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REFERENCES

Baker, P and Worley, F 2014, *Animal Bones and Archaeology: Guidelines for Best Practice*. Swindon: English Heritage.

Campbell, G 2016, *Archaeological Marine Shell: Guidance for their Collection, Retention and Disposal*. Unpublished text, available from the Site Library folder on the site network.

English Heritage, 1998 *Dendrochronology: Guidelines on producing and interpreting dendrochronological dates*. Swindon: English Heritage.

English Heritage, 2007, *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record*, 2nd Edition. Swindon: English Heritage.

English Heritage 2008, *Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains*. Swindon: English Heritage

English Heritage 2008, *Management of Research Projects in the Historic Environment (MoRPHE) Project Planning Note 3: Archaeological Excavation*.

English Heritage 2010, *Waterlogged Wood: Guidelines on the recording, sampling, conservation and curation of waterlogged wood*. Swindon: English Heritage

English Heritage, 2011, *Environmental Archaeology: a Guide to the Theory and Practice of Methods from Sampling and Recovery to Post-excavation* (second edition). English Heritage: Swindon

Fell, V, Mould, Q and White, R 2006 *Guidelines on the X-radiography of Archaeological Metalwork*. Swindon: English Heritage

Harris, R 1979 *Discovering Timber-Framed Buildings*. Princes Risborough: Shire Publications.

Health and Safety Executive (HSE) 2005 *Control of Substances Hazardous to Health (Fifth Edition). The Control of Substances Hazardous to Health Regulations 2002 (As Amended). Approved Code of Practice and Guidance*. Sudbury, Suffolk: HSE Books

Historic England, 2015 *Archaeometallurgy: Guidelines for Best Practice*. Swindon: Historic England.

Historic England, 2015 *Digital Image Capture and File Storage: Guidelines for Best Practice*.

Historic England, 2017 *Photogrammetric Applications for Cultural*

Heritage: Guidance for Good Practice.

Karsten, A, Graham, K, Jones, J, Mould, Q and Walton Rogers, P 2012 *Waterlogged Organic Artefacts: Guidelines on their Recovery, Analysis and Conservation*. Swindon: English Heritage

Kenward, H K, Hall, A R and Jones, A K G, 1980, A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged deposits. *Science and Archaeology* 22, 3-15.

Mays, S A 1991 *Recommendations for processing human bone from archaeological sites*. Ancient Monuments Laboratory Report 124/91. London: English Heritage.

Museum of London, 1994 *Archaeological Site Manual*. London.

Portable Antiquity Scheme Advice for Finders of Treasure https://finds.org.uk/treasure. (Accessed 12/10/2015 – downloaded copy in the 'Site Library'.)

Rimmer, M,Thickett, D, Watkinson, D and Ganiaris, H 2013 *Guidelines for the Storage and Display of Archaeological Metalwork*. Swindon: English Heritage

Watkinson, D & Neal, V 2001 *First Aid for Finds*. Rescue/UKIC Archaeology Section. London.

- Historic England/English Heritage Guidelines and AML Reports can be downloaded from the Historic England website
- Digital copies of the HE/EH Guidelines and AML Reports listed are available in the 'Site Library' folder on the site network

1 INTRODUCTION

1.1 HISTORIC ENGLAND

We are the public body that champions and protects England's historic places. We look after the historic environment, providing expert advice about it, helping people protect and care for it, and helping the public to understand and enjoy it.

This manual has been put together by members of the Excavation and Analysis team based at Fort Cumberland in Portsmouth. We include field archaeologists, environmental scientists, and specialists in archaeological finds, archives, computing, conservation and ancient technology.

We produce a wide range of Guidelines for archaeologists. These documents can be downloaded free from the Historic England web site (http://www.HistoricEngland.org.uk), where you can also find our Project Management guidelines (MoRPHE) and Research Reports resulting from our work, in the field and in the lab.

1.1.1 HOW WE WORK

Historic England's Excavation and Analysis Team carries out a wide range of interventions, from watching briefs, test pits and evaluations to full excavation. Our work is often part of wider interdisciplinary projects that use a range of methods to explore the past.

We plan our projects to

- focus on defined research questions
- gain the maximum information possible
- develop our methods
- take a multidisciplinary approach
- collaborate with appropriate partners

Our recording system combines the best established methods with digital recording. We use the Swedish Intrasis database system to record spatial and written data in the field, adapting the database structure to support

our recording system. We aim to have our site records (contexts, finds, human remains and samples) entered into the project database and checked before the end of the fieldwork. This makes errors and omissions less likely and ensures we have the best possible record and that all project staff have access to full and up-to-date information, including phasing and grouping. Each record is linked to the digital photographs and scanned plans and sections it is shown on, and these can be viewed directly from the database.

All our staff are given appropriate training in using Intrasis, and reference notes and crib sheets are always available on site.

1.1.2 WORKING PRACTICE – TASK ALLOCATION AND FLEXIBILITY

We expect our staff to work flexibly to contribute to the successful completion of our projects. For example, project archaeologists may be asked to help with sample or finds processing at times, and finds and environmental staff may be asked to work on site.

We ask project archaeologists to share responsibility for some tasks, generally by allocating them to individuals in turn for periods one or two weeks. These include

- setting up and downloading the total station (TST), and ensuring it's properly cared for
- downloading the cameras, backing up the photographs, and renaming and adding metadata to the image files
- setting up and packing away the site laptops each day.

You'll be given training where necessary, and there are crib sheets to help you through the processes involved.

All experienced site staff may also be asked to help and mentor trainees and volunteers.

1.2 PURPOSE OF THE MANUAL

This field manual explains how and why Historic England records archaeological data. It should ensure that field staff understand recording procedures and their purpose, and describes how data is recorded to meet the needs of the project team throughout the Assessment and Analysis stages of the project.

It provides instructions for all recording tasks and lists and defines controlled vocabularies where appropriate. Words that are used as part of controlled vocabulary are indicated in ***bold italics***. The names of attributes and relationships in the project database are shown in a different font, for example Small Finds are related to the contexts or samples they are recovered from using the Has/Collected From relationship: the finds are Collected From the context or sample, and the context or sample Has the finds..

The manual draws on a huge range of literature and on other recording manuals. But it is also the result of years of work by all the Fort Cumberland staff, and may well contain information and approaches that are new to you.

We welcome any comments or suggestions you may have on how to improve the manual, crib sheets and training materials.

1.3 HOW TO USE THIS MANUAL

The Historic England recording system is supported by a set of recording sheets and indexes, a customised database, this recording manual, and a series of crib sheets and other reference material.

The paper forms are used to record information in the trench, but this information is transferred as soon as possible to the project database. Sketches are scanned, and the scanned sketches and the digital photographs are imported into the database. There is a separate series of reference notes showing you how to enter and link the data, and training is always provided.

The manual explains how to use the recording forms, and describes some other aspects of our archaeological fieldwork practice. It is presented as a series of modules covering different aspects of our work. These aspects overlap, so you may need to consult a number of modules for any one stage of your work (for example, excavating and recording an inhumation burial with grave goods requires you to be familiar with every section of the manual). It is worth taking the time to read through the entire manual before you begin recording, so that you are clear how the different modules work together.

As well as the recording manual, there are some laminated crib sheets for quick referencing whilst on-site. These are issued separately, in a clip-file, which can also be used to hold and store your current recording form(s) and relevant modules from the recording manual. The recording tasks you do will change over the course of the excavation, and you can select the modules and crib sheets to carry on site in your clip-file accordingly.

Your copies of the modules are yours to keep if you want them (though we'd like the ring binder back). So feel free to annotate them in response to experience, questions or advice as you feel appropriate and useful.

1.4 THE CONTEXT RECORD

Archaeological sites and landscapes are formed by the interaction of human, animal, and environmental agencies. The primary tool for interpretation of excavated sites is the stratigraphic record or sequence, which represents the order and manner in which deposits, structures, and materials have either accumulated or been removed.

Any deposit or cut (removal or displacement of material) which is observed to be physically different from others and leaves a positive or negative record within the stratigraphic sequence is defined as a stratigraphic unit or context. In order to record the stratigraphic changes, a unique identifying number (the context number) should be allocated to each individual stratigraphic unit.

Each context has a relationship with one or more other contexts: it can be earlier than, later than, or contemporary with them. The earliest context

on a site will always be either cut or overlain by a later one. Identifying these relationships is fundamental to the recording of the stratigraphic sequence and the understanding and interpretation of the site.

It must be stressed that it is the sequence of these events, the primary **direct** stratigraphic relationship between contexts (not necessarily the same as the physical relationships between contexts) which is essential to the understanding of a site's stratigraphy (see Module 2: Stratigraphy and Matrix Compilation).

The majority of contexts on a site will probably be deposits, cuts, structures, or structural components. Objects, such as *in situ* posts, burial urns, coffins and mosaics, which have been deliberately placed within the sequence of events are also contexts, and should also be allocated a context number. Use your judgement, and if in doubt, ask. Some items (for example, burial urns) which are allocated a context number must also be allocated a Small Find number. Human remains form a separate Class with their own record sheets and number block, but are otherwise treated as a type of context.

In some cases it is useful to subdivide a context for recording purposes. As well as an overall number for the stratigraphic unit, individual context numbers will be assigned to its subdivisions. The contextual relations Division of and Divided into are used to record this. Examples of the use of this on site would be

- the excavation of an extensive or deep deposit in a grid pattern or in spits to allow the retrieved finds or environmental evidence to be analysed spatially.
- subdivision of a ditch cut, with segments selected for sectioning given their own cut numbers.

The divisions are stratigraphically the same as the context they are divisions of. The decision to excavate in a grid pattern or in spits may be taken in advance (in which case the method to be used will be set out in the Project Design) or during excavation (when it should be noted in the record for the overall context, and also recorded as a 'Decision' in the 'Notebook' section of the database when appropriate).

The record sheets (Deposit, Cut, Masonry, Timber Record and Human Remains) include fields selected to ensure that the details relevant to a specific type of context are recorded. Other less commonly found contexts, such as deliberately buried pots, may not fit easily into these categories, and should be recorded on either the most appropriate form, or, if the project's recording strategy warrants it, a new specifically designed form may be created.

The minimum recording for any context must include its

- spatial location
- stratigraphic position
- physical composition and character

as well as

- an informed description of the processes involved in its deposition or formation
- suggestions as to its date, origin, use, and any changes it may have undergone.

1.5 THE RECORD FORMS

We are increasingly moving to direct digital entry of data. At present we use a mix of paper recording sheets and direct entry using rugged laptops in the trench linked directly to the site network.

Assign record numbers from the appropriate Index (see Section 1.6 following) and always start a paper record for the context, sample, find, human burial or animal bone group you are excavating. Record information as you excavate – don't wait until you've finished before making any notes! This applies whether you are recording on paper sheets or directly into the database in the trench (often you'll be combining the two). If all your data goes directly into the database, just note that on the paper sheet.

You must ensure all the information from paper record forms is entered into the project database as soon as possible. As the excavation proceeds, the database records will be checked by the supervisors, the project manager (PM), the project finds officer (PFO) and the project environmental science officer (PEO).

The database record is the definitive record – so you need to ensure all the information from your paper sheets is entered there. You may add to the data as you type it in, for example improving your interpretation, re-writing things more clearly, and ensuring terms used are consistent with our controlled vocabularies. If you enter data as soon as possible, you may be able to go back and check if you find you have missed noting some information on the sheet.

Since we have a wide-range of in-house specialisms, we make use of a wide range of data. Please don't assume that an attribute isn't important because you haven't seen it used elsewhere.

For all record types there are some compulsory fields which must be completed on all occasions. The other fields may not always be needed, but if they are they should be filled in on-site. Do not leave these fields to be completed in post-excavation – always ask if you need advice on what's required.

Some fields must be completed using controlled vocabulary. The terms to be used are set out and described in the relevant modules, and in many cases you can select them from drop-down lists in the database.

All on-site recording of context dimensions must be in metres and recorded to two decimal places, and all finds recording must be in millimetres.

As the excavator, you have unique knowledge and understanding which cannot be replicated later. Our recording system is not a 'tick box' exercise – we want your comments and interpretation. Please use the 'Comments' and 'Interpretation' fields on the paper record sheets to make notes, and enter this information in the Site Comments and Site Interpretation attributes on the Text tab of the database. If you change your mind about something, also note this here and say why. Don't remove earlier comments (these may reflect different ideas that can still be useful) and never remove anyone else's comments! Please initial and date any new comments you add to a record.

1.6 RECORD NUMBER ALLOCATION AND INDEX SHEETS

1.6.1 THE RECORD NUMBER ALLOCATION FORM

The Historic England recording system is based on uniquely numbered archaeological records, including records of all products of the excavation. We allocate blocks of numbers to specific record types before fieldwork begins (for example, context records 90000-99999; photographic records 2001-3000; object records 5001-5999 and so on). The size of these blocks will depend upon the nature of the project but is chosen to allow for the likely maximum number of records of each type.

Because of the numbering requirements of the project database, there will be two ranges of numbers defined for all types of records which can be spatially recorded using the Total Station (TST). For example, Small Find numbers may be 5001-5999 and 50001-59999. The four-digit number block is used for records created manually in the database, and the five-digit numbers are used for records created using the TST,

The allocation of number blocks is recorded on the Record Number Allocation Form before fieldwork starts, and updated as necessary. In some circumstances a project manager may choose to allocate sequences within these blocks to a trench or record type (e.g. the allocation of context records 1001-1200 to graves), which will also be noted on the Record Number Allocation Form.

1.6.2 ASSIGNING RECORD NUMBERS ON SITE – RECORD INDEX SHEETS

The person excavating and recording a context, small find, human remains or sample assigns its record number by taking the next available number from the appropriate index. When you take a record number, you must fill out the index sheet with basic initial information about the context, small find or sample. The same applies to photographs, plans and section drawings.

For contexts, samples, small finds, human remains and sections, you must also survey them using the TST, as their database records are created automatically in the database when the survey data is imported. It

is important that you do this promptly and carefully, for example making sure you record enough points to give a good outline of contexts. You will be trained in how to do this, and reference notes and a crib sheet are available to help you.

On most sites there are separate Context and Human Remains Index sheets for each site subdivision, and there are separate Small Finds Index sheets for use in each trench, in the Finds office and in the Environmental Science office (to record small finds recovered during sample processing).

1.6.3 THE RECORD NUMBERS USED FORM

After completion of site work, the Record Numbers Used Form should be completed by the project manager. This is a useful first index into the archive and a manual check for the archives accession. It forms part of the 'Site Archive Completion Report', a summary produced after the fieldwork to provide information to the project team during the Assessment stage.

1.7 RECORD CHECKING

Record checking is always a crucial part of archaeological fieldwork, and the sooner it's done, the better the quality of the resulting dataset.

The first and most important check on your records is by **you**. Check you have collected all the necessary information and entered it into the database, and scanned and imported the sketches you have made. Check the spatial information in the database too – does that context outline look right? Is that sample or small find shown in the right place? Do the photographs you've taken look OK? Are all the samples and small finds correctly related to the context in the database? What about the photographs, sketches and plans and section records? Are the plan and section drawings complete, with grid point, levels and scale shown? When you're sure a record's complete, flag its status as ***Ready to be checked***.

Context, sample and human remains records, plans and sections will be checked by the site supervisors, who will ask you if they have any queries, tell you if the data is incomplete and prompt you if your records are not

being entered into the database in good time. All issues raised should be resolved as quickly as possible.

The spatial data from the TST and the digital photographs will be checked daily when they are downloaded and imported into the database.

Assemblages (Finds) records and Sample records are checked by the project finds and environmental science officers. The project manager will also monitor the quality of the data throughout.

1.8 ARCHIVE SECURITY

The archive is comprised of documents, digital data, finds and samples and represents the only record of any material that has been removed during a project. It is irreplaceable and other archaeologists will rely on it for primary information about the site. All the processes of an archaeological project affect the quality of the resulting archive.

Archive creation begins with the start of a project, and archive management must begin at the same time. Throughout the life of a project it is the responsibility of **all** project staff to treat documents, records and materials in ways that ensure their continuing security and accessibility.

Follow these rules to ensure the security, stability and integrity of the site archive:

- All recording on paper must be done in permanent ink, archival or Bic biros (**not red**, as red pen fades over quite short periods of time). Make sure your writing is very clear. Remember that people will need to read what you write when you are no longer there to explain what you mean
- All records, whether data or documentary (and including correspondence) must be authored, dated, and carry the project code
- All archives must be internally consistent and cross-referenced. All elements and records must be cross-referenced accurately. Record checking should be an on-going activity that takes place throughout the excavation, as errors are more easily corrected when they are identified early

- The site archive (all paper records, permatrace drawings, etc.) should be clearly legible, and kept as clean and dry as possible. Particular care should be taken with drawings as dirt on the drawing film damages the scanner, which is used during archiving. For the same reason please be particularly careful to remove all tape from drawings. Grit caught in the adhesive is particularly damaging.
- All record sheets and permatrace drawings must be stored in a clean dry area, away from direct heat sources. Food, drink, and cigarettes must be kept well away from records, both while they are in use and during storage. Smoking is not permitted on site.

The security and regular backing up of the digital data is equally vital. This includes the project database, photographs, TST data and scanned sketches. The procedures for data download and back up will be explained on site, and there will be cribs sheets outlining the process, file locations and back up media. It is essential that these are followed – no piece of kit is infallible, and if the database server or the project hard drive fails it must be possible to retrieve all the information from the back-up drives or data sticks. The computers and survey equipment must be treated with care, and transported and stored securely.

All digital files must be named in line with our digital archiving protocol. Photographs and other digital images must have the appropriate metadata attached. Files must be saved in the correct locations on the site network to ensure they are backed up and transferred to the network at Fort Cumberland after the fieldwork is completed (do **not** save information on the hard drive of the laptop you are using…). Ideally all notes by field staff should be made in the project database whenever possible.

1.9 FURTHER INFORMATION

The most important document is the **Project Design**, which gives the background to the project and its aims and objectives, as well as setting out the methods to be used, the types of finds and deposits expected, and the sampling and finds retrieval strategies.

You'll find this in the **Site Library** folder of the site computer network, along with relevant Guidelines, and in some cases copies of other reports on the site or background information. There will also be a digital copy of this manual and the site crib sheets.

Intrasis reference notes, crib sheets and site-specific 'How to' guides are also available on the site network.

Remember that in addition to staff based at and/or regularly visiting site, our **in-house specialists** are available to give advice on all aspects of our projects.

2 STRATIGRAPHY AND MATRIX COMPILATION

The stratigraphic sequence records how and in which order contexts were formed. It is a key tool for the analysis of the site and the objects and environmental evidence recovered. The quality of its recording greatly affects the research potential of a site, and it is crucial to the understanding of a site that the stratigraphic sequence is correctly recorded

The Harris matrix is a graphic representation of the stratigraphic sequence and the processes of site formation.

