional Development Agency, English Heritage was undertaking a refurbishment programme at St Peter's aimed at conservation of the historic fabric and enhancing visitor experience at the site. The construction

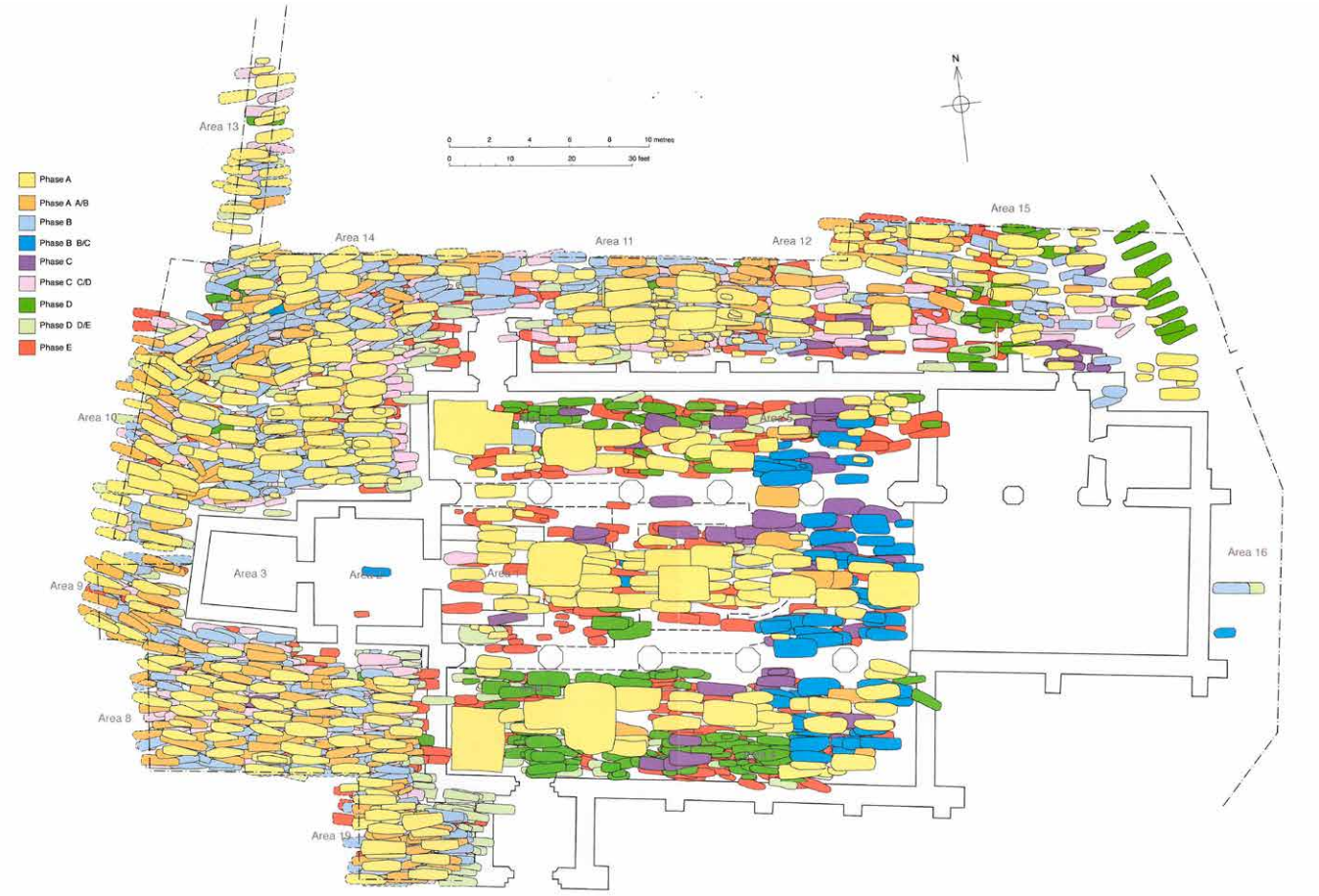

Figure 21
Plan of graves excavated around St Peter's Church, Barton-Upon-Humber.

of a suitable repository in the church, separate from the visitor-accessible parts, was integrated within this programme of works. This resulted in the construction of a secure space of ca. 200m^3 sufficient to store approximately 4000 boxes on roller-racking, plus a small work area. In addition there is access to WC and basic kitchen facilities. Humidity control and a frost-stat protect the remains from fluctuations in environmental conditions. As well as explaining the history of the church, displays in the public part of the site feature a few of the skeletons and explain what we have learnt from them so far. Visitors are also told of the presence of the bone store and why the remains are kept there.