Although matrices can be generated electronically by computer packages, building up the matrix manually is often a vital step in understanding the site. We regard creation of the matrix as an essential part of the analytical thought process.

On site, matrices are recorded on paper forms or pre-printed permatrace sheets, and the final site matrices can be drawn on permatrace sheets and scanned, or produced as Excel spreadsheets and saved as pdf files.

The overall site matrix should be kept in the site hut and updated by the site director (it is better if it goes through one hand) or supervisors in consultation with the site director. This should be an essential part of the record checking process. Records should be checked and numbers added to the running matrix diagram every day or two, depending on the rapidity of record generation. At the end of the site part of the final check should be to draw up a neat matrix which will be part of the site archive. This will include preliminary phasing, especially where (for example) building phases are easily seen. It's not necessary to phase every context at this stage.

2.1 STRATIGRAPHIC RECORDING RESPONSIBILITIES AND PROCEDURES

Direct stratigraphic recording and the compilation of matrices are essential for all sites. Throughout the life of the project and as part of the archive matrices will be updated and have information added as work progresses – for example, it may be useful to show pottery spot dates, and included phasing and grouping information. Older versions should be kept, but marked 'superseded'.

MoRPHE Project Planning Note 3: Archaeological Excavation (English Heritage, 2008) requires matrices to be produced as part of field archives.

Site staff are responsible for:

- recording stratigraphic information for individual contexts (on the context forms and as relationships in the project database)
- compiling local matrices for complex archaeology or groups of features when required (on a Working Matrix Form)
- scanning the working matrix when completed, naming the file correctly, importing it into the database and creating relationships to the contexts shown

The archaeological supervisor is responsible for:

- checking context stratigraphy in the project database
- compiling and updating running matrices
- scanning the running matrix when completed, naming the file correctly, importing it into the database and creating relationships to the contexts shown
- producing overall checked context matrix for the area(s) they supervise (on Working Matrix form, pre-printed matrix permatrace, or in Excel)

The project manager is responsible for:

- the overall quality of the record
- producing an overall checked context matrix for the site (on pre-printed matrix permatrace or in Excel)

- including overall matrices for the whole site in the Site Archive Completion report. This provides information to specialists for Assessment , and these matrices should include phasing and grouping information where applicable.

Matrices on the Working Matrix form are scanned during fieldwork, and imported into the database as Images/Matrix.

Matrices on A3 or A1 permatrace sheets are scanned by the Archaeological Archives team at Fort Cumberland. It is the project manager's responsibility to check the matrices are complete before scanning, and to import the scanned images into the database.

2.2 RECORDING STRATIGRAPHIC INFORMATION

2.2.1 CONTEXT RECORDS

Complete the matrix on the Context or Human Remains record sheet, showing **only** the stratigraphic relationships for that Context. It doesn't matter if redundant stratigraphic relationships are shown at this stage (often this isn't clear until groups of contexts are combined into a single local matrix).

Enter the Earlier than/Later than relationships shown on the mini-matrix into the Context record into the database (see Figure 2.1).

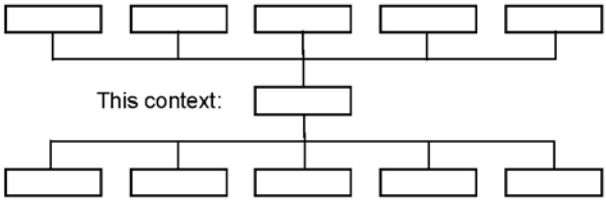


Figure 2.1 The context sheet matrix for recording stratigraphic relationships

2.2.2 WORKING AND LOCAL MATRICES

Compile a working matrix where this is useful, for example for groups of intercutting features or ditches with multiple recuts. Describe on the

form what the matrix shows, and where the features are located (for example, 'Pits in the north-east part of Trench 3').

Working and local matrices should be drawn on a Working Matrix Form and, when completed, scanned and imported into the database in the Image class/Working Matrix subclass (there is a crib sheet explaining how to do this).

2.2.3 OVERALL MATRICES

Supervisors will compile running matrices covering the areas they are responsible for, using the information in the context records and working matrices, These should be built up throughout the excavation, and updated as necessary.

An overall matrix for each area of the site should be completed before the end of the fieldwork stage of the project.

Matrices drawn on permatrace must have a Drawing Sheet number (taken from the Drawing Sheet Index in the same way as for plans and section drawings). This is essential for archiving.

Overall matrices can be compiled either on pre-printed permatrace sheets or in Excel. They must be available before the start of Assessment.

2.2.4 MATRICES, RECORDS AND THE PROJECT DATABASE

Working matrices are sketches, and when scanned are saved as Image class, Working Matrix subclass. They should be scanned and imported into the database on site as soon as they are completed. A site-specific crib sheet on scanning, naming files and importing sketches will be available on site.

Permatrace matrices are Image class, Site Drawing Sheet subclass and Site Drawing Type ***Matrix***. The database record for the matrix is not created until the permatrace sheet is scanned and imported at Fort Cumberland. Make sure you write a description of what the matrix covers on the sheet.

2.3 COMPILING A MATRIX

The stratigraphic sequence is represented using a Harris matrix, which provides a simple graphical method of showing the relationships between contexts. Human remains are included on the matrix in the same way as contexts. Earliest features are at the bottom of the diagram, latest features at the top. Non-stratigraphic units, such as cleaning layers, are not included in the sequence as they do not represent site formation processes.

Understanding these processes is vital to the production of accurate matrices. Do not be afraid to ask if you are uncertain.

When compiling a Harris matrix, it is important to remember it is only the direct stratigraphic relationships of a context (the order of events defined by what has come directly earlier and later), which constitute the stratigraphic sequence. Remember all direct stratigraphic relationships are physical, although not all physical relationships are direct stratigraphic relationships (see Section 3.4.1for further information on physical relationships).

When you compile a matrix, it's important to:

- only include stratigraphic relationships (Earlier than and Later than) not physical relationships
- cut out 'redundant' relationships
- ensure relationships are shown clearly and unambiguously (see Figure 2.5).

You can also:

- use the matrix layout to convey additional information and interpretation, for example by marking on spot dates or indicating which layers are probably the same.
- incorporate initial stratigraphic phasing as understood on site (if necessary this will be amended in post-excavation).
- indicate any structural groups defined (for example, show where post holes are interpreted as a fence, timber wall or building)

2.3.1 EXAMPLE 1

The stratigraphic sequence explains how the site was formed. For this example, we'll work backwards and explain how the site was formed to make determining the stratigraphic sequence easier.

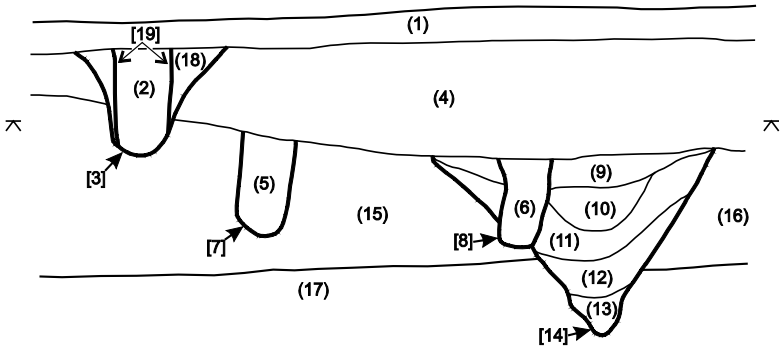


Figure 2.2 Example section drawing to demonstrate stratigraphic relationships

Focussing near the top of Figure 2.2, the post hole [3] was dug and the post inserted, then the hole was packed (18). Eventually the post rotted away, leaving a post pipe [19], into which later material accumulated (2) (see Fig. 2.3).

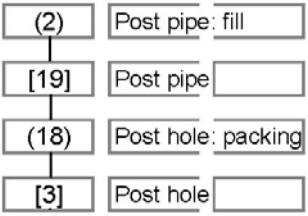


Figure 2.3 Stratigraphic relationships for post hole [3] in Figure 2.2

On a waterlogged site the timber might survive, in which case the sequence would be different as (2) would represent the post and would be stratigraphically earlier than the insertion of the packing (18). In this instance there would be no need to context the post pipe interface [19].

2.3.2 EXAMPLE 2

Including unnecessary physical relationships is a common problem when compiling matrices on-site. In Figure 2.2 post hole [8] physically cuts and is therefore later than contexts (9), (10), (11) and (15).

However, the *latest* context to be deposited prior to its construction was fill (9). Therefore (9) is the only context to be recorded as stratigraphically earlier than [8]. The other relationships are redundant.

So the full matrix would be:

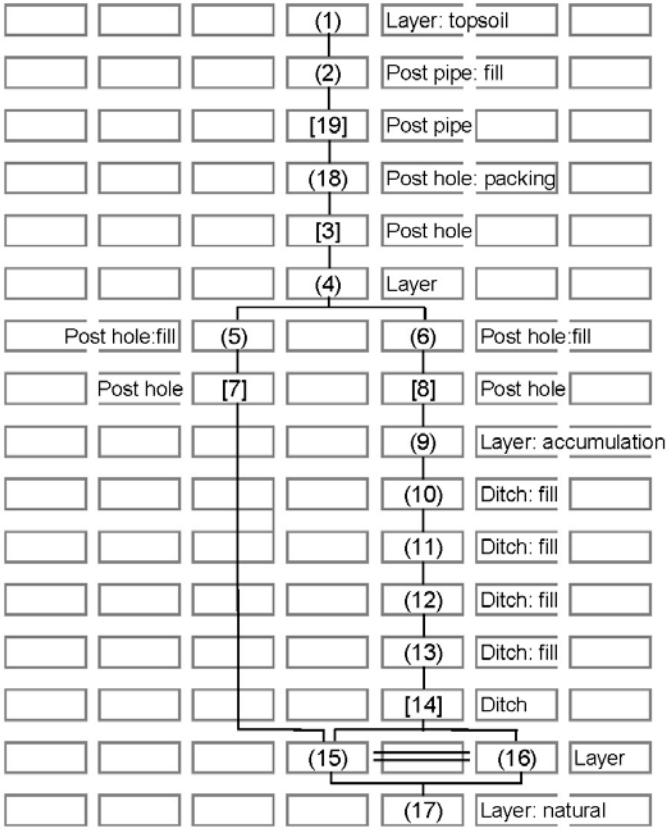


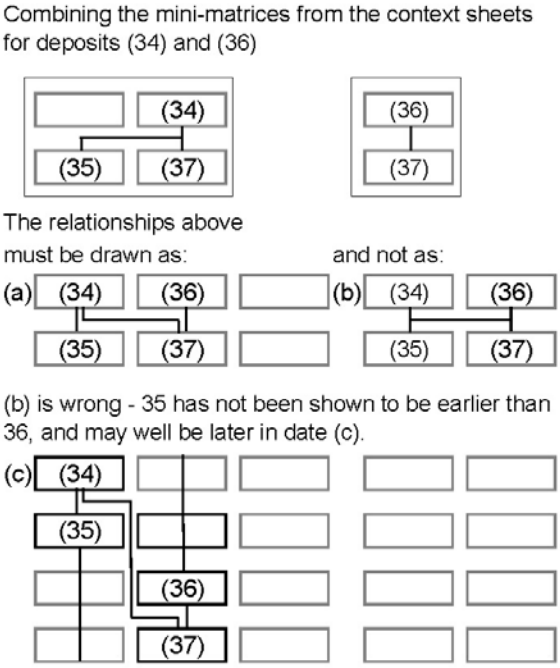
Figure 2.4 Example matrix

In the above case contexts (15) and (16) have been **interpreted** as being part of the same layer, and so they are linked by = signs on the matrix. Note that contexts are not recorded as **Same As** in the context records unless they are proved by excavation to be parts of the same context.

2.3.3 EXAMPLE 3

Make sure you only show the relationships you mean to and don't imply incorrect relationships. Use separate lines to link context where necessary. In Fig 2.5, the stratigraphic relationships from the context record sheet mini-matrices for deposits (34) and (36) are combined into part of a working matrix. Versions (a) and (c) are both correct – version (b) is wrong.

Figure 2.5



Avoid crossing lines wherever possible - if it's really necessary, show a break or bridge in the horizontal line so you don't imply incorrect relationships (see Fig. 2.6).

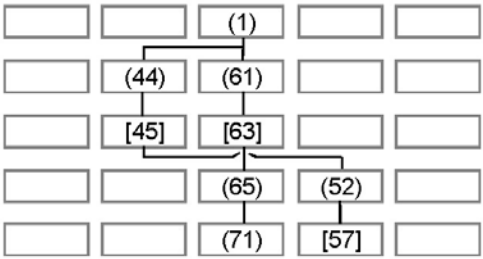


Figure 2.6

2.3.4 EXAMPLE 4

The Contains/Is Within relationship is not often used in recording relationships between contexts – it applies where one context (deposit, masonry or human remains) lies wholly within another. Examples are a lens of a different material lying in an otherwise homogenous ditch fill; a masonry element included in the build of another (such as a window constructed at the same time as the wall surrounding it), or an infant skeleton lying within an extensive fill or layer with no indications of a grave cut surviving.

Contains/Is Within is **not** a stratigraphic relationship, and care is needed when creating matrices.

Where the included context is clearly contemporary with its surroundings, you can show the relationship in the matrix using a horizontal line, as in Figure 2.7.

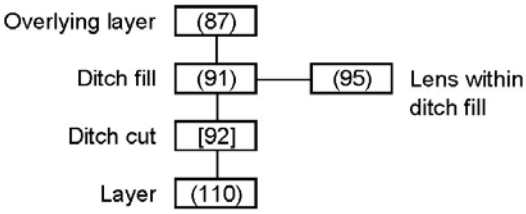


Figure 2.7

But in the example of the infant skeleton, the processes of deposition are unclear. In the case of a rapidly filled pit, the burial and the pit filling may be contemporary. In the case of a slowly filling ditch, the

infant may have been placed in a cut which is not archaeologically detectable, and may therefore post-date the ditch fill. The position of the Human Remains context in the matrix must be shown as uncertain – all you can say is that it post-dates the ditch cut and pre-dates the first overlying layer which you are confident has not been cut through.

2.4 GROUPING AND PHASING

It will sometimes be possible to identify groups of individual contexts which add up to larger stratigraphic entities. Although interpretative, such groups can usefully be given a 'Structural Group' number (there's an allocated number block) and recorded in the project database. They can be linked on the matrices, for example by drawing a box round them.

Examples are:

- A building, clearly identified in plan by the presence of stone/ brick walls, rows of post holes or timber beam slots.
- A well, including its construction cut; lining and complex fill pattern
- A burial, including a grave cut, evidence for a coffin, and a skeleton.

There is no paper record sheet for Structural Groups (except for inhumation Burial Groups and Cremation Related Groups - see Module 10). The record is created directly in the project database, but making an annotated sketch on a Sketch Sheet can be useful. Relate all the assigned contexts to the Structural Group using the Consists of/Part of relationship (see Section 3.9.1)

Grouping should be done only for complex context groups: a single pit with a couple of fills does not usually require a Structural Group record.

On some sites it will be possible to create preliminary stratigraphic phasing on site. Such phasing will seldom (if ever) encompass all contexts on a site, but it is worth allocating phase numbers. The records are created directly into the database, and the individual contexts that

form part of the phase are related to it using the Consists of/Part of relationship (see Section 3.9.1).

2.5 FINALLY …

These examples use sections and plans in order to give you visual references for the matrix. In reality, the experience of excavation is vital for understanding stratigraphy. The stratigraphic sequence cannot simply be reconstructed from plans and sections after the excavation has finished. This is why on-site recording is so important.

If you have any questions about recording stratigraphy don't be afraid to ask for advice. Understanding formation processes and interpreting stratigraphy is a complex skill which can only be learnt through experience. It's much easier to sort out problems in the field than in post-excavation.

3 RECORDING DEPOSITS AND CUTS

Most of contexts you encounter on a site will usually be Deposits or Cuts.

- **Deposits** may be layers such as roads or floor surfaces, flood silting, hearth debris, or 'occupation' deposits, as well as the fill deposits within cut features such as pits, ditches, post holes and wells.
- **Cuts** may be pits or ditches, foundation trenches, post holes, graves etc. Interfaces (such as post pipes) are also recorded as cuts.

Deposits and Cuts are subclasses of the **Context** class. The other subclasses of Context are **Masonry** and **Timber**, used for recording masonry and timber structural elements respectively. These are described in Module 4. All contexts have the same class level fields, and each type has additional specific subclass level fields.

Although **Human Remains** are excavated and recorded as contexts (rather than as finds within a context), they have a separate class in the database. Excavating and recording Human Remains is described in Module 10. Human Remains records are required for any articulated human remains or groups of associated disarticulated human bones.

Before excavating, make sure you understand our **finds and environmental sampling procedures** (Sections 5.2 and 9.2), and the project's collection strategies (set out in the project design). See especially Sections 9.2.3 (**whole earth sampling**) and 9.2.5 (**trench-side sieving**).

We aim for consistency in recording as this helps both post-excavation assessment and analysis, and the later re-use of our archives. To support this, several fields are recorded using controlled vocabularies (glossaries) and these terms appear as drop-down lists in the database.

If you feel that the options available don't adequately describe the context you are excavating, please select the 'best fit' term and explain in the Site Comments field (on the Text tab in the database) why you think something else would be better.

For some fields (such as simple names) additional site-specific terms can be added to the database drop-down lists if the project manager asks for them, but for others (such as soil texture) the terms must remain unchanged to allow consistent comparisons between sites.

3.1 DEPOSIT AND CUT RECORDS : CLASS LEVEL ATTRIBUTES

Context No

Assign each context a unique number as soon as you have defined its extent, using the Context Index (see Section 1 .6 Record Number Allocation). The numbers are often assigned in blocks by trench (site subdivision), and the same number sequence is used for all contexts, whether Cuts, Deposits, Timber or Masonry. There are separate paper recording sheets for Cuts, Deposits, Timber and Masonry contexts.

You will also need to create a spatial record for the context when you assign the number. Ideally this will be the full outline, but if that is not possible a single point should be surveyed as a label (see Section 8.4, Total station surveying and the Intrasis database).

Dimensions

All dimensions should be measured in metres to two decimal places. Record the dimensions within the excavated area. If a context extends beyond the trench edges, or is deeper than the depth of excavation, this should be noted in the 'Dimensions Comments' field. The dimension fields are numeric - they can't include text or symbols such as <, > or ?.

Length should always be measured along longest visible axis of a feature.
Width is measured perpendicular to length.
Diameter is only measured for contexts that are circular (or roughly circular) in plan.
Height is the maximum recordable height, for example of a wall.
Depth is the maximum recordable depth, for example of a ditch or pit.

Excavation method

Describe how the context was excavated – for example, 'half-sectioned', '1m wide section excavated' or '100% as Sample'. Also note the tools used

– whether it was excavated by trowel, mattock/shovel or machine (this information is helpful to finds and environmental specialists).

Weather

Note any weather conditions which affected work or recording (this might affect confidence levels in the recognition of features or recovery of finds).

Excavated by/date and Recorded by/date

Enter all the people who excavated the context and one person responsible for recording it (all staff names should be in the drop-down lists). This is to help with checking and resolving any queries.

Comments and Interpretation

The Site Comments and Site Interpretation attributes are on the Text tab, to allow for longer comments (see 3.5 below).

Interpretative Summary

This attribute is for the Project Manager to use, normally during site archive completion in preparation for assessment.

3.2 DEPOSITS: SUBCLASS LEVEL ATTRIBUTES

Simple Name

The simple name of the context is a brief description, such as ***Pit: fill***; ***Surface: metalled***; ***Layer***. It uses controlled vocabulary so contexts can be grouped by type during assessment and analysis. The terms are in a drop-down list in the database.

Compaction

The compaction of a soil can help demonstrate post-depositional processes (for example, identifying an area of one deposit that was under pressure from a structure constructed on sleeper beams, or more heavily exploited/walked over), and can sometimes be the only indication of such changes of use (between contexts).

Compaction should be evaluated when the deposit is moist. The following terms are used to record compaction:

Loose	non-coherent and crumbles very easily in the hand
Friable	coheres when pressed together/crushes under gentle pressure
Compact	crushes under moderate pressure but resistance is noticeable
Hard	strong pressure required in the hand to crush the soil
Cemented	cannot be broken with hands

Colour

The colour of a deposit can help determine its origin, and some aspects of depositional or post-depositional processes. In some cases it may be the only indication of differences between contexts.

A Munsell colour chart should be used on moist samples of the deposit to ensure consistency of recording and colour names. If done conscientiously, this record is important for analysis of any samples taken from the deposit.

Record both the Munsell number and a Colour Description (e.g. 'dark brown with orange mottles' – don't just repeat the standard Munsell description!) If the colour is mixed, you can note additional Munsell numbers in the Colour Description or the Comments field (Text tab).

Texture

The texture of a soil is a generalisation of its particle size characteristics. It may demonstrate the origin of a deposit, or the conditions under which it was deposited (for example, quickly, slowly, washed or blown in). Texture can sometimes be the only indication of change between contexts. The field record of the texture is important in the analysis of samples taken from the deposit.

The mineral fraction of a soil (as distinct from the organic fraction) is made up of particles ranging in size from centimetres (boulders) down to material smaller than 0.002 mm (clays). A soil's texture is simply a group name, such as ***sandy loam*** or ***silty clay loam***, describing roughly what percentage of the soil weight is made up of the different size grades.

HOW TO DO FINGER TEXTURING

Take a small quantity of soil and remove any stones or coarse material larger than 2 mm. Take a lump about the size of a marble, and moisten if necessary. Work between the fingers until it is reasonably uniform, and then run through these questions :

1. Can the soil be rolled into a ball?
Yes Go to 2
No ***sand***

2. Can the soil be rolled into a thick (10-15mm) sausage between the palms?
Yes Go to 3
No ***loamy sand***

3. Can the soil be rolled into a thin (5mm) sausage between the palms?
Yes Go to 4
No ***sandy loam***

4. Can the 5 mm sausage be bent into a U shape without cracking?
Yes Go to 5
No, and feels gritty ***sandy silt loam***
No, and feels doughy ***silt loam***

5. Can the 5 mm sausage be bent into a ring without cracking?
Yes Go to 7
No Go to 6

6. Does the soil feel
very gritty? ***sandy clay loam***
slightly gritty? ***clay loam***
like dough? ***silty clay loam***

7. Does a surface rubbed with finger and thumb become
very smooth and very polished? ***clay***
smooth and slightly polished? ***silty clay***
smooth with sand grains visible? ***sandy clay***

For organic deposits:
humic less than 30% organic material; dark in colour; 'dirty' and smeary if wet; friable if dry
peaty 30%-70% organic material

If a deposit is almost entirely organic material, it is described as either amorphous or structured peat:
amorphous peat almost entirely organic, retains little structure
structured peat almost entirely organic, retains structure and is fibrous; contains identifiable leaves, twigs, etc.

Texture can be determined in two different ways:

- particle size analysis is the detailed laboratory test, which gives accurate numerical percentages to the different size grades through the use of sieves and sophisticated equipment
- finger texturing is the field estimation, which gives only the verbal grouping

Since laboratory accuracy is neither practical nor necessary for deposit recording in the field, finger texturing is the widely used method. It is too subjective for detailed interpretations, but can, with care, provide most of the basic information required in the field. The method and terms to use are set out in the table above.

Inclusions

Inclusions in a deposit may indicate the reasons behind its deposition (such as brushwood and stones to mop up/dry out a squelchy ditch fill) or represent contemporary or earlier activity taking place in the area (for example wood working debris indicating a joiner's yard).

All inclusions which comprise more than 2% of the total deposit should be noted, prefixed by their **frequency** (in order, with greatest first), **size**, and if necessary **shape**. The terms used should follow the controlled vocabulary lists set out below.

Examples: Occasional flecks of pottery; Occasional small well-rounded pebbles; 25% medium sub-angular ceramic building materials

Frequency (choose a term from the following list):
Occasional (2%-5% of total deposit)
Moderate (6%-14% of total deposit)
Frequent (15%-20% of total deposit)
If above 20%, the **actual percentage** should be given

Size (choose a term from the following list):
Flecks (up to 6mm)
Small (6mm-20mm)
Medium (21mm-60mm)
Large (61mm-120mm)
If above 120mm, the **actual size** should be given

Shape (choose a term from the following list - see Fig. 3.1):

Very angular
Angular
Sub-angular
Sub-rounded
Rounded
Well-rounded

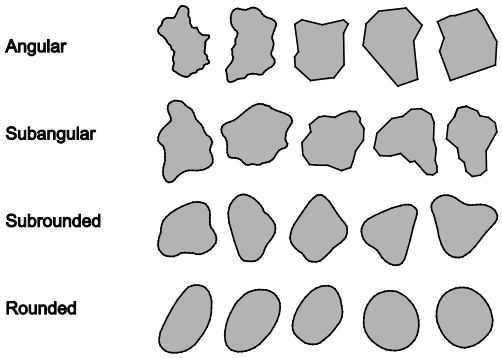


Figure 3.1 Examples of shape descriptions for inclusions in a deposit

Material
For unworked stone, choose a term from the following list:
Pebbles (<60mm)
Cobbles (60mm-200mm)
Boulders (>200mm)

Contamination

Give an estimation of the possibility of post-depositional contamination of the deposit. This is helpful for finds analysis and assessing the value of soil samples for environmental science analysis.

These terms are used:
Probable – when disturbance is present, intercutting is noted or boundaries between contexts are particularly difficult to define
Possible - when there is a chance of movement of material between contexts but this is less likely
Unlikely - when dealing with discrete features and well-sealed contexts.

Note the difference between

- **contamination** - later disturbance of deposits by intercutting of later features, animal disturbance, tree roots, ploughing, and so forth.
- **residuality** – when material that was already old was unintentionally incorporated as the deposit was formed (for example, Bronze Age flint working debris found in a Romano-British pit fill)

If you think there are indications of residuality in the material you are recovering, note this in the Comments field on the recording sheet (in the Text tab in the database), explaining why (for example, some of the pot looks very fresh but some looks very abraded).

3.3 CUTS - SUBCLASS LEVEL ATTRIBUTES

Simple name

The simple name of the context is a brief description, such as **Pit**; **ditch, post hole**. It uses controlled vocabulary so contexts can be grouped by type during assessment and analysis. The terms are in a drop-down list in the database.

Shape in plan

Describe the shape of the top of the cut, its outline edges and (where applicable) corners. Select as many terms as appropriate.

Outline - Irregular
Outline - Linear
Outline - Oval
Outline - Rectangular
Outline - Square
Outline - Sub-circular
Outline - Sub-rectangular

Edges - Curving
Edges - Irregular
Edges - Parallel
Edges - Straight

Corners - Rounded
Corners - Square

Orientation

The orientation of the context in plan.

Profile

Use the controlled vocabulary terms to describe the profiles of cuts. Select as many terms as appropriate.

You need to record breaks of slope, changes in gradient, the slope and shape of the sides, and the properties of the base. If a post- or stake hole is at an angle, its angle (rake) and the direction in which the post would have pointed should be noted. In the case of particularly asymmetrical cuts, all sides should be described.

You can give more information in the Comments field (Text tab) where appropriate, for example noting the gradient of the sides of the cut or break of slope part way down the profile.

An annotated sketch is usually helpful, and for complex asymmetric cuts, drawing a profile at right angles to the recorded section can be useful.

Profile - overall

Asymmetric
Bowl shaped
Concave base
Flat base
Gradual sides
Irregular
Sloping base
Steep sides
U-shaped
Uneven base
V-shaped
Vertical sides

Break of slope (see Fig. 3.2)

Note the break of slope for both the top and base of the cut.

Gradual **Imperceptible** **Sharp**

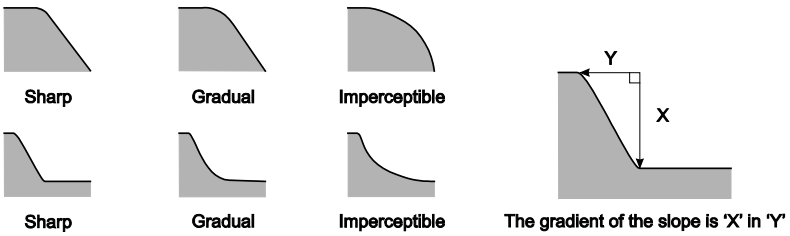


Figure 3.2 Example descriptions for change of slope

Slope of sides
Record the slope of sides as **Irregular or Smooth**

Shape of sides
Record the shape of sides as **Concave**, **Convex** or **Straight**

Post holes and stake holes
Also record the

- Point shape (select from **Tapered; Tapered, blunt point; Tapered, rounded; Straight with flat base**)
- Angle **or rake** (estimate the angle of slope and note the direction the post leans in)

3.4 RECORDING RELATIONSHIPS

Accurate recording of relationships is essential for understanding the development of the site, its finds assemblages and the environmental evidence recovered.

In the Intrasis database, there are three types of relationships:

- Stratigraphic: the stratigraphic relationship, Later than/Earlier than
- Physical: physical and spatial relationships between objects
- Contextual: all the other relationships you create on site for Cuts and Deposits, such as their relationships to finds, samples and images.

Note relationships on the paper sheet, and create them using the Relation tab in the database. The relationships **link** records – so if you record that a deposit is Shown on a Photograph, the Photograph record Shows the deposit.

Don't create redundant relationships. For example, a Sample must be related to the Context it was collected from, but Assemblages from the Sample only need relating to the Sample (and not directly to the Context). Redundant relationships can cause problems querying the data later.

3.4.1 STRATIGRAPHIC RELATIONSHIPS

The stratigraphic sequence of the site is the key to understanding the order of events on the site (see Module 2: Stratigraphy and Matrix Compilation). It is the key to phasing and most other interpretations that take place during assessment and analysis.

The **stratigraphic** relationships between contexts are recorded and interpreted through the construction of a Harris matrix. The matrix is built up as the fieldwork proceeds, and the 'mini-matrix' on the forms is the first stage in that process. It is vital that these relationships are recorded correctly. The stratigraphic matrix only records direct stratigraphic relationships. If you have any questions about this aspect of recording, always ask.

Record the direct stratigraphic relationships in the mini-matrix on the paper record sheet. In the database, the information is recorded in the database by creating Later Than/Earlier Than relationships.

Don't show **physica**l relationships (see 3.4.2) in the mini-matrix on the context record sheet or in working matrices.

If you are working with a complex feature or a group of features, it is often useful to produce a 'working matrix'(see Section 2.2.2). Compile this on the paper Working Matrix sheet, and then scan it, import it into the database, and relate it to the contexts it shows. Supervisors should compile and update working matrices of their trenches as work progresses.

3.4.2 PHYSICAL RELATIONSHIPS

These relationships record where contexts are in physical contact with each other. For example, they record the relationship of a Cut to the layer it is cut through and the fills it contains. If a single deposit is excavated in spits, the relationship between each spit and the spits over- and underlying it is a physical relationship.

The Cuts/Is Cut By, Filled By/Fill Of and Same As/Same As are the physical relationships most often used for Cuts and Deposits. In some cases a layer (such as a floor) may be related to a masonry wall using the Butts/Butted By relationship.

Where the Project Design requires excavation of a context in spits, the Overlies Spit/Underlies Spit relationship is used. This relationship is not always available in the database, but can be implemented if required.

Cuts/Is Cut By

Cuts - Record the context numbers of any **Deposits** or **Masonry** structures partially removed by the creation of the Cut feature being recorded. Complete for cuts only.
Cut by - Record the context numbers of any **Cuts** which are intrusive into, and therefore later than, the context (Deposit or Masonry) being excavated.

A cut should **never** be recorded as cutting another cut.

Filled by/ Fill of

A Cut should be linked to all the Deposits it contains using the Filled by relationship. As well as Deposits, both Masonry and Human Remains contexts can be the Fill of a cut.

Contains/Is Within

This relationship is used when one context (deposit, masonry or human remains) lies wholly within another. Examples are a lens of a different material lying in an otherwise homogenous ditch fill; a masonry element included in the build of another (such as a window constructed at the same time as the wall surrounding it), or an infant skeleton lying within an extensive fill or layer with no indications of a grave cut surviving.

This relationship must **not** be used to link cuts to their fills (use Filled by/Fill of), or to create groups (use Consists of/Part of).
When you record a context as Within another, **don't** also record direct stratigraphic relationships (Earlier Than/Later Than) for it. Contains/Is Within is **not** a stratigraphic relationship, and care is needed when creating matrices. See Section 2.3.4

Same As

Same As used to relate contexts where one number is an accidental duplicate or where the context has been **shown by excavation** to be the same as another context. This **isn't** an interpretation field, and you

should explain in the Comments field/Text tab why you have used the relationship.

When you create a Same As relationship in the database, make sure the main context (the number you will using to refer to the context from then on) is the 'parent' in the relationship (this will be explained in the Intrasis training, but ask if you are unsure). This makes things easier during assessment and analysis, especially for finds.

In some cases you will want to **interpret** contexts as being parts of the same cut, deposit or masonry structure. Don't use Is the Same As for this. You can record your interpretation in three ways:

- write notes in the Site Interpretation attribute on the Text tab (see 3.5.2)
- create a working matrix (see Section 2.2.2) and use = signs to show your interpretation
- where appropriate, create a Structural Group to link contexts (see 3.9.1 below)

3.4.3 CONTEXTUAL RELATIONSHIPS

All relationships which are neither stratigraphic nor spatial are defined as contextual in the database. This includes their relationships to samples, finds and images. In general the relationship names are self-explanatory, so only a few are described here.

Intersects/Is Intersected By

This relationship is used only to record the relationships between Sections and the Contexts, Finds, Human Remains and Samples shown on the Section drawing. Note that this differs from Plans and Images, where the Shows/Is Shown on relationship is used.

Has/Collected from

Used to relate Contexts, Human Remains, Samples and Finds (Assemblages).

Divided Into/Division Of

A deposit can be Divided Into a number of separate spatial-elements to allow the spatial analysis of recovered finds or environmental material.

This relationship describes a **method of excavation**. For example, it's used when a continuous length of ditch is excavated by digging sections in several places. It **isn't** used when you **interpret** several separate stretches of ditch as being part of the same feature. See Section 1.4 for more information.

Includes/Included In

Records the relationship between Contexts and the Site Sub-Division they are in.

3.5 DESCRIPTIVE TEXT: COMMENTS AND INTERPRETATION

The attributes on the Text tab allow longer descriptive and interpretative comments.

3.5.1 SITE COMMENTS

Record any additional information not covered by the other attributes, and comments qualifying the information in them, particularly where there is uncertainty about any aspect. For example, note if the context extends beyond the excavated area. You could give an estimate of the overall size of the context, or state that no estimate was possible. Also note truncations of cuts; uncertainties of relationships; homogeneity of deposits; difficulties of excavation and/or recording; and odd characteristics. The reasons for designating as Same As another or recording it as Void (see 3.10) must also be noted here.

3.5.2 SITE INTERPRETATION

Give a basic interpretation of the context explaining the evidence for, and reasoning behind, the conclusions you have reached. This is an important field, as it will be the only record of the on-the-spot interpretation of the person excavating the feature, and it can be an important aid to post-excavation.

You can change your interpretation in light of later excavation – please don't delete the original, but add your revised view and initial and date.

Supervisors can also add comments to the Interpretation, and should initial and date their remarks to make it clear whose interpretation it is.

Sometimes your interpretation may include creating a Structural Group (see 3.9.1 below) – for example, you may think that the post hole you're excavating along with three nearby features makes up a four-post structure.

3.5.3 ASSESSMENT

For additional description, summary and interpretation during the Site Archive completion and Assessment stages of the project, for example as the basis for report text..

3.6 SKETCH

Draw sketches on the context record sheets (plans, sections, and/or profiles as appropriate), with an approximate scale (or a comment 'not to scale'), north point, co-ordinates and dimensions, context numbers and annotation as necessary. Draw this separately and don't just copy from the drawings – sketches have a different purpose.

Sketches are very useful in interpretation, particularly if something doesn't show up well in the formal drawn record.

3.7 FINDS AND SAMPLES

Note the record numbers of the Samples taken and Small Finds recovered. These should have been recorded using the Total Station (TST), and their records and relationships to the deposit will be created when the TST data is imported into the database. When you enter your context data, check that all the relationships you expect are present (and that there are no incorrect ones – typing errors do occur in TST survey!). Remember that things recorded using the TST on one day are not normally imported into the database until the following morning.

Also record the types of Bulk Finds present – this lets the Finds staff know what to expect and helps resolves any problems which arise. Enter these in the Contains field of the Deposit subclass record.

Remember that Cuts **cannot** have finds or samples….

3.8 RECORDING

The Recording section of the paper record sheet is used both as a work flow prompt and for noting the numbers of photographs, plans and sections showing the context.