Applications from researchers to access to the human remains at Barton are assessed by a committee comprising representatives from the English Heritage Trust, Historic England and the St Mary's PCC, together with an independent, external expert on the scientific study of human remains. Since the work on the church was completed in 2007, there has been a steady stream of such applications. A growing number of PhD theses and academic publications have resulted from work carried out on the remains. Many of these involve large scale studies, utilising the large numbers of skeletons at Barton in order to maximise sample size for statistical analyses. Some of these focus on specific parts of the population – for example several studies focus on the children, looking at disease, injury and growth. Others exploit the well-dated nature of the remains, looking at change through time in response to the fluctuating fortunes of Barton as a settlement from the late Saxon period onward. Most research involves comparing results from

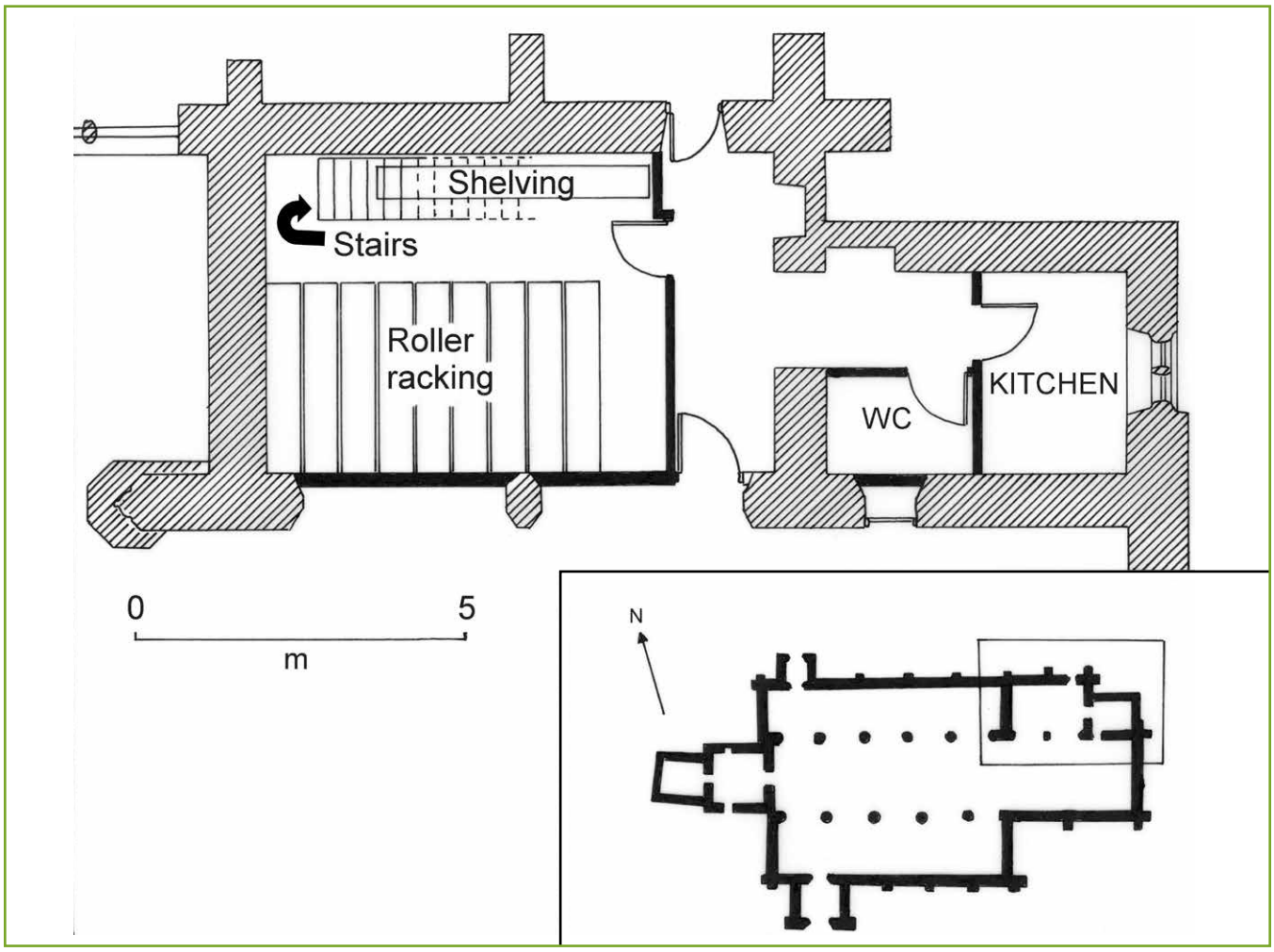

Figure 22
The human remains store, St Peter's Church, Barton-Upon-Humber.

Figure 23
Roller racking, the human remains store, St Peter's Church, Barton-Upon-Humber.

Barton to those from other sites, for example health at Barton compared with urban and industrial centres during the Industrial Revolution. The large size of the collection also makes it well-suited to methodological research, for example to evaluate dental wear as an age estimation method, and to develop methods of identifying age at puberty in skeletal remains.

8 References

BABAO 2010a. British Association of Biological Anthropology and Osteoarchaeology Code of Practice. BABAO, London. http://www.babao.org.uk/assets/Uploads-to-Web/code-of-practice.pdf.

BABAO 2010b. British Association of Biological Anthropology and Osteoarchaeology Code of Ethics. BABAO, London. http://www.babao.org.uk/assets/Uploads-to-Web/code-of-ethics.pdf.