The relationships may be created in the database either from the context record or by creating relationships from the photograph, plan or section to all the contexts it shows. It doesn't matter which way round this is done (though it can be more efficient to work from the image to the contexts), but you should check that all the required relationships are present. If you can't create the relationship (for example the plan record has not yet been created or the photograph has not yet been imported) make a note and return to check later (you can use the Issue Log class to note this).

3.9 INTERPRETATION: GROUPING AND PHASING

3.9.1 STRUCTURAL GROUPS

It is often useful to give a number to a feature such as a building, corn drying oven, well or enclosure. We don't assign these context numbers, but record them as Structural Groups. This is a useful way of linking all the contexts which make up the group (for example, the construction cut, construction backfill, lining and complex fill pattern of a well, or the walls, post holes and beam slots of a building).

Inhumation Burial Groups and Cremation Related Groups are subclasses of Structural Group and must always have a Structural Group record. Numbers are allocated from the Index for Inhumation Burial Groups and Cremation Related Groups, and there are record sheets for both to help

ensure all the necessary information is collected. See Module 10, sections 10.6.5 and 10.7.

Other Structural Groups do not have a specific paper recording sheet, and the records are created directly into the database (a block of record numbers is allocated to them). However, it is often useful to draw an annotated sketch of the group. The sketch sheet should be scanned, imported into the database and related to the Group (but not to the individual contexts shown on the sketch).

Groups must be related to the contexts you assign to them, using the Consists of/Part of relationship. The group Consists of its constituent contexts, and the individual contexts are Part of the structural group.

Describe the Structural Group in the Comments attribute on the Text tab, and give a concise summary in the 'Interpretative Summary' attribute.

Where appropriate, creating Structural Groups is an important part of understanding the site, and another way of ensuring that the interpretation you reach during excavation is available for assessment and analysis. But don't overdo it – a single pit with a couple of fills does not usually need a Group record!

3.9.2 PHASING

On some sites it will be possible to create preliminary stratigraphic phasing on site. At this stage it's unlikely to be possible to include all contexts in the phasing, but it's worth starting to define phases and create records in the database. This is usually done by the project manager or trench supervisor.

Let the database assign the Id to the Phase, and use the Name field to give it a Phase number and brief description (e.g. Phase 5, late RB). Select Preliminary for the Stage. Describe the Phase in the Comments attribute on the Text tab, and give a concise summary in the 'Interpretative Summary' attribute.

Relate the Phases to the Contexts they contain using Consists of/Part of relationship in the database. You cannot assign a Structural Group directly to a Phase.

You should also show the phasing on a matrix or working matrix (see Section 2.2.2.)

Completing the phasing is a key part of Site Archive Completion, and phasing may also be updated during Assessment.

3.10 VOIDING CONTEXT RECORDS

The VOID subclass for contexts must **only** be used when there is so little information noted that the context record is valueless and where all material from it should therefore be discarded or treated as unstratified. An example is where a context number has been assigned (and perhaps some finds have been recovered), but the context has not been further recorded so there is no information on where or what it is. In this case, the Context subclass can be changed to VOID. This decision is usually taken by the supervisor.

Do **not** use VOID where the context (and any material from it) are OK, but the number is a duplicate or where the context has been shown to be the same as another context. The Same As relationship should be used to relate these contexts (section 3.4.3 above)..

All VOID records **must** have a database entry. If you have started a paper record sheet, **don't** discard it (write VOID on it), and **don't** delete any information you have already entered on the database.

When you void a context, you must explain why in the Site Comments attribute on the Text tab of the context record in the database.

4 RECORDING STRUCTURES AND STRUCTURAL ELEMENTS

The Masonry and Timber Records enable structural remains encountered during excavation to be recorded in the same way as the structural remains of standing buildings. Where relevant this will enable seamless integration of the site excavation and building recording records.

Masonry and Timber records are subclasses of the Context class. The other subclasses of Context are Deposit and Cut (described in Module 3). All contexts have the same class level fields, and each type has additional specific subclass level fields. Sites may require a combination of Masonry and/or Timber records along with the Deposit and Cut records.

A structural context number is assigned to each stratigraphic element of the structure being recorded. For example, where a wall has two or more different builds, each is given a context number, and their respective relationships are recorded.

When recording masonry or timber buildings, care should be taken to look out for graffiti and mason's marks. These must be noted and be photographed individually, and may on occasions be given a separate cut context number.

The **whole structure** should also be recorded as a Structural Group. Relationships should be made to **all** contexts in the group (See Module 3, section 3.9.1).

For advice in taking samples for dendrochronology contact the Scientific Dating Team. Further information is available in the Historic England dendrochronology guidelines (English Heritage 1998), which are currently being revised.

4.1 MASONRY AND TIMBER RECORDS: CLASS LEVEL ATTRIBUTES

All types of contexts – Deposits, Cuts, Masonry and Timber - have the same class level attributes.

Context No

Assign each context a unique number as soon as you have defined its extent, using the Context Index (see Section 1.6, Record Number Allocation). The numbers are often assigned in blocks by trench (site subdivision), and the same number sequence is used for all contexts, whether Cuts, Deposits, Timber or Masonry.

There are separate paper recording sheets for Cuts, Deposits, Timber and Masonry contexts.

You will also need to create a spatial record for the context when you assign the number. Ideally this will be the full outline, but if that is not possible a single point should be surveyed as a label (read Section 8.4, Total station surveying and the Intrasis database.

All dimensions should be measured in metres to two decimal places. Record the dimensions of the context within the excavated area. If a context extends beyond the trench edges, or is deeper than the depth of excavation, this should be noted in the 'Dimensions Comments' field. The dimension fields are numeric - they can't include text of symbols such as <, >, or ?.

Length is always measured along the longest visible axis of a feature.
Width is perpendicular to length.
Diameter is only measured for contexts that are circular (or sub-circular) in plan. In the case of structural contexts this dimension is likely to be rarely used – for example in the case of prehistoric structures or apsidal elements.
Height is the maximum recordable height, for example of a wall
Depth is the maximum recordable depth, for example of a foundation.

Excavation method
Describe how the context was excavated; for example whether it was excavated by trowel, mattock/shovel or machine

Weather
Note any weather conditions which affected work or recording.

Excavated by/date and Recorded by/date
Enter all the people who excavated the context and one person responsible for recording it (all staff names should be in the drop-down lists). This is to help with checking and resolving any queries.

4.2 MASONRY SUBCLASS ATTRIBUTES
Attributes which relate only to masonry contexts or which have a different set of alternatives depending on the type of context (such as Simple Name) are recorded at subclass level in the database.

Simple Name
The simple name of the context is a brief description, such as ***Drain; Wall***; ***Well***. It uses controlled vocabulary so contexts can be grouped by type during assessment and analysis. The terms are in a drop-down list in the database.

Orientation
The orientation of the context in plan.

Materials: Facing/Core

Brick	***Sandstone blocks***
Chalk blocks	***Sandstone rubble***
Chalk rubble	***Stone blocks***
Flint pebbles	***Stone rubble***
Limestone blocks	***Struck flint***
Limestone rubble	***Tiles***

Material size
The size of the materials used in metres and recorded to two decimal points. Variations within a material category should be

noted, as should the size of any particularly significant items.

Finish

A description of the surface treatment of the masonry materials used. Each face should be described if different.

Roughly hewn	irregular
Roughly squared	approximately rectangular, rough edges
Squared	rectangular with sharp edges
Ashlar	smooth, accurately cut stones
Eroded	naturally abraded, rounded, or undefined edges

Coursing

The coursing or bonding pattern of the materials that form the structure. Both faces should be described if different. Use the terms as shown in Figures 4.1, 4.2, and 4.3.

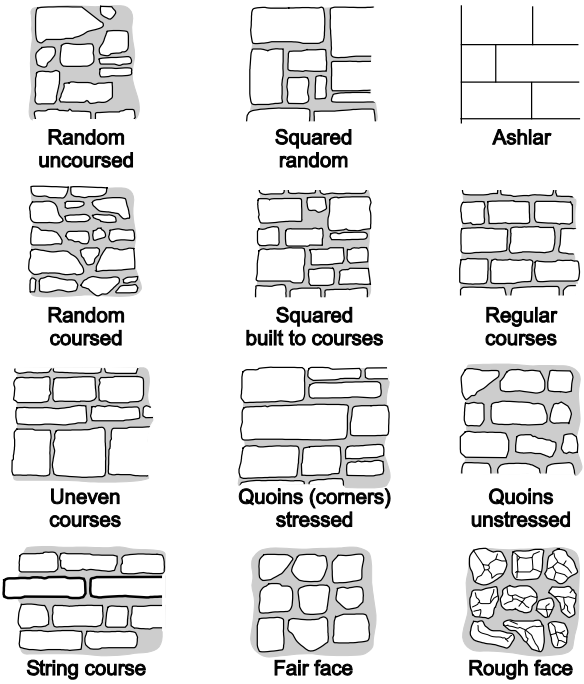


Figure 4.1 Common types of coursing in stonework. After Museum of London 1994

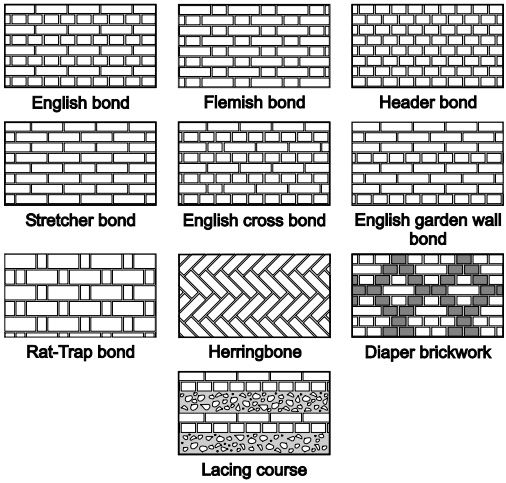


Figure 4.2 Common types of bonding in brickwork

Bricks may be laid ***on bed***, ***on edge*** or ***on end***.

A brick laid along the length of a wall is a ***stretcher***. A brick laid across a wall is a ***header***.

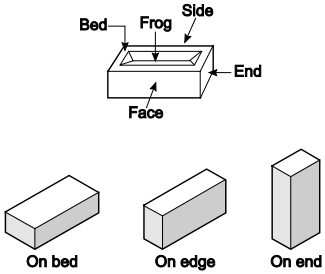


Figure 4.3 Terminology for use in describing bricks

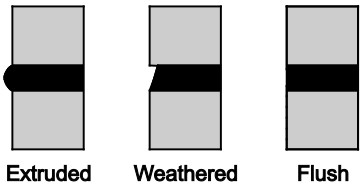
Bonding material

A description of the bonding material used. Lime mortar is the most frequently encountered material, although cement mortar, clay or earth are also used. If the structure has no bonding material, e.g. dry-stone wall, this should be stated.

Pointing

A description of the manner in which the bonding material has been treated. Please use terms as shown in Figure 4.4.

Figure 4.4 Types of pointing used in brickwork



4.3 TIMBER SUBCLASS ATTRIBUTES

Attributes which relate only to masonry contexts or which have a different set of alternatives depending on the type of context (such as Simple Name) are recorded at subclass level in the project database.

The objective of timber recording is the collection of sufficient data to:

- establish its position and situation in relation to other features on the site
- establish its form within the limits of the excavation
- determine, where relevant, its order of assembly
- enable it to be dated
- enable the structure to be drawn up as an isometric projection

Simple name

The simple name of the context is a brief description using terms in the specific site glossary or the glossary at the end of this module.

Species

If identification to species takes place on site, this field is completed by the project timber specialist. The record must note the name of the person making the identification.

Condition

The terms used should follow the controlled vocabulary lists set out below. Choose as many as appropriate.

Complete	*the timber has nothing missing*
Old break	*the timber was broken in antiquity*
Modern break	*the timber is broken as a result of modern activity*
Charred	*the timber is damaged by fire*
Sooted	*the timber is blackened by soot*
Worn	*the timber is smoothed or altered in shape by use, e.g. as timber stairs or timber threshold*
Decayed	*the timber shows signs of a breakdown in structure, usually as a result of the action of rot*
Insect attack	*the timber has evidence of damage by boring insects, e.g. woodworm; beetles*
Bark present	*Timber has bark present*
Sapwood present	*Timber has sapwood present*
Knotty	*Timber has a number of knots where branches were present*
Straight grained	*Timber is without knots*

Re-use

Yes or No

If the timber is re-used, describe this in the Comments field.

Inclination angle

The angle the timber makes from the horizontal (90º is vertical, 0º is horizontal).

Orientation

The orientation of the context.

Conversion

The method of timber conversion. Use terms as shown in Figure 4.5.

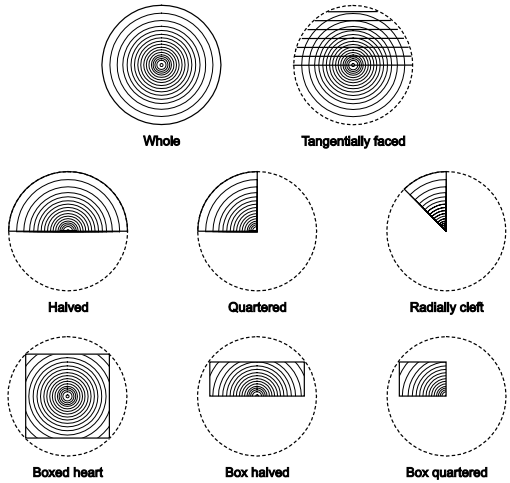


Figure 4.5 Methods of timber conversion for structural use.

Assembly marks

A description of any assembly marks. Carpenters' marks are generally variations of Roman numerals, scratched, punched or chiselled onto the upper face of the timbers. Assembly marks also include laying-out marks and lines used to set out the geometry of the frame and as construction aids.

Tooling description

A description of any evidence of the tools used in the preparation of the timber, e.g. saw, chisel, adze, auger marks.

Joint type

The type of the joint used to attach timbers together. Figure 4.6 shows the most commonly encountered types of joint (controlled vocabulary), although there are numerous variants of these as they have been adapted for specific purposes.

If the timber is Jointed To several others, list their numbers and the type of joint used in Site Comments attribute on the Text Tab.

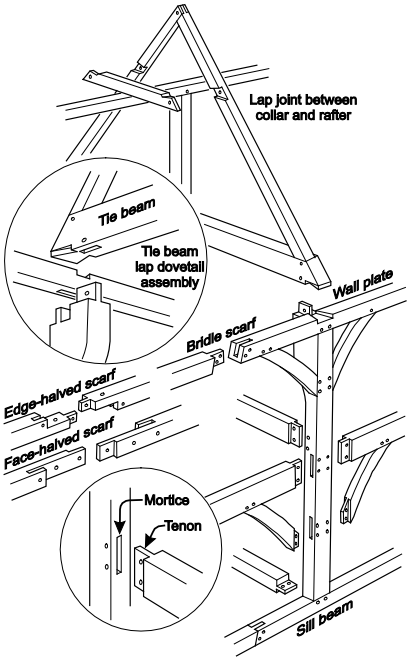


Figure 4.6 Common types of joints used in timber framed construction. After Harris, 1979, 12.

4.4 RECORDING RELATIONSHIPS

Accurate recording of relationships is essential for understanding the development of the site, its finds assemblages and the environmental evidence recovered.

In the Intrasis database, there are three types of relationships:

- Stratigraphic: the stratigraphic relationship, Later Than/Earlier Than
- Physical: physical relationships – these include Fill Of/Filled By, Contains/Is Within and Bonded With, Butts/ Butted by and Cuts/Is Cut By for masonry and Jointed To for timber.
- Contextual: all the other relationships you create on site for Masonry and Timber contexts.

Note relationships on the paper sheet, and create them using the Relation tab in the database. The relationships **link** records – so if you record that a masonry or timber context Is Shown on a Photograph, the Photograph record Shows that context.

Stratigraphic relationships

The stratigraphic sequence of the site is the key to understanding the order of events on the site (see Module 2: Stratigraphy and Matrix Compilation). It is the keystone of phasing and most other interpretation that takes place during assessment and analysis.

Record stratigraphy by using the mini-matrix on the paper sheets and the Later Than/Earlier Than relationship in the database.

The **stratigraphic** relationships between contexts are recorded and interpreted through the construction of a Harris matrix. The matrix is built up as the fieldwork proceeds and the mini-matrix on the sheets is the first step in this process.

It is vital that these relationships are recorded correctly. The stratigraphic matrix only records direct stratigraphic. If you have any questions about this aspect of recording, always ask.

Record the direct stratigraphic relationships in the mini-matrix on the paper record sheet. In the database, the information is recorded in the database by creating Later Than/Earlier Than relationships.

Don't show physical relationships (relationships between those contexts which are merely in physical contact with each other) in the mini-matrix on the record sheet or on working matrices.

It is important when dealing with standing buildings, and below ground archaeology, to ensure that the stratigraphic relationships are fully integrated, and that the above ground archaeology is thought of and recorded as a continuation of that below ground (and vice versa).

If you are working with a complex feature or a group of features, it is often useful to produce a 'working matrix'(see Section 2.2.2.).

Compile this on the paper Working Matrix sheet, and then scan it, import it into the database, and relate it to the contexts it shows. Supervisors should compile and update working matrices of their trenches as work progresses.

Physical relationships

These are the physical relationships between structural elements.

Butts/ Butted By

This relates structural element where one is built up against an existing feature. For example, in Figure 4.7a the later wall A Butts wall B, and the earlier wall B is Butted By wall A. Similarly, a timber context may be Butted By a later wall or floor surface.

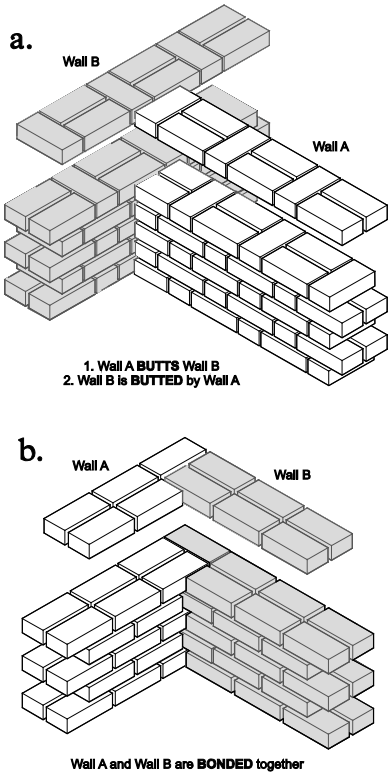


Figure 4.7a+b Example of the physical relationships 'Butts', 'Butted by', and 'Bonded with'. Note that these terms also can apply to structural materials other than brick.

Bonded With

This relates structural elements which have been constructed at the same time but whose form or alignment requires their being distinguished. An example is shown in Figure 4.7b, where two walls set at right angles have been built up together and have interlaced\interlocking courses of building material. A timber beam set into a wall can be recorded as Bonded With it.

Jointed to

This records when there is a joint between two timbers.

Cut by

The context numbers of any **cuts** whose creation has resulted in the removal of part of the context being recorded. Masonry and Timber contexts can be cut, but cannot cut another deposit (though a masonry wall's foundation trench will).

Same as

The context numbers of any structures that have identical physical attributes to the structure being excavated. For example, two segments of the same wall, excavated in different trenches and given different context numbers. Do not make assumptions. If you use this field, you **must** include a statement about the basis for the decision in Comments field, and enter it in the Text tab in the project database.

Filled by/Fill of

The context number of building material used to fill other contexts, e.g. the cut for an inserted doorway would have the doorway as the 'Fill of, (reciprocated in the Deposit and Cut Form with 'Filled by'). In plan a structure might be the 'Fill of' its foundation trench.

Contains/Is Within

This relates a feature to elements included within its build of the context, such as the relationship between a wall and contemporary doors or windows within it. The wall Contains the window, and the window Is Within the wall.

Contains/Is Within must **not** be used to link cuts to their fills (use Filled by/Fill of), or to create groups (use Consists of/Part of).

When you record a context as Within another, **don't** also record direct stratigraphic relationships (Earlier Than/Later Than) for it. Contains/Is Within is **not** a stratigraphic relationship, and care is needed when creating matrices (see Section 2.2.2).

Contextual relationships

All relationships which are neither stratigraphic nor spatial are defined as contextual in the database. In general the relationship names are self-explanatory, so only a few are described here.

Has/Collected From

Relates contexts to finds and samples, including dendrochronological samples.

Consists of/Part of

This relationship is used to link a Structural Group to the contexts it Consists of. See Section 4.5.2 below.

4.5 DESCRIPTION AND INTERPRETATION

4.5.1 COMMENTS AND INTERPRETATION

Information from these fields on the record sheets is entered into the Site Comments and Site Interpretation attributes on the Text tab in the database.

Comments

Record any additional information not covered by the above fields, and comments qualifying the information in them, particularly where there is uncertainty about any aspect.

For example, note if the context extends beyond the excavated area. You could give an estimate of the overall size of the context, or state that no estimate was possible. Also note uncertainties of relationships; difficulties of excavation and/or recording; odd

characteristics; and the rationale behind the designation of the context as the same as another, etc.

Give additional information about the materials used – for example, describe individual bricks and how they are laid using the terms shown in Figure 4.3.

Describe any fittings, mason's marks or graffiti present.

If a timber is jointed to more than one other timber, make it clear which timbers are jointed with which type of joint.

Interpretation

Give a basic interpretation of the context explaining the evidence for, and reasoning behind, the conclusions that have been reached. This is an important field, as it will be the only record of the on-the-spot interpretation of the person excavating the feature, and it can be an important aid in post-excavation.

You can change your interpretation in light of later excavation – please don't delete the original, but add your revised view and initial and date.

Supervisors can also add comments to the Interpretation, and should initial and date their remarks to make it clear whose interpretation it is.

Sometimes your interpretation may include creating a Structural Group (see Section 3.9.1). For example, a number of walls, butting or bonded will make a building.

4.5.2 STRUCTURAL GROUPS

It is often useful to group structural elements – for example, several walls and a floor may be grouped as a building.

There are no paper recording sheets for Structural Groups (except for Burial Groups), and they are usually created directly in the project database. As they are an interpretation of what you have excavated, you'll find them under 'Interpretative Data' not

'Excavation Records'. Describe the group in the Text tab, giving the reasons for your interpretation. Make an annotated sketch of the group. Scan the sketch sheet and import the image into the database.

The Consists of/Part of relationship is used to relate the Group to the contexts it Consists of.

4.5.3 SKETCH

You can sketch individuals timber or masonry elements, the way they are related into a structure, or, if useful, the material they comprise (such as individual bricks or stones)

Draw sketches on the context sheets as appropriate (plans, sections, elevations etc), with an approximate scale (or a comment 'not to scale'), north point, co-ordinates and dimensions, context numbers, and annotation as necessary.

Sketches are very useful in interpretation, particularly if an element of interpretation doesn't show well in the formal drawn record. Draw this separately and don't just copy from the permatrace drawings. Sketches have a different purpose – to draw attention to interpretative aspects of the context.

4.6 REFERENCES

English Heritage 1998 *Dendrochronology: Guidelines on producing and interpreting dendrochronological dates*. Swindon: English Heritage

Etherington D, 1991 Drawings in Fleming R, Honour H, and Pevsner N *The Penguin Dictionary of Architecture* (4th Edition). Penguin Books.

Harris, R 1979 *Discovering Timber-Framed Buildings*. Princes Risborough: Shire Publications.

Museum of London, 1994 *Archaeological Site Manual*. London.

GLOSSARY OF SIMPLE NAMES for Masonry Structural Elements

A

Abacus – flat slab on top of capital
Abutment – masonry placed to counteract the thrust of a vault or arch
Alcove – recess or niche in a wall
Apex stone – top stone of a gable end
Arch – spanning of an opening by means other than that of a lintel

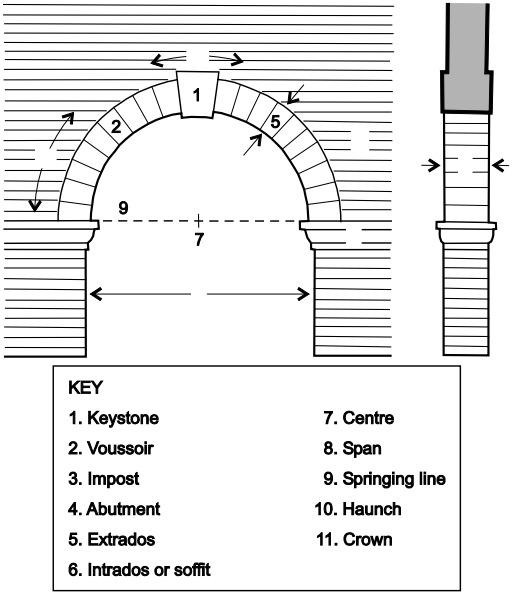


Figure 4.8 Terminology applied to arches in built structures. After Etherton 1991, 16.

Different arch styles:

3-centred arch (3 arcs)
drop arch (pointed with span > radius)
corbelled arch
4-centred arch (4 arcs)

lancet arch (pointed with radius > span)
ogee arch
equilateral arch (2 curves, each with radius = span)
relieving arch (arch placed over an opening to discharge weight from above)
segmental arch (2 centres below the springing line)
shouldered\Caernarvon-headed arch (arch with stepped squared central section)
strainer arch (preventing walls from leaning)
Tudor arch (late medieval – quarter circles with straight lines running to apex)

B

Band\plat band – projecting string course
Batter – inclined face of wall
Bay – vertical division, internal or external, not necessarily marked by walls
Blind Tracery – tracery applied to the surface of walls
Blind window - elements applied to a wall without an opening
Boss – ornamental projection at the intersection of ribs
Bracket – projecting stone to carry weight
Brickwork
Bridge
Bulls eye window – circular window
Buttress – mass of masonry or brickwork projecting from or built into a wall to give strength

Different buttress types:
angled
clasping
diagonal
flying

C

Capital – the top part of a column
Casement window – vertically hung sash opening in or out
Chamfer – formed when the right-angled edge of a piece of wood or

stone is cut away (see Fig. 4.9, mouldings)
Chimney breast – the stone or brick projection containing the flue
Chimney stack – stone or brick containing several flues
Cladding – external covering to wall for aesthetic or protective purposes
Cob – walling material made of clay, gravel, straw and sand (or combination)
Column – free-standing upright, circular in section
Compound pier – pier with several shafts
Coping – capping or covering of a wall, either flat or moulded, to throw water off

Corbel – projecting block, usually stone, supporting beam or other member
Corbelling – brick or masonry with courses built out beyond the one below
Cornice – projecting ornamental moulding at the top of a building
Course\Lacing Course – layer of stones or brick \ binding face of wall with core
Curtain wall – outer wall of castle, usually with towers

D

Dais – raised platform at end of medieval hall for head of house
Door
Dormer – window opening on a sloping roof
Drip (hood) mould – projection above opening to divert water

E

Embrasure – recess for a window or door opening

F

Facing – the finishing applied to the outer surface of a building

G

Gable – triangular upper portion of wall at the end of a pitched roof

Garderobe – medieval lavatory

H

Herringbone work – stone, brick or tile laid diagonally, with courses alternating in direction
Hip – external angle formed by the meeting of two sloping roof surfaces

I

Impost – projecting bracket-like moulding on which the end of an arch appears to rest

J

Jamb – vertical face of an archway, doorway or window – the part of the jamb that lies between the glass or door and the outer wall surface is called the reveal
Joggled joint – a notch or tooth in the joining surface of any piece of building material to prevent slipping

K

Keystone – central stone of arch or vault

L

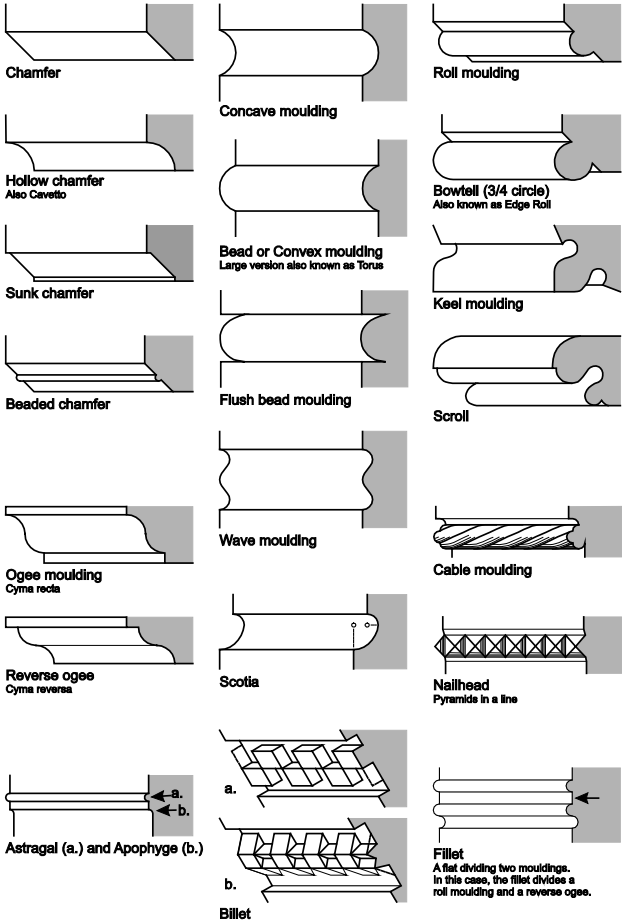
Lintel – horizontal beam or stone bridging an opening
Loggia – gallery or room open on one or more sides
Long and short work – eg Saxon quoins

M

Machicolation – parapet projecting on brackets on the outside of a wall with openings in the floor for weapons\oil etc
Mantelpiece – wood, brick or stone surrounding a fire
Mathematical Tiles – tiles applied to timber-framed walls to make them appear brick built
Mortar – lime-based material used for bonding building fabric
Mouldings – the carved contours given to elements of a building

structure, such as a door arch (see Figure 4.9)
Mullion – Vertical element of a window (see Figure 4.12)

Figure 4.9 Common types of moulding.



N

Nogging – brickwork infilling timber framing

P

Padstone – term for a stone block used variously as the base for a

post, as the springing point of an arch, or as a supporting block within a wall for a timber member
Panel – flat surface, sunk or raised within a framework
Parapet – low wall, sometimes battlemented, placed to protect any spot where there's a drop
Pier – solid masonry support, distinct from a column
Pilaster – shallow pier projecting only slightly from the wall face
Pillar – free-standing upright member – doesn't have to be cylindrical
Plinth – the projecting base of a wall or column

Q

Quoins – dressed stones at the corners of a building, laid so their faces alternate long and short

R

Rendering – plastering of an outer wall
Rib – projecting band on a ceiling or vault (see Fig.4.10)

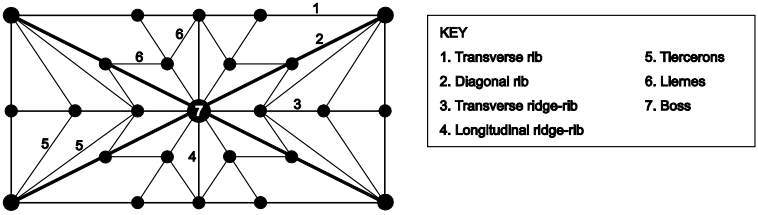


Figure 4.10 Terms for ribs used in a rib vault. After Etherton, 1991, 462.

S

Shaft – the trunk of a column between the base and capital
Sill – the horizontal member at the base of a timber-framed wall (see Fig.4.13), or the base of a door or of a window frame (see Fig.4.12)
Skirting – the edging attached to the base of an internal wall
Spandrel – the triangular space to the outside of the haunch of an arch
Splay – the sloping chamfered cut into walls, e.g. for a window opening

String Course – horizontal band set into and projecting from the surface of an external wall, usually moulded

T

Tracery – decorative forms of window openings (see Figure 4.11)

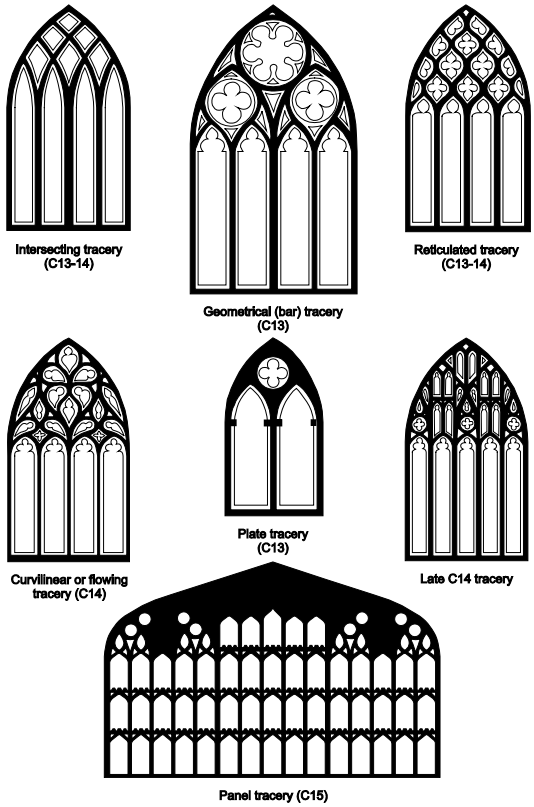


Figure 4.11 Common types of tracery. After Etherton 1991, 447.

Transom – horizontal bar in a window (see Fig.4.12)
Tusking – stones left projecting from a wall for subsequent bonding into another wall

U

Undercroft – vaulted room beneath an upper room

V

Vault

W

Wall
Wall footings\foundations – material used to form a structurally sound base for the construction of the wall above. The depth and width of the footings and material used varies greatly and depends on the nature of the site and on the available building material
Web – compartment of vault
Well
Window (see Figure 4.12)

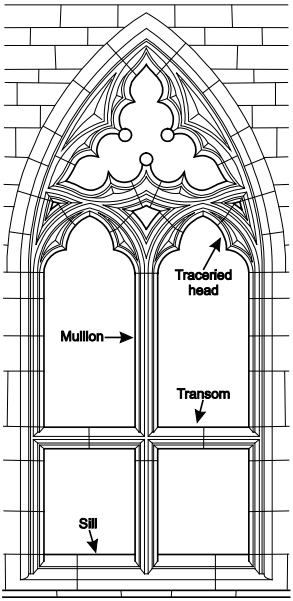


Figure 4.12 Terms for parts of a window

GLOSSARY OF SIMPLE NAMES for Timber Structural Elements

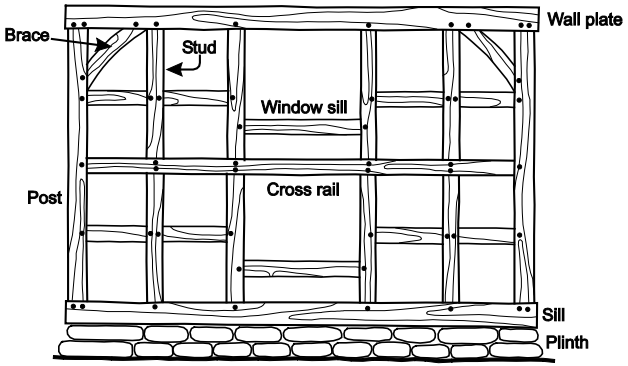


Figure 4.13 Terms for members in a timber frame. After Etherton 1991, 445

B

Beam – a horizontal timber member

Collar Beam – beam tying together a pair of rafters, distinct from a tie beam

Tie Beam – beam tying together the feet of principal rafters preventing their spread and forming the roof truss (see Fig.4.15)

Brace – a diagonal timber used to strengthen a timber frame (see Figure 4.13)

C

Close studding – walls constructed of timber posts set very close together, the spaces infilled with plastered panels

Cross rail – a horizontal member of a timber framed wall (see Fig.13)

Crucks – truss formed from pairs of curved timbers, known as blades, the pair frequently derived from the same tree

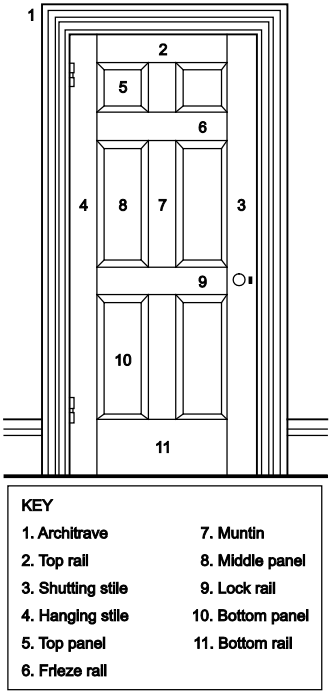


Figure 4.14 Terms for parts of a door. After Etherton, 1991, 128.