Brickley, M. & McKinley, J., eds 2004. *Guidelines to the Standards for the Recording of Human Remains*. British Association for Biological Anthropology and Osteoarchaeology / Institute of Field Archaeologists, Reading. http://www.babao.org.uk/assets/Uploads-to-Web/HumanremainsFINAL2.pdf

Campbell G, Moffett L, Straker V. 2011. *Environmental Archaeology. A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (2nd edition). Historic England, London. https://content.historicengland.org.uk/images-books/publications/environmental-archaeology-2nd/environmental-archaeology-2nd.pdf/

CIfA 2014a. Standard and guidance for archaeological excavation. Chartered Institute for Archaeologists, Reading. http://www.archaeologists.net/sites/default/files/CIfAS&GExcavation_1.pdf

CIfA 2014b. Standard and guidance for historic environment desk-based assessment. Chartered Institute for Archaeologists, Reading. http://www.archaeologists.net/sites/default/files/CIfAS&GDBA_2.pdf

CIfA 2014c. Standard and guidance for archaeological field evaluation. Chartered Institute for Archaeologists, Reading. http://www.archaeologists.net/sites/default/files/CIfAS&GFieldevaluation_1.pdf

CIfA 2014d. Standard and guidance for the collection, documentation, conservation and research of archaeological materials. Chartered Institute for Archaeologists, Reading. http://www.archaeologists.net/sites/default/files/CIfAS&GFinds_1.pdf

CIfA 2014e. Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives. Chartered Institute for Archaeologists, Reading. http://www.archaeologists.net/sites/default/files/CIFAS&GArchives_2.pdf

Cox, M. 2001. Crypt Archaeology. IFA Paper No. 3. Reading: Institute of Field Archaeologists.

David A, Linford N, Linford P. 2008. *Geophysical Survey in Archaeological Field Evaluation*. Historic England: Swindon.

Elders, J., Harding, V., Litten, J., Miles, A.., Powers, N., Roberts, C., Schofield, J., Sidell, J., Sloane, B. and White W. 2010. *Archaeology and Burial Vaults: A Guidance Note for Churches*. Association of Diocesan and Cathedral Archaeologists, Guidance Note 2. London: Association of Diocesan and Cathedral Archaeologists. http://www.archaeologyuk.org/apabe/pdf/ADCA_Guidance_Note2.pdf

English Heritage, 2008. *Conservation Principles, Policies and Guidance*. https://historicengland.org.uk/images-books/publications/conservation-principles-sustainable-management-historic-environment/

Historic England, 2008. *MoRPHE Project Planning Note 3*. Swindon: Historic England

Historic England 2015. *Piling and Archaeology. Guidelines and Best Practice*. Swindon: Historic England. https://historicengland.org.uk/images-books/publications/piling-and-archaeology/

Mays, S. 1991. *Recommendations for Processing Human Bone From Archaeological Sites*. AML Report 124/91. London: English Heritage. http://research.historicengland.org.uk/Results.aspx?p=1&n=10&rn=124&ry=1991&ns=1

Mays S. (ed) 2017. *Guidance for Best Practice for the Treatment of Human Remains Excavated From Christian Burial Grounds in England*. Advisory Panel on the Archaeology of Burials in England, London. http://www.archaeologyuk.org/apabe/pdf/APABE_ToHREfCBG_FINAL_WEB.pdf

Mays S, Brickley M, Dodwell, N. 2002. *Human Bones From Archaeological Sites. Guidelines for Producing Assessment Documents and Analytical Reports*. English Heritage, Swindon.

Mays, S., Elders, J., Humphrey L., White, W. and Marshall, P. 2013. *Science and the Dead. A Guideline for the Destructive Sampling of Archaeological Human Remains for Scientific Analysis*. London: Advisory Panel on the Archaeology of Burials in England. http://www.archaeologyuk.org/apabe/pdf/Science_and_the_Dead.pdf

Mays, S., Sidell, J., Sloane, B., White, W. and Elders, J. 2015. *Large Burial Grounds. Guidance on Sampling in Archaeological Fieldwork Projects*. London: Advisory Panel on the Archaeology of Burials in England. http://www.archaeologyuk.org/apabe/pdf/Large_Burial_Grounds.pdf

McKinley, J.I. & Roberts, C. 1993. *Excavation and Post-Excavation Treatment of Cremated and Inhumed Human Remains*. Institute of Field Archaeologists Technical Paper 13. Reading: Institute of Field Archaeologists.

MHCLG, 2018. National Planning Policy Framework https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/728643/Revised_NPPF_2018.pdf

Mitchell PD, Brickley M, (eds) 2017. Updated Guidelines to the Standards for Recording Human Remains. CiFA/BABAO, Reading. http://www.babao.org.uk/assets/Uploads-to-Web/14-Updated-Guidelines-to-the-Standards-for-Recording-Human-Remains-digital.pdf

9 Further Reading

9.1 Archiving

Caffell AC, Roberts CA, Janaway RC, Wilson AS. 2001. 'Pressures on osteological collections – the importance of damage limitation'. *In* (Williams E, ed) *Human Remains: conservation, Retrieval and Analysis.* Proceedings of a Conference Held at Williamsburg, Va., November 7th-11th 1999. *British Archaeological Reports*, International Series 934. Archaeopress, Oxford, pp. 187-197.

Croft S, Walton D. 2015. *Cambridgeshire's Archaeological Archives – a Solution*. Cambridgeshire County Council, Cambridge. Presentation at ICON Archaeology Group, Archaeological Archival Storage: Problems, Potentials and Solutions Meeting, Fishbourne, June 2015. https://icon.org.uk/system/files/documents/ccc_archives_presentation_ikon_fishbourne_june_2015_web_version_1_0.pdf

Edwards R. 2012. *Archaeological Archives and Museums*. Society for Museum Archaeology, London. http://socmusarch.org.uk/socmusarch/gailmark/wordpress/wp-content/uploads/2016/07/Archaeological-archives-and-museums-2012.pdf

Mays SA. 2010. 'Human osteoarchaeology in the UK 2001-2007: a bibliometric perspective'. *International Journal of Osteoarchaeology* 20: 192-204.