D

Door (see Figure 4.14)

J

Jetty – the projection of an upper storey beyond the one below – created by beams and joists of the lower storey projecting beyond the external elevation

Joist – horizontally laid timbers between the walls and beams of a building to carry the floorboards

L

Lath and plaster – strips of wood (laths) nailed to other timbers that are coated in plaster to form a wall finish

Louvre – lantern-like structure in a roof with an opening in the sides for the venting of smoke

P

Pargetting – exterior plastering of a timber framed building, usually decorated into naturalistic patterns, eg foliage, figures
Plank – a wide piece of sawn timber, usually 1½ to 4½ inches thick and 6 inches or more wide
Post – in wall frames, vertical timbers that are the full height of the frame (shorter uprights are studs) (see Figure 4.13). In roofs – posts are the vertical timbers that carry longitudinal ones

Crown post
Hammer post See roof descriptions below
King post
Queen post

Purlin – a horizontal longitudinal timber
Butt purlin
Collar purlin
Side purlin
Trenched purlin
Ridge purlin

R

Rail – short horizontal timber in a timber framed wall (see Figure 4.13)
Rafter – inclined timbers sloping from the wall top to the apex and supporting the roof covering
Principal Rafter – rafters that are the main structural inclined timbers in the roof trusses (see Figure 4.15)
Common Rafter – rafters that infill between the principal rafters

Ridge – the horizontal timber at the apex of the roof supporting the top ends of the rafters

Roof -

Hammerbeam – roof consisting of trusses that have a pair of brackets (the hammerbeams – like a tie beam with the central section missing), supporting the hammer posts that in turn support the rafters
King post – roof consisting of trusses with a single timber from the tie beam to the apex of the roof, supporting the ridge purlin
Queen post – roof consisting of trusses with a pair of vertical timbers sat on the tie beam supporting the side purlins
Crown post – roof with a crown post standing on a tie beam to support the collar purlin, and usually with 4 struts
Pitched – roof with gables at both ends
Hipped – roof with sloped instead of vertical gable ends
Lean-to – roof with one slope only and built against a vertical wall
Mansard – roof has 2 pitch angles, the lower being longer and steeper than the upper

S

Sill beam (or Sole Plate) – the lowest member of a wall frame into which the posts and studs of the frame are tenoned (see Figure 4.13)
Stud – intermediate posts between the main posts in a timber frame (see Figure 4.13)
Strut – sloping supporting timbers in a frame

T

Tenon – projection from the end of a timber to sit in a mortice (see Figure 4.7 above)
Tie beam – beam tying together the feet of principal rafters preventing their spread and forming the roof truss
Timber framing – a method of construction where walls are built of jointed interlocking timbers

Truss – triangular framework within the roof, self-supporting and dividing the building into bays

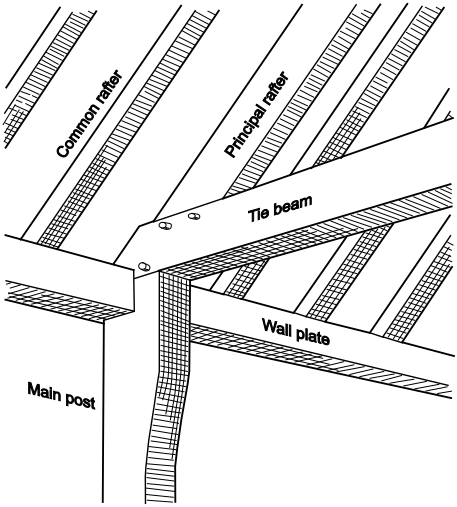


Figure 4.15 Terms for common members in a timber roof structure. After Harris, 1979, 7.

W

Wattle and daub – system used to infill panels in timber-framed structures, comprising of vertical staves of oak, interwoven with fine flexible branches or twigs, usually of hazel, and daubed with a mixture of mud, dung and chopped straw
Wall plate – horizontal timber along the wall top to receive the rafters of a roof (see Fig.4.13 and 4.15)
Weather boarding – form of wall cladding composed of overlapping horizontal boards on a timber framework
Window sill – the lowest horizontal member of a window frame (see Fig.4.12)
Wind brace – brace running from principal rafter to purlin to strengthen the frame

5A THE EXCAVATION, CARE AND RECORDING OF FINDS: COLLECTION AND INITIAL RECORDING OF FINDS ON SITE

This module is divided into two sections:
Part 5A contains the introduction and describes collection and initial recording of finds on site (Section 5.1 and 5.2)
Part 5B contains the procedures for processing, recording and packing finds (Sections 5.3 to 5.7 and the references (Section 5.8)

Many types of find can be found on archaeological sites, providing valuable indicators of the social and economic lives of those present in the past. Finds may provide the only evidence for a site (e.g. flint scatters) and are recovered as part of intrusive investigations (including field walking and metal detector survey).

This module documents finds procedures from the pre-fieldwork Project Design stage to the Site Archive Completion point at the end of the fieldwork stage. It provides guidelines for the recovery, recording, care and on-site processing of Bulk Finds, finds recovered from Samples and individually recorded Small Finds.

The procedures documented in this module provide a general guide to on-site processing procedures. Further, specific procedures may be required for some sites or some categories of finds; these will be documented in the site Project Design and explained to the finds staff. Appropriate finds specialists will have been consulted at the project planning stage so that recovery strategies and specialist visits can be planned. The finds supervisor should contact the project finds officer (PFO) as soon as is practicable if unexpected finds are encountered; good communication is of paramount importance.

If you are unsure of any of the procedures, or if unexpected types or quantities of finds occur, please ask for advice straight away. Site staff should initially ask the finds supervisor, and the finds supervisor should contact the project finds officer at Fort Cumberland.

A conservator is assigned to every field project and can also be contacted for advice.

5.1 INTRODUCTION

5.1.1 DEFINITIONS

Assemblages – all finds are recorded in the project database under the Assemblages class. Small Finds, Bulk Finds and Finds from Samples are distinguished by the way in which they are recovered and recorded, using the Method of Recording attribute.

Bulk Find - this term is used for any material from a stratigraphic context that is recorded and bagged as a material group, for example pottery, building materials, animal bone. These categories may vary depending on the site.

From Sample – this is similar to Bulk Finds, but is used for finds recovered from Samples which are recorded and bagged as a material group (the term is not used for individually objects recorded as Small Finds – see below).

Small Find - individually recorded items. This term covers any item (however large!) that is given a unique number and individually recorded. This can vary depending on the date and type of site, and will be decided by the project manager (PM) and PFO. Any unusual requirements will be noted in the Project Design. Small Finds include objects such as coins, metal finds, worked bone, beads etc., and any material that needs to be individually located or three dimensionally recorded on site, or requires tracking (see Section 5.4.3.1).

Small Finds can be recovered as part of sampling a deposit (see Module 9). If any Small Finds are recovered while taking or processing a sample, they must be recorded as coming from the sample **not** directly from the Context.

Glossaries

Fields using controlled vocabularies (glossaries) are identified in ***bold italics*** in this module and on all recording sheets. In the project database, these terms can usually be selected from a drop-down list.

We use controlled vocabulary to ensure our data can be readily indexed, summarized and interrogated.

Throughout the Recording Manual, Attribute (field) names and Relationship names are shown in a different font, for example Condition, Count Has/Collected From, Stores/Stored in and Sent to/Is Receiving.

5.1.2 THE NEED FOR FINDS PROCESSING AND RECORDING

The recording and curation of finds is as important as the site stratigraphic record. The way finds are recovered, the care given to them during and after recovery, and their recording will all have a major impact on the information that can be gained from a site.

Full integration of finds, environmental, and stratigraphic evidence during assessment and analysis underlines the necessity to handle, process and record finds in a systematic and efficient fashion (see English Heritage 2008 MoRPHE PPN 3). In general a finds data set should provide:

- evidence of site usage and site formation processes;
- a means of understanding, elucidating, refining and dating the stratigraphy;
- answers to a wide range of trade and socio-economic questions.

Historic England Project Designs incorporate the following:-

- a strategy for collection, retention, discard (if appropriate), and 'first aid' conservation of finds
- the likely effect of burial conditions on site, if known
- references to any appropriate terminologies to be used
- any site specific glossaries, if required

Although the Project Design will cover finds policies and procedures, these may require modification during the excavation. This applies particularly to discard or retention policies. However, changes must not be made without the prior agreement of the PFO, and any such changes must be documented as a Decision in the Notebook Class of

the project database and will be noted by the PFO in the Site Archive Completion report.

5.1.3 CARE OF FINDS

Initial care of finds should be in line with the principles and techniques outlined in the HE Recording Manual, First Aid for Finds (Watkinson & Neal 2001), and, if waterlogged organic materials are encountered, the Waterlogged Wood Guidelines (English Heritage 2010, section 3.3) and Waterlogged Organic Artefact Guidelines (Karsten et al 2012, section 4).

During fieldwork, the named project conservator will be available to advise on and assist with the retrieval of finds and make any adjustments to the planned materials and categories selected for X-radiography (see Fell *et al* 2006, section 4).

Before finds are lifted, handled and processed, thought must be given to the potential requirements for analysis, in particular biomolecular analysis and dating where certain lifting and packaging materials could preclude future analysis (see Karsten et al 2012, Section 5, and Section 5.2.1.1 below). Seek initial advice from the PFO and project conservator. As appropriate, consult the intended specialist for these analyses for information on any protocols that should be followed.

5.1.4 SITE FINDS AND THE TREASURE LAW

Should material covered by the Treasure Act 1996, or The Treasure (Designation) Order 2002, be found, the finds supervisor must immediately notify the project manager and project finds officer, who will report it in accordance with the requirements of the Act.

Ask the PFO if you are still unsure what constitutes Treasure, or refer to the Portable Antiquities Scheme (PAS) website https://finds.org.uk/treasure. The PAS leaflet *Advice for Finders of Treasure* is available in the Site Library.

Treasure includes

- Any metallic object, other than a coin, provided that at least 10 per cent by weight of metal is precious metal (that is, gold or silver) and that it is at least 300 years old when found. If the object is of prehistoric date it will be Treasure provided any part of it is precious metal.
- Any group of two or more metallic objects of any composition of prehistoric date that come from the same find (see below)
- Two or more coins from the same find provided they are at least 300 years old when found and contain 10 per cent gold or silver (if the coins contain less than 10 per cent of gold or silver there must be at least ten of them). Only the following groups of coins will normally be regarded as coming from the same find: Hoards that have been deliberately hidden; Smaller groups of coins, such as the contents of purses, that may been dropped or lost; Votive or ritual deposits.
- Any object, whatever it is made of, that is found in the same place as, or had previously been together with, another object that is Treasure.

Taken from https://finds.org.uk/treasure/advice/summary

5.2 COLLECTION AND RECORDING

All finds are recorded under the class 'Assemblages', but this can be undertaken in three ways:

- an individual (***Small Finds***) basis – the detailed recording of individual items
- a collective (***Bulk Finds***) basis – the collection and recording of items by stratigraphic context and by material
- during sampling (***From Sample***) (i.e. either a percentage or total sampling of a deposit, collected as a whole-earth sample)

Trench side coarse sieving is **always** recorded as a sample (unless it is specifically stated otherwise in the Project Design). See Section 9.2.5. The recording, processing, and investigation of small and bulk finds are covered in this module of the manual.

There is additional information on

- finds from samples in Section 9.6.3
- 3D recording using the total station in Section 8.4.3.2

All finds **must** be kept in clearly labelled trays or bags from the moment they are excavated - all finds trays and bags must be labelled **before** any finds are collected in them. It is the responsibility of the project archaeologists and site supervisors to ensure that this is done, and that of the finds staff to check the trays and bags when they are taken to the finds office.

Finds trays and bags must be taken to the finds office once excavation of a context is completed, or at the end of each day. **Under no circumstances** are finds trays or bags to be left on site overnight. If a context is dug over more than one day, use a different finds tray for each day.

Fragile materials (including prehistoric pottery, human and animal bone, metals and waterlogged finds) should not be left exposed on excavated surfaces any longer than necessary. They should be covered in hot, dry or windy weather to give them some protection. The covering selected should not damage the objects or materials they are protecting (i.e. they should not abrade, crush or contaminate the archaeological remains). Suggested materials include plastic sheeting or Tyvek (depending on whether they are wet or dry) or more solid protection (such as an upside down sample bucket secured in place).

Always seek advice from the PFO, conservator or other appropriate project specialist if you come across any unusual, fragile or waterlogged finds (including animal bones or plant materials). See Section 5.2.5 below.

5.2.1 METHOD OF RECORDING: SMALL FIND

Each Small Find is given a unique number, taken from the appropriate Small Finds Index recording sheet.

The number can be:

- Allocated on site, using the Small Finds Index – Finds from Site
- Allocated in the finds office, using the Small Finds Index – Finds from Finds Office
- Allocated following Sample processing, using the Small Finds Index – Finds from Samples.

Where finds are numbered on site, they will normally be three dimensionally (3D) recorded immediately (see Section 8.4) and their database record is created when the total station (TST) data is imported into the database.

The nature of the archaeology and the project objectives will determine the site-specific strategy (specified in the Project Design), but generally the following items are individually recorded:- all metal items, glass, worked bone, worked antler and non-structural worked wood, leather objects and textiles, ceramic and stone objects, and architectural stone. Animal Bone Groups (ABGs) are also always recorded as Small Finds (see Section 5.2.5.3).

If a decision has been made to record the location of a particular find (or class of find) in three dimensions on site, the object is treated as a Small Find, regardless of the material from which it is made or if it would normally be classed as a Bulk Find.

Use the Small Find Index sheet to allocate a number and record basic information about the find and its location. Give an initial description (e.g. copper alloy brooch; bone comb, in numerous fragments; 3 small sherds of prehistoric pottery). Normally each item has a separate number, but occasionally one number is given to a group of pieces, such as a few potsherds found close together and apparently from the same vessel. Items such as coins or beads should always have separate numbers even if found in groups. Make additional notes on the find spot, recovery and disturbance if useful (e.g. 'by right arm of skeleton Human Remains 12356'; 'possibly disturbed by rabbit burrow'; 'found loose in spoil'; 'one of a group of 7 coins').

If the Small Find is discovered on site while you are taking a sample, it should be recorded as coming from the Sample both on the Index form and when you survey it using the total station (TST).

Each Small Find is normally placed in a polythene bag (but see 5.2.1.1 below). The bag must be labelled on the outside and also have a waterproof label (Tyvek® tag) inside (use the black permanent marker pens supplied **not** a biro or Sharpie). Each label must give the Project Code, Year, Site subdivision, Small Find number, Context number, and your initials and the date. If the Small Find is found while you are taking a sample, the label **must** also show the sample number as that is the primary relationship.

5.2.1.1 Collecting finds for residue analysis

Where finds such as pottery may be used for residue analysis, the item should be kept from direct contact with plastic, and a small ***Specialist*** sample should be taken from around the item to act as a control. The sherds should be wrapped in foil and then placed within a labelled bag. Sherds should **not** be washed or marked.

Where sampling for residue analysis has been planned as part of the project details of the procedures will have been laid out in the PD. If in doubt consult the PFO or the project conservator.

5.2.2 METHOD OF RECORDING: BULK FIND

On many sites some material categories, particularly those looked at in groups rather than as individual items, e.g. pottery and animal bone, are recovered and recorded together (i.e. all the pottery from one context is collected and recorded together). However, on some sites all finds will be recorded individually. This will usually be determined before the start of excavation and noted in the Project Design. Occasionally unexpected finds or other factors may necessitate a deviation from the Project Design; this will be decided by the PFO and PM. It should be documented by the PFO as a Decision in the Notebook Class of the project database and will be noted in the Site Archive Completion report.

Bulk finds are placed in finds trays. These must be labelled **before** finds are put in them, using two waterproof labels (Tyvek tags)

attached to the tray with a treasury tag and marked using a black permanent marker pen (**not** a biro). Each label carries the same information: Project Code, Year, Site subdivision, Context number, and your initials and the date.

Individual bones that are likely to fall apart and jaw bones with teeth should always be placed into labelled bags so that pieces belong together are kept together. Groups of associated animal bones must be recorded as Small Finds - Animal Bone Groups (see Section 5.2.5.3 below).

5.2.2.1 Subdividing Contexts for Bulk Finds retrieval

Extensive or deep contexts may be subdivided for finds retrieval purposes, to allow the distribution of material to be examined without the need to number and three dimensionally record every individual sherd or object. Material is collected as bulk finds from horizontal gridded divisions (usually into 1m squares) or by excavating in spits (usually 0.1m deep) (see Section 1.4). Each grid square or spit must have its outline surveyed.

Each division is given a separate context (deposit) number, although the deposit being excavated within these squares or spits is in fact one stratigraphic unit. The Divided Into/Division Of relationship is used to link the spits or squares to the overall deposit record.

5.2.3 METHOD OF RECORDING: FROM SAMPLE

Coarse-sieved and Flotation samples are always taken as whole earth samples (see Section 9.2.3).

Fragile finds should be removed from the sample, placed in a bag or small box labelled with the sample and context numbers and handed to the site finds staff. Note on the Sample Record that the material has been removed. If appropriate, the finds should be assigned Small Find numbers and, if seen while still *in situ*, surveyed using the total station.

Less fragile items can be put in a bag labelled with the sample number and placed in the top of the sample bucket.

Individual bones that are likely to fall apart during excavation and processing should be always bagged up individually (all fragments in the same bag). This is particularly important for mandibles which might lose their teeth as we cannot use them for ageing unless we know which teeth belong to the mandible. Label the bag with the sample and context numbers, and put it into the top of the sample bucket.

For fragile finds and animal bones seen in situ, take a photograph before lifting them if it may be useful to the specialist to see how they were discovered.

Where finds are recovered during sample processing

- material to be recorded and bagged as a material group (the equivalent of Bulk Finds) will be quantified and bagged by the environmental processors (see Section 5.4.2)
- the environmental processors will hand Small Finds over to the finds staff as soon as practicable, ensuring each find is labelled with the sample number and the Fraction from which it was recovered. The finds staff should allocate them numbers from the 'Small Finds Index – Finds from Samples' sheet, and create the new SF record, relating it to the Sample (i.e. not to the Context).

5.2.4 FIELD WALKING AND METAL DETECTING COLLECTION

Material from field walking is usually collected by grid square or transect, with a Context (Deposit) number assigned as a unique identifier to each square or transect. In addition to the context number, the grid square or transect number (and usually a grid reference) must also be written on bag labels.

Sometimes our field walking will form part of a wider area project (for example, field walking parts of a World Heritage Site), and in these cases we will follow the relevant WHS or area methodology to ensure data compatibility.

Metal detecting can take the form of systematic recovery similar to fieldwalking (and be recorded in the same way). However, often it

consists of scanning spoil heaps, in which case deposits numbers should be assigned to the spoil heaps and their locations described (e.g. 'Spoil heap at west end of Trench B').

Finds from fieldwalking and metal detecting are recorded and processed in the same way as excavated material, as either Small or Bulk finds within the Assemblages class. The Fraction is entered as ***Surface collection***.

5.2.5 FINDS REQUIRING SPECIAL CARE DURING EXCAVATION AND RECORDING

5.2.5.1 Human Remains and Grave Goods

Please read Module 10 Human Remains carefully **before** excavating any human inhumation burials, and follow the lifting, recording and sampling guidance given in Section 10.4. Cremation and pyre deposits are excavated as ***Specialist*** samples – see Section 5.2.5.2 below and Section 9.4.3.3.