McKinley J. 2013. 'No room at the inn'… Contract archaeology and the storage of human remains. *In* (Giesen M, ed) *Curating Human Remains. Caring for the Dead in the United Kingdom*. Boydell, Woodbridge, pp. 135-145.

Mills, S. and Tranter, V. 2010. *Research Into Issues Surrounding Human Remains in Museums*. London: Business Development Research Consultants. https://content.historicengland.org.uk/content/docs/research/opinion-survey-results.pdf

Redfern R, Bekvalac J. 2013. 'The Museum of London: overview of policies and practice'. *In* (Giesen M, ed) *Curating Human Remains. Caring for the Dead in the United Kingdom*. Boydell, Woodbridge, pp. 87-98.

Richards MP. 2017. 'Sampling guidelines for bone chemistry'. *In*: Mitchell PD, Brickley M, (eds). *Updated Guidelines to the Standards for Recording Human Remains*. CiFA/BABAO, Reading.

Roberts C, Mays S. 2011. 'Study and restudy of curated skeletal collections in bioarchaeology: a perspective from the UK and the implications for future curation of human remains'. *International Journal of Osteoarchaeology* 21: 626-630.

Swain, H. *et al*. 2005. *Guidance for the Care of Human Remains in Museums*. London: DCMS. http://webarchive.nationalarchives.gov.uk/+/http://www.culture.gov.uk/images/publications/GuidanceHumanRemains11Oct.pdf

9.2 Ancient biomolecules and spectroscopic studies

Eckhardt, H., Müldner, G., & Lewis, M. (2014). 'People on the move in Roman Britain'. *World Archaeology,* 46: 534-550.

Hoffreiter M, Paijmans JLA, Goodchild H, Speller CF, Barlow A, Fortes GG, Thomas JA, Ludwig A, Collins MJ. 2014. 'The future of ancient DNA: technical advances and conceptual shifts'. *Bioessays* 37: 284-293.

Huynh HTT, Verneau J, Levasseur A, Drancourt M, Aboudharam G. 2016. 'Bacteria and archaeopaleomicrobiology of the dental calculus: a review'. *Mol Oral Biol* 31: 234-242.

Linderholm A. 2016. 'Ancient DNA: the next generation – chapter and verse'. *Biol J Linnean Soc* 117: 150-160.

Olalde I, Brace S, Allentoft ME *et al*. 2018. 'The Beaker phenomenon and the genomic transformation of northwest Europe'. *Nature doi*: 10.1038/nature25738

Parker Pearson M, Chamberlain A, Jay M, Richards M, Sheridan A, Curtis N, Evans, J, Gibson A, Hutchison M, Mahoney P, Marshall P, Montgomery J, Needham S, O'Mahoney S, Pellegrini M, Wilkin N, 2016. 'Beaker people in Britain: migration, mobility and diet'. *Antiquity* 90, 620-637.

Schulting R, Borić D. 2017. 'A tale of two processes of Neolithisation: southeast Europe and Britain / Ireland'. *In* (Bickle P, Cummings V, Hofmann D, Pollard J, eds.) *The Neolithic of Europe: Papers in Honour of Alasdair Whittle*. Oxbow, Oxford, pp. 82-104.

Thompson TJU, Szigeti J, Gowland RL, Witcher RE. 2016. 'Death on the frontier: military cremation practices in the north of Roman Britain'. *J Archaeol Sci Rep* 10: 828-836.

Warinner C, Hendy J, Speller C *et al*. 2014. 'Direct evidence of milk consumption from ancient human dental calculus'. *Scientific Reports* 4: 7104.

9.3 Case study 1

Mays S, Roberts D, Marshall P, Pike AWG, van Heekeren V, Bronk Ramsey C, Dunbar E, Reimer P, Linscott B, Radini A, Lowe A, Dowle A, Speller C, Vallender J, Bedford J. 2018. 'Lives before and after Stonehenge: an osteobiographical study of four prehistoric burials recently excavated from the Stonehenge World Heritage Site'. *J Archaeol Sci Rep* 20: 692-710.