Grave goods can be found with inhumation or cremation burials. It is particularly important that any grave goods, grave furniture and coffin fittings are accurately recorded as Small Finds, including planning, photography and 3D recording. Rectified photography or photogrammetry of burials is always required (see the Project Design and Modules 7.8 and 10.4.2).

The orientation of objects, both relative to the body and north-south must be recorded in some i*n situ* images, as it is potentially important for reconstructions of clothing and objects. Use the TST in reflectorless mode for accurate surveying (see Module 8.4.3.2).

As well as planning an inhumed skeleton at 1:10, you may need to redraw selected areas of both inhumation and cremation burials at a larger scale to record the detail and exact position of these objects, including orientation (datum points, upper and lower sides). Each object must be given a separate number, and its location precisely planned. This applies even if a group of objects look identical and even if they are lifted in a soil block - for example each of a cluster of small similar beads requires its own number and must be labelled on the plan.

Block lifting should always be considered for grave goods (in consultation with the PFO, project conservator and osteologist). Soil block are micro-excavated in the lab by the conservator to understand the relationship of, for example, all the beads and to see if any organic 'stringing' material remains. Coffin nails also need individual numbers and must be planned.

Take additional close-up photographs and photographs from different angles to show details of the grave goods.

If you notice any fragile objects during sampling the grave floor (see Section 10.4.5), they should be removed and bagged separately to avoid damage, and the sample number must be written on the bag and label.

Grave goods and grave furniture must be noted on the Burial Group Record.

5.2.5.2 Cremation related deposits

The excavation and sampling of cremation related deposits is described in Sections 9.4.3.3 and 10.1.

Identification of the type of cremation deposit, as far as is possible in the field, is essential. 100% sampling of most deposits is recommended, with the exception of large deposits of pyre debris, where specialist advice should be sought from the project osteologist.

Key points

- **Block-lift cremation urns with their contents.** Cremation urns should be block lifted for X-radiography and micro-excavation under laboratory conditions. Lifting requires the skills and expertise of a project conservator or field staff experienced in lifting. In the first instance, the project conservator should be contacted for advice (see Section 5.2.6)
- **Block lifts are recorded as Samples**, with subclass (Simple Name) ***Block Lifts***. Fill in the database record, making sure you include the method of lifting and geolocation attributes (how the block is marked to ensure it

can be correctly orientated in the lab). As for most samples, the outline must be surveyed. Give the urn and its fill separate context numbers – the urn should also be assigned a Small Find number (see Section 1.4).

- **Cremation related deposits** should generally be half-sectioned to allow the vertical distribution of the deposits to be recorded and then dug and recorded in spits (see Sections 1.4 and 3.4.2).

5.2.5.3 Animal Bone Groups (ABGs)

Groups of associated animal bones (whether complete skeletons or just a few articulating bone elements, or unfused parts) have great evidential value (see pages 13-14 in Baker, P and Worley, F 2014, *Animal Bones and Archaeology: Guidelines for Best Practice*. English Heritage). They should usually be excavated in their entirety, and as soon as possible after they are exposed and recorded, to prevent their deterioration.

ABGs are assigned Small Find numbers and recorded using the Animal Bone Group forms (there are separate forms for mammals, birds and fish). They must be surveyed in (record an approximate outline round the group), photographed (including a photo with photo targets which can be rectified – see Module 7, section 7.8) and planned (usually at 1:10), and the skeleton diagram on the back of the ABG form must be filled in. There also is space on the forms for a sketch, which can be annotated with additional information such as any associated finds.

If the ABG is a complete/near complete skeleton or contains small bones, samples for coarse sieving should be taken (see Section 9.4.3.1). For small animals (birds, fish, cats or smaller mammals) sample the entire area of the ABG. For larger animals, sample the regions with small bones (feet, abdomen and head). Follow the bagging guidance on the ABG form. All bags must be labelled in the usual way for Small Finds (see Section 5.4.3.2).

If all or part of the ABG is fragile, it may be better to block lift it (see Section 5.2.3.6 for advice on lifting). ABGs that are block-lifted are

recorded as ***Specialist*** samples, and the sample must be related to the ABG record.

If you find any unusual or poorly preserved bone deposits (such as bone working waste or bone used in floors or well linings), seek advice from the finds and environmental supervisors, who will consult the project environmental officer (PEO), PFO and project conservator as required (see Baker and Worley 2014, sections 3.1.5.2 and 3.1.5.3).

5.2.5.4 Industrial Debris

Most industrial debris should be recorded as Bulk Finds. In most cases industrial debris is not encountered *in situ*. When *in situ* evidence for metalworking or glassworking is expected, the methods of excavation, finds recovery and sampling will be specified in the Project Design and must be followed carefully. This could include grid-based excavation, recording and whole earth samples. If industrial debris in primary contexts (such as furnaces, hearths, floor surfaces or pits) is encountered unexpectedly, **stop excavating** and ask for advice. The supervisor or finds supervisor should contact the PM and PFO, who will get advice from the Ancient Technology specialists.

Finds such as crucibles, tools and scrap metal are normally recorded as Small Finds; however, if large quantities of such material are recovered from a secondary context it may be appropriate to record such material as bulk finds. The decision to record as bulk rather than small finds must be made in consultation with the PM, PFO and Ancient Technology specialist.

While most metalworking debris comprises slag which generally survives well on archaeological sites, some categories of waste (e.g. ceramic moulds used for casting) are friable. The excavation of substantial deposits of such material should take place after consultation with the PM, PFO and relevant specialist. Glassworking debris is highly variable: some comprises large lumps of glass, while others may be small, fragile or heavily weathered (and unstable). Seek advice from the PM, PFO and relevant Ancient Technology specialist. Some minerals and metal production wastes are harmful, so **stop excavating** and seek advice if you come across something you don't

recognise. See Historic England (2015) *Archaeometallurgy: Guidelines for Best Practice,* especially pages 9-12.

5.2.6 FRAGILE AND WATERLOGGED FINDS, BLOCK LIFTING AND CONSERVATION ADVICE

5.2.6.1 First Aid Conservation

During fieldwork the project conservator may need to stabilise materials *in situ* to enable their safe recovery. The project conservator should be contacted in the first instance to discuss concerns regarding fragile and unstable objects or ecofacts.

The project conservator will discuss first aid conservation with the PFO and, as necessary, other specialists such as the project zooarchaeologist and the Scientific Dating team to discuss requirements and to ensure that the work is timely and does not interfere with any requirements for analysis including scientific dating. First aid conservation work will be carried out by the project conservator or under their supervision.

5.2.6.2 Waterlogged Finds

Depending on the nature of the site, waterlogged organic artefacts can be found in abundance or as the occasional chance find (see Table 5.1). The quantity of waterlogged finds recovered will determine whether material is recorded as bulk finds or as small finds.

Table 5.1: Materials and the waterlogged burial environments in which they are preserved

Preserving waterlogged soil types (pH)	**Material**
neutral (or weak acid/alkali) to alkaline	bone
acid to neutral	horn
acid to alkaline	leather
acid	animal fibres: silk, wool
alkaline	plant fibres: flax, hemp
acid to alkaline	wood

If wet deposits with waterlogged organic materials are encountered, the project conservator will make a site visit to advise on and assist with the recovery and storage of waterlogged materials, as required. If appropriate cold storage facilities are not available onsite, the project manager should arrange the removal of the finds to nearby cold storage facilities or, to Fort Cumberland as soon as possible.

5.2.6.3 Lifting

Finds may look more stable in the ground than they actually are. The soil matrix gives support to these fragile materials, which is lost as soon as lifting is attempted.

Lifting can be beneficial for:

- Fragile finds such as fractured ceramics, organic objects or totally corroded metalwork
- Complex or composite objects such as wet objects, vessels with contents or grave goods
- Areas of degraded organics such as dark soil stains surrounding artefacts or mineralised organic materials associated with grave goods.
- Unstable ecofacts such as waterlogged bone and antler

Block lifts are recorded as samples (see Section 9.2.4).

The artefacts or assemblages must be recorded before they are lifted. Plan them at a suitable scale, and take photographs (see Module 7, Section 7.5.1 on photographing finds in situ). Include an overall photograph with at least four photo targets so a georeferenced rectified image can be created (Modules 7.8.1 and 8.4.3.7).).

The lifting of fragile material or assemblages requires the skills and expertise of a project conservator or field staff experienced in lifting. In the first instance, the project conservator must be contacted for advice.

For detailed advice on lifting approaches and techniques and for materials to be used for lifting. See Watkinson & Neal 2001 (section 7: Lifting Fragile Objects) and Karsten et al 2010 (section 4: Lifting, Handling and Processing on Site).

General principles for lifting

- Knowing when to ask for help is important to ensure a successful outcome and recovery of objects and to prevent the loss of important information. The project finds officer and project conservator are available to provide support and advice.
- Lifting must be carefully planned to ensure that
    - the most appropriate technique is selected;
    - the appropriate specialists have been contacted (to arrange receiving the items and to ensure the lifting proposal does not affect proposed work, analyses or scientific dating);
    - enough staff with appropriate experience are in place;
    - all the staff have been briefed on the plan;
    - all the necessary materials are ready;
    - that there is sufficient time to undertake the lifting (i.e. not starting near the end of the day and ensuring there is enough time to pack post-lifting and, if required, transport to controlled cold storage).
- Ensure there is a contingency plan in the event of the lift being more complex than anticipated or adverse weather conditions.
- Large-scale lifting projects such as kilns, mosaics and other heavy items like lead coffins may require the assistance of other specialists such as civil engineers.
- A record of the artefact or assemblage must be made before lifting; of the materials used to lift the artefact (including handling precautions); and, of the actual lifting process. These records are vital to the individual processing the lifted find or assemblage.
- Ensure that the lifted item is fully labelled on the packaging with all relevant information including site code, sample number and simple name, numbering, orientation (top / bottom, compass bearings), handling precautions (how to handle; health & safety issues)
- It is generally advisable to adopt a passive lifting system; that is *not* to lift the artefacts directly, but do so with the aid of a board or similar support, so that the artefacts do not have to bear their own weight and the weight of soil (and water) within them. This approach should be used especially for large, flat and thin items.

Lifting with the surrounding soil in place is also possible.

- Generally it is best to make use of durable, water-resistant and non-corrosive materials. Care should be taken to avoid using materials that leave impressions on the object (e.g. bubble wrap or bandages directly on soft surfaces).
- For waterlogged and damp finds, special care has to be taken that the lifting materials selected can withstand constant contact with water
- Use what is easily obtainable or even naturally available to support an object or soil block, or to fill empty spaces in a box (eg sand or soil). To avoid contamination of the archaeology place a separating layer (such as cling film) between the artefact and any material introduced, and ensure that materials only recommended for short-term use are removed after lifting.
- All lifted finds should be dispatched to the Project Conservator or other specialist (as agreed with the PFO) as soon as possible accompanied with all associated information (data and image files).

5.3 DISCARD POLICIES

In most cases discard or retention policies for finds are only formulated after excavations have begun in response to very large quantities of certain groups of material, usually fragmentary building materials of either ceramic or stone. A single discard policy cannot be applied to all sites and it is agreed on a site by site basis, formulated by the project finds officer and agreed with the project manager.

In no circumstances is a discard policy instigated without the prior agreement of the PFO.

5B THE EXCAVATION, CARE AND RECORDING OF FINDS: PROCEDURES FOR PROCESSING, RECORDING AND PACKING FINDS

Many types of find can be found on archaeological sites, providing valuable indicators of the social and economic lives of those present in the past. Finds may provide the only evidence for a site (e.g. flint scatters) and are recovered as part of intrusive investigations (including field walking and metal detector survey).

This module documents finds procedures from the pre-fieldwork Project Design stage to the Site Archive Completion point at the end of the fieldwork stage. It provides guidelines for the recovery, recording, care and on-site processing of Bulk Finds, finds recovered from Samples and individually recorded Small Finds.

The procedures documented in this module provide a general guide to on-site processing procedures. Further, specific procedures may be required for some sites or some categories of finds; these will be documented in the site Project Design and explained to the finds staff. Appropriate finds specialists will have been consulted at the project planning stage so that recovery strategies and specialist visits can be planned. The finds supervisor should contact the project finds officer (PFO) as soon as is practicable if unexpected finds are encountered; good communication is of paramount importance.

If you are unsure of any of the procedures, or if unexpected types or quantities of finds occur, please ask for advice straight away. Site staff should initially ask the finds supervisor, and the finds supervisor should contact the project finds officer at Fort Cumberland. A conservator is assigned to every field project and can also be contacted for advice.

This module is divided into two sections:
Part 1 contains the introduction and describes collection and initial recording of finds on site (Section 5.1 and 5.2)

Part 2 contains the procedures for processing, recording and packing finds (Sections 5.3 to 5.7 and the references (Section 5.8)

5.4 FINDS PROCESSING PROCEDURES DURING FIELD WORK

It is Historic England policy that all primary processing of finds is undertaken as part of the fieldwork stage of the project. Occasionally it is not possible to process finds on site, but the basic guidelines remain the same.

All finds must be clearly labelled from the moment they are excavated, and finds trays must be taken to the finds shed once excavation of a context is completed, or at the end of each day. Under no circumstances are finds trays to be left in or by a trench on site overnight, and if a context is dug over more than one day, a different finds tray must be used for each day. It is the responsibility of the finds supervisor and site supervisor to check that this is being done.

The on-site finds staff (supervisor and assistants) are responsible for ensuring that all finds documentation is accurate, correctly completed, and internally consistent.

Prior to the end of excavation and leaving site, the finds staff should ensure that different categories of finds are subdivided as appropriate into separate boxes. Bulk finds are boxed in context order, and Small Finds ordered by small find number.

All files, boxes and large finds must be clearly labelled with the site name, project code, year, site subdivision (if used) and contents. For boxes the first and last record numbers (context, sample or Human Remains) should also be added, e.g. Whitby Cliff IV, Site 409, 2007, SSD Q36, Pottery, 4083–5761.

The finds supervisor should note any problems, queries or unfinished work as a Notebook record in the project database. Print the notes and put a copy in the front of the Small Finds ring binder (you can copy and paste the Notebook text into Word to print). A list of the initials

used and full name of **all** those filling in the forms should also be put in the front of the Small Finds ring binder (if this includes any people who do not have a Staff class record in the project database, also make a Notebook record listing them).

The condition of finds will vary, not only from site to site, but from context to context, so the following procedures are for general guidance. In cases of uncertainty finds staff should always refer to the PFO in the first instance. The project conservator can provide detailed advice on condition and implications for care of finds

In no circumstances is a discard policy instigated without the prior agreement of the PFO.

5.4.1 PROCESSING BULK FINDS

As soon as excavation of a context is completed, or first thing the next day, finds trays should be checked prior to washing by the finds staff and any fragile items or metal finds that should not be washed should be placed in a labelled bag or container and removed. At this stage the finds tray should only contain bulk finds that can be washed and it should contain at least two labels, preferably fixed to the finds tray with treasury tags.

Usually pottery, ceramic building materials, animal bone, clay pipes, architectural stone, human bone and metal-working slag can be washed (see Processing Prompts in Section 5.4.1.3).

5.4.1.1 Washing and drying Bulk Finds

Washing should be done with copious and frequently changed lukewarm water and soft brushes. No cleaning products, such as detergents, should be used. No material should be scrubbed so vigorously that surface detail is removed, or surfaces scarred.

Where deposits such as sooting or carbonized residues are present on pottery or traces of paint or lime wash on architectural stone, the finds **should not be washed**. Don't try to remove burning or staining from human or animal bones. Seek the advice of the PFO, and see

Section 5.2.1.1 for advice on collecting pottery for organic residues analysis.

Inexperienced finds washers should be given appropriate training and carefully supervised. If you are uncertain about anything, please ask the site finds supervisor or the PFO. Knowing when to ask for help is important to ensure a successful outcome and to prevent the loss of important information.

During finds washing it is **essential** that one label always remains with the unwashed material and one label is with the washed material. If more than one tray is needed, additional labels must be written at the time.

Look at what is about to be washed before you start and if in any doubt - STOP!

Drying washed finds should be spread out (not heaped) on drying racks or trays lined with newspaper and left to dry naturally.

Care must be taken not to confuse groups of material from different contexts. Ideally, trays will only contain material from one context. If it is necessary to put finds from more than one context is put on a tray, a roll of newspaper must be taped to the tray to act as a barrier between them.

Direct heat should not be used to speed up the drying process (except with prior approval from the PFO).

5.4.1.2 Damp or waterlogged?

Waterlogged material is defined as material coming from contexts that have been permanently waterlogged such that normal decay processes have not occurred, usually since they were deposited.

Where wet deposits are encountered, the project conservator will visit site to advise (see Section 5.2.6.2). Waterlogged finds should not be washed or dried out. They require appropriate cold storage facilities. **Do not** store waterlogged finds (or boxes containing them) in a fridge containing food or drink for human consumption.

Care should be taken with **ALL** categories of material coming from waterlogged deposits and **before** even pottery and bone is dried out it should be checked by the project conservator or the PFO.

Damp material – nearly all material recovered from sites in England is damp to some degree when found. For most material this is not a problem, but care needs to be taken not to let organic material, such as wood, leather, cloth, jet and shale, and some types of glass, dry out any further. (See below for guidance for bagging and boxing).
Never wrap damp finds in acid free tissue paper. Do not leave damp finds in sealed bags, unless absolutely necessary for short periods (for transport, for example).

5.4.1.3 Processing prompts

See Tables 5.2 and 5.3.

Always seek advice from the PFO if you are uncertain.