9.4 Case Study 2

Mays S. 2013. 'Curation of human remains at St Peters Church, Barton-upon-Humber, England. *In* (Giesen, M., ed) *Curating Human Remains. Caring for the Dead in the United Kingdom*. Woodbridge: Boydell. p.109-121.

10 Where to Get Advice

Advisory Panel on the Archaeology of Burials in England
http://www.archaeologyuk.org/apabe/

Archaeology Data Service
http://archaeologydataservice.ac.uk/

British Association for Biological and Anthropological Osteoarchaeology
http://www.babao.org.uk/

Chartered Institute for Archaeologists
https://www.archaeologists.net/

Regional Research Frameworks
https://www.algao.org.uk/england/research_frameworks

10.1 Contact Historic England

East Midlands
2nd Floor, Windsor House
Cliftonville
Northampton NN1 5BE
Tel: 01604 735460
Email: eastmidlands@HistoricEngland.org.uk

East of England
Brooklands
24 Brooklands Avenue
Cambridge CB2 8BU
Tel: 01223 582749
Email: eastofengland@HistoricEngland.org.uk

Fort Cumberland
Fort Cumberland Road
Eastney
Portsmouth PO4 9LD
Tel: 023 9285 6704
Email: fort.cumberland@HistoricEngland.org.uk

London
4th Floor, Cannon Bridge House
25 Dowgate Hill
London
EC4R 2YA
Tel: 020 7973 3700
Email: london@HistoricEngland.org.uk

North East
Bessie Surtees House
41-44 Sandhill
Newcastle Upon Tyne
NE1 3JF
Tel: 0191 269 1255
Email: northeast@HistoricEngland.org.uk

North West
3rd Floor, Canada House
3 Chepstow Street
Manchester M1 5FW
Tel: 0161 242 1416
Email: northwest@HistoricEngland.org.uk

South East
Eastgate Court
195-205 High Street
Guildford GU1 3EH
Tel: 01483 252020
Email: southeast@HistoricEngland.org.uk

South West
29 Queen Square
Bristol BS1 4ND
Tel: 0117 975 1308
Email: southwest@HistoricEngland.org.uk

Swindon
The Engine House
Fire Fly Avenue
Swindon SN2 2EH
Tel: 01793 445050
Email: swindon@HistoricEngland.org.uk

West Midlands
The Axis
10 Holliday Street
Birmingham B1 1TF
Tel: 0121 625 6870
Email: westmidlands@HistoricEngland.org.uk

Yorkshire
37 Tanner Row
York YO1 6WP
Tel: 01904 601948
Email: yorkshire@HistoricEngland.org.uk

Acknowledgements

Thanks are due to the following people and organisations that responded during the consultation phase of this document: APABE, BABAO, CIfA, Sharon Clough, David Errickson, Rachel Ives, Ed Lee, Jackie McKinley, Adrian Miles, Lisa Moffett, Oxford Archaeology, Natasha Powers, Rebecca Redfern, Sue Stallibrass, Rosy Szymanski, Don Walker, Jim Williams.

Images

All images except those listed below

Figures 1, 5-6: Cambridge Archaeological Unit

Figures 7, 17: Museum of London

Figures 8-9: High Speed 2 (HS2)

Figures 10, 12: Wessex Archaeology

Figure 14: Megan Brickley

Figure 21: Warwick Rodwell

Historic England

We are the public body that helps people care for, enjoy and celebrate England's spectacular historic environment.

Please contact
guidance@HistoricEngland.org.uk
with any questions about this document.

HistoricEngland.org.uk

If you would like this document in a different format, please contact our customer services department on:

Tel: 0370 333 0607
Email: customers@HistoricEngland.org.uk

All information and weblinks accurate at the time of publication.

Please consider the environment before printing this document

This guidance is published in association with The British Association for Biological Anthropology and Osteoarchaeology (BABAO)

HEAG263
Publication date: September 2018 © Historic England
Design: Historic England