Table 5.2 Finds - Initial cleaning prompts for Bulk Finds

Material	**Wash**	**Mark**	**Keep damp**
Bone - animal (unworked)	Yes	No	No
Bone - human	Yes	Yes	No
Ceramics:			
Ceramic – building material	Yes	Yes	No
Ceramic - clay pipe	Yes	Yes	No
Ceramic – pottery, except prehistoric or Saxon	Yes **– but see below**	Yes	No
Ceramic - prehistoric or Saxon pottery	Normally not – check with PFO		No
Ceramic - pottery with traces of organic residues	No	No	No
Fired clay/Daub	Check with PFO first	No	No
Glass	No	No	Dry, but keep damp if recovered wet.
Industrial debris	Check with PFO first	No	No
Slag	Yes **– but see below**	No	No
Crucibles and moulds	No	No	No; see Small Finds
Leather and textile	No	No	See below
Metalwork - modern	No	No	Probably outside collection policy
Shell, unworked	Yes **– but see below**	No	No
Stone, general	Yes **– but see below**	Yes	No
Flint	Yes	No	No; see Small Finds
Wood	No	No	See below

****If** traces of paint, pigments or lime wash survive, or sooting or food residues are present, **do not wash**
****If** an object crumbles, erodes, or flakes on washing: **stop!**
****If** slag has any burnt clay or traces of furnace lining, hearth or crucible attached, **do not wash**

Table 5.3 Bulk Finds - Recording and bagging prompts

Material	Weigh	Count	Bag	Box type
Animal bone (unworked)	Yes	Yes	Perforated	Cardboard
Ceramics				
Ceramic building materials	Yes	Yes	Perforated	Cardboard
Pottery	Yes	Yes	Perforated	Cardboard
Pottery for residue analysis	Yes	Yes	Wrap in foil before bagging and boxing	
Fired clay/Daub	Yes	No	Perforated	Cardboard
Clay tobacco pipes	No	Yes	Perforated	Cardboard
Glass				
- if dry	No	Yes	Perforated	Cardboard
- if recovered wet			Keep wet	
Human skeletal material **	Yes	Yes	Perforated	Cardboard
Industrial debris	Yes	No	Perforated	Cardboard
Metalwork modern	No	Yes	Probably outside collection policy – check PD	
Shell	No	Yes	Perforated	Cardboard
Stone (inc. bulk flint)	No	Yes	Perforated	Cardboard
Wood				
- if wet	No	Yes	Sealed	Polyethylene
- if dry	No	No	Perforated	

**Bulk Find Human bones only – bones from burials with Human Remains records are not weighed or counted on site.

5.4.1.4 Marking Bulk Finds

Table 5.2 (Initial cleaning prompts) sets out what categories of finds should be marked. When completely dry (which can take several days) appropriate material as listed above should be marked with the Site Code and Context number separated by a slash, e.g. 123/45678.
For pottery, most stone and some other porous objects, a base for marking should be made using a layer of Paraloid B72 (an ethyl-methacrylate co-polymer) in acetone. The marking should be fixed with an overlying layer of Paraloid B72 in acetone; if in doubt consult the PFO. Pottery must be washed and completely dry before it is marked.

Paraloid B72 in acetone is covered under the COSHH regulations (HSE 2005) and users must ensure that the COSHH assessment is read before its use (a copy will be available in the finds office and in the 'Site Library' folder on the site computer network).

Pottery intended for chemical analysis or analysis or organic residues should not be sealed or marked.

Marking should be small, neat and **legible to others!** Make sure the way you write various numbers is clear. Care should be taken to avoid scoring the surface with the pen. Numbering should be discreetly located e.g. not on the front face of a pottery sherd (think about the future use of the object).

Marking should be done using a fine permanent felt tip pen or flexible nibbed mapping pen and black Indian ink. In the case of black surfaces, use a flexible nibbed mapping pen and white Indian ink. Pens should be kept clean and nibs if used changed frequently. As a general rule all fragments bigger than 20mm should be marked; on very small fragments only the context number only can be used. **If not all pottery is marked** because the fragments are too small write on the bag 'some unmarked'.

Usually there is no need to mark pottery on breaks as this can make it difficult to read. Marking should be done on the inside or under side of sherds wherever it can be determined – never mark decorated surfaces. If a complete but broken pot is recovered in situ only the exterior base sherd(s) should be marked.

Stone should only be marked on a broken surface. The size of lettering should be appropriate to the size of the stone, but never more than 1cm high. Large architectural stone should be marked in two opposite places if possible. If there is no broken surface, consult the on-site finds staff or PFO first.

Do not mark material if it is due to be discarded on site. This usually applied to Ceramic Building Material (CBM) and items should only be marked after the discard policy has been implemented.

5.4.1.5 Bagging Bulk Finds and Finds from Samples

See Table 5.3 (Recording and Bagging Prompts). You should aim to quantify and bag all the material from one context at the same time.

Bulk Finds

Material should be bagged in suitably sized polythene grip top bags. Each bag should be pierced top and bottom and **must** contain at least one label. Usually grip top bags with a top closure and white panels are used. All bags must be marked using the permanent fine black pens supplied (**not** biro or Sharpie).

Bulk Finds bags and labels require the following information:

- Site name
- Project Code
- Year of excavation
- Site sub division (if used)
- Context number
- Material

Do not over fill bags, and if more than one bag is used each bag must carry an indication of the total number of bags (e.g. Bag 1 of 3). If larger bags without grip tops are used these should have two labels put in them, which can be read from the outside, and the tops must be secured with string.

Do **not** separate pot sherds by fabric unless you have been asked to do so by the PFO. This doesn't help the pottery specialist – it takes longer to record pottery if there are more individual bags to handle.

Finds from Samples
Material recovered from any form of sampling should be placed in a separate bag with the same information as for Bulk finds, plus

- Sample number
- Fraction (e.g. >4mm; 2-4mm)

These bags should be **placed inside** the main bag.

DO NOT mix hand retrieved and sample retrieved material.

5.4.2 PROCESSING FINDS FROM SAMPLES

The PEO, PFO and PM will decide on a site-by-site basis whether Assemblages recovered 'From Samples '(see Section 5.1.1) will be processed, recorded and bagged and entered into the project database by the finds or environmental site staff. Further information and the processing prompt are in Section 9.6.3 and Table 9.1.

Small Finds recovered from samples (see Section 5.2.3) are processed and recorded by the finds staff in the same way as other Small Finds.

5.4.2.1 Identifying material retrieved from samples

The sieving of flotation and coarse-sieved samples, fieldwalking and metal detecting of topsoil can produce a relatively large number of items that may turn out not to be finds (e.g. flakes of corrosion, stone) or to be modern. With agreement from the project finds officer and project conservator, the unidentifiable material could be X-rayed by Sample or Context number to ascertain whether they should be assigned Small Find numbers.

5.4.3 PROCESSING SMALL FINDS (INDIVIDUALLY RECORDED OBJECTS)

The following procedures apply to **all** items that are three dimensionally recorded on site, and anything that needs to be dealt with as an individual item, e.g. coins, most metals, worked bone etc., or anything that needs to be individually tracked. For convenience these are all called **Small Finds** in the procedures outlined below.

The PFO will determine the range and/or materials of objects to be treated as Small Finds in the Project Design, or on site if necessary.

5.4.3.1 Allocation of Small Find Numbers

All Small Finds, however recovered, should be given a unique identifying number as soon as possible.

Separate blocks of record number are allocated to

- for use on site, where Small finds are normally 3D recorded using the total station
- for use by staff in the finds office to allocate to objects not individually recorded on site but requiring individual numbers for tracking
- for Small Finds from samples.

DO NOT mix these blocks. Use the appropriate Index sheet:

- Small Finds Index – Finds from Samples
- Small Finds Index – Finds from Site
- Small Finds Index – Finds from Finds Office.

Finds staff are responsible for collecting completed sheets from site staff and filing them in a separate ring binder. Use these sheets regularly, both on and off the site, to check that you actually have received all the Small Finds given numbers on site – they should be handed in every day.

Generally one number is allocated to each item, even if several objects are found together. However, in a few cases one Small Find Number is given to a group of pieces from one context (for example, nails), but this must only be done with the prior agreement of the PFO. In the case of nails, the bag should only contain as many objects as will fit on an 18 x 24 cm X-Ray plate; if more than one bag per context is needed each bag is given a Small Find Number. Coffin nails from graves must always be separately recorded.

Never mix finds types or materials – if you have both iron nails and iron tacks, or lead off cuts and lead waste from the same context separate them and give each group a number.

List of items which should be treated as Small Finds:

Amber	Gold	Pewter
Antler	Horn	Shale
Clay – burnt or fired	Iron	Shell
Basketry	Ivory	Silver
Bone - Worked	Jet	Stone: Object
Ceramic Objects	Lead	Stone: Architectural
Ceramic Vessel	Leather	Stone: Semi-precious
Copper Alloy	Litharge (lead oxide)	Textile
Flint - worked	Metal - alloys	Unknown
Glass	Metal - other	Wood

5.4.3.2 Processing prompts for Small Finds

Key points:

- Do not wash
- Do not mark
- Use 'small find' printed bags (if available)
- Always separate metals into their different types
- Box by material – metal into Stewart plastic containers with silica gel and adequate packaging
- Always put fragile items into an individual crystal or Stewart Plastics container, with adequate packing
- Box in Small Find number order

Small Finds should never be marked (with the exception of architectural stones). Generally metal, stone, ceramic finds etc. should be allowed to dry out slowly and thoroughly before bagging in perforated bags and boxing. Fragile or delicate finds should be adequately protected and if necessary packed in a crystal plastic box with adequate packing.

Bags and crystal boxes must be labelled with the following information.

- Small Find number
- Site name
- Project Code
- Year of excavation
- Site sub division (if used)
- Context number

- Sample number (if appropriate)
- Frcation
- Material

5.4.3.3 Sketches and Photographs

Sketches

For most items a sketch is very useful (but don't attempt to draw coins). This is intended to be informative; 'publication quality' drawing is **not** required and shading is not usually necessary or helpful, but showing which parts are broken and sections across the object (in more than one place if necessary) are helpful.

Draw the sketch on a Small Finds Sketch sheet. If an object is smaller than the space available draw at life size, if not draw at approximately half or quarter scale and note this next to the drawing, 1:2 and 1:4 can be used to show this.

Photography

Small finds should be photographed *in situ* during excavation where this provides useful information about their context, location, orientation or condition, especially in the case of grave goods (see Section 5.2.5.1, Human Remains and Grave Goods) or before block lifting (section 5.2.5.2).

It is not usually necessary to photograph small finds in the site office. The PFO will advise what types of finds should be photographed, but in general it is a good idea to take photographs of anything particularly interesting or unusual to the site. When you take the photographs, think about what you are trying to show and the best way to achieve this. See Section 7.5, Finds Photography.

Photographs may be taken to:

- Record the condition of the object shortly after recovery, especially if it is fragile
- Send to the PFO or other specialists to ask for advice
- Record an object before it is sent off site to a specialist or for conservation

5.4.4 PROCESSING HUMAN REMAINS

Read Module 10, Section 10.5 for processing information.

5.4.4.1 Bagging and Marking Human bone

When dry, the bones should be marked with the project code and Human Remains number in waterproof ink. Isolated human bones (which are not given a Human Remains number) are marked with the context number, as for other Bulk Finds. Marking should be directly on to the bone, with no sealant used before or after marking.

The different areas of the skeleton should be bagged separately, normal separation is skull, torso, left arm, right arm, left leg, right leg with four separate bags for the left and right hands and left and right foot bones. They should be bagged in perforated labelled, self-seal, clear polythene bags. Any disarticulated bone in the grave fill must be kept separate from the articulated skeleton. The bags should be placed in acid-free cardboard boxes. The skull should generally be boxed separately from the rest of the skeleton, with packing to cushion it.

For further information see AML Report 124/91 (Mays 1991).

5.5 RECORDING FINDS IN THE PROJECT DATABASE

Apart from the Small Finds Index sheets and the Small Finds Sketch sheet, all finds are recorded directly into the project database as Assemblages class records. A **detailed crib sheet** for finds and environmental staff is available to help you through the data entry process. This section focusses mainly on the recording rather than the data entry.

Basic points

- Class level attributes are shown in the left hand window of the Assemblages record Attributes tab.
- The class level attributes available are the same for all Assemblages, but the fields to be completed differ. Fewer are required for Bulk Finds and finds from samples than for Small Finds (see Section 5.5.1 below).
- Assemblages are divided into subclasses using the Assemblage

Category attribute.

- Subclass level attributes are specific to the type of finds being recorded – for example, pottery requires different fields to flint, and copper alloy coins require different fields to copper alloy brooches.
- Subclass level attributes are normally only completed by project specialists during the Assessment stage of a project.
- Occasionally, site finds staff may carry out basic subclass-level quantification. This is **only** done if specified in the Project Design or by the PFO during excavation. See Section 5.5.1.2.

Record finds carefully and thoroughly – but **don't over-record**. For example, don't record pottery by fabric or note bone identifications in the Comments field/Text tab unless the PFO or PEO has asked you to do so. But do feel free to flag up anything interesting – for example, 'Pottery includes Nene Valley colour coat hunt cup' or 'Bones may include deer', noting who made the observation.

In the database, finds are recorded using **Attributes** and **Relationships.**

- **Attributes** are the fields that describe the find. They are shown in the **Attributes tab** of the Assemblages window. Type the information into the boxes, or select values from the drop-down lists.
- Longer attributes such as Comments are on the Text tab.
- **Relationships** are links between records. You create these in the **Relation tab** of the Assemblages window.

5.5.1 RECORDING ATTRIBUTES

5.5.1.1. Recording class-level attributes.

All Intrasis records include the Id, Name and Class attributes. Table 5.4 shows the full list of the other class-level attributes for Assemblages.

Table 5.4 Class-level attributes applying to the Assemblages class

	Small Find	Bulk Find	From Sample
Assemblage Category	**X**	**X**	**X**
Site Sub Division	**X**	**X**	**X**
Recording Method	**X**	**X**	**X**
Fraction	**X**	**X**	**X**
Material	**X**	**X**	**X**
Simple name	**X**		
Weight	**X1**	**X2**	**X3**
Count	**X**	**X2**	**X3**
Abundance		**X2**	**X3**
Site Checking Status	**X**	**X**	**X**
Assessed by	*Fill in at Assessment only*		
Report date	*Fill in at Assessment only*		
Functional Category	**X**		
Condition	**X**		
Completeness	**X**		
Parts Present	**X**		
Site treatment	**X**		
Length	**X**		
Width	**X**		
Thickness	**X**		
Height	**X**		
Diameter	**X**		
Composite Material	**X**		
Allocated by	**X**		
Allocated date	**X**		
Recorded by	**X**		
Date recorded	**X**		
Checked by	**X**		
Checked on	**X**		

X1 Check with PFO – not all Small Finds are weighed

X2 See Table 5.3 for quantifying Bulk Finds

X3 See Section 9.6.3 and Table 9.1 for quantifying finds From Samples

Id

This is the unique identifier for the Assemblages record. For Small Finds recorded on site using the total station, the record is created where the survey data is imported into the database.

- For Small Finds numbers assigned in the Finds or Environmental offices, you type in the record number you've allocated from the appropriate Index sheet.

For Bulk Finds and finds from sample, don't enter a value – the database will automatically assign one.

Name

This field (which appears in the Objects tree at the left of the screen) is used to hold some additional identify information. For finds, enter the Context number, or for finds recovered from samples, the Sample number/Context number.

Class

Select the Class when you create the new Assemblages record. If a Small Find was 3-d recorded in the trench, the record will already exist. The Class cannot be changed after the record is created.

Assemblage category

This field groups finds into broad categories ready for Assessment. Select the category from the drop-down list. This is the subclass designator (it determines which subclass levels fields are available for recording).

Recording Method

Select ***Bulk Find***, ***From Sample*** or ***Small Find*** as appropriate.

Fraction

This field records whether the material was hand-collected or recovered from a particular fraction of a sample during processing. Select the relevant term from the drop-down list. If the appropriate term isn't there (for example, the right sieve mesh size isn't showing), ask the project superuser or PFO to add the correct term to the list. This is a mandatory field - you must complete it for all assemblages records.

Material

The material(s) from which an object is made. Select from the drop-down list. Composite objects e.g. an iron knife with a bone handle require a multiple entry, with the greatest component selected first. If the relevant material is not in the list, select 'Other', make a note in the Text tab and ask the PFO for advice.

Simple name

The Simple Name is a basic description of the object type/form e.g. pin, bead. If the identity of an object is uncertain, ***object*** may be used but only as a last resort. For small undiagnostic pieces ***fragment*** or ***lump*** should be used as appropriate.

Weight (in grams)

Bulk Finds: note the total weight where required, but check Table 5.3 as some Bulk Finds are not weighed.
Finds from samples: see Section 9.6.3 – only some Finds from Samples are weighed.
Small Finds: only some types of Small Finds are weighed – ask the PFO for advice. Lead items should always be weighed.

Count

Bulk Finds: count the number of items present (but check Table 5.3 as a few types of Bulk Find are not counted).

Finds from samples: material is often quantified using an abundance scale rather than counted – see Section 9.6.3.

For **Small Finds**, this should only be more than 1 on the rare occasions (see above) when several objects have been recorded under the same record number. This field does **not** record the number of fragments. For example, part of a bone comb in 6 fragments should be recorded as 1 in the count box and the information about the number of fragments noted in the Comments attribute on the Text tab.

Abundance

This attribute – which records quantity using an abundance scale – is

used **only** for some types of **finds from samples**. See Section 9.6.3.

Assessed by and Report date

These fields are only filled in when the material is assessed.

The class-level attributes which follow are used only in recording Small Finds.

Completeness

The completeness of an object at the time of excavation (this is **not** fragment count).

Complete	excavated object has nothing missing
Almost complete	some pieces of the object are missing (over 75% present)
Incomplete	some pieces of the object are missing (less than 75% present)
Unknown	where it is not possible to know the size of the original object so the amount surviving cannot be estimated

Parts present

For some Small Finds which are not ***Complete***, record which parts of the object are present. The terms in the drop-down list depend on the **Simple name** of the find, and the filed will be greyed out if it's not applicable to the Simple name you've just entered. Select all the terms which apply.

Condition

It is only necessary to complete this field if the condition of an object at the time of excavation is listed below. Any other comments, such as unrecognizable, must be noted in the Text tab

Burnt	the object appears to have been in a fire
Organic remains	traces of organic artefact materials are present
Waterlogged	appears waterlogged

Site treatment
Any on-site treatment of the object. This will be rare but should include comments like 'kept damp'.

Dimensions

Length, **Width**, **Thickness**, **Height** and **Diameter**
For finds, dimensions are always measured in millimetres. Measure maximum length or height, width and thickness, or diameter, or overall dimensions if appropriate. Use the digital callipers if they are available.

Waterlogged timber should be measured as soon as exposed as it will shrink in width if exposed for any length of time. It should not be left exposed until a decision has been made regarding whether it is to be retained. See section 3.2 Recording in-situ in the Waterlogged Wood Guidelines (English Heritage 2010).

The Text tabs

There are two Text fields. **Comments** is used for additional comments and description. This should include such information as the number of fragments; broken ends, sides or edges; shape in section; colour(s) if relevant. Any additional useful or relevant comments should also be recorded here, for instance, the orientation of a brooch found in a grave. **Specialist Comments** is for use by the PFO or finds specialist only.

5.5.1.2 Subclass level attributes for basic on-site sorting and quantification of Bulk Finds

There are some types of Bulk Finds for which additional on-site sorting and quantification may take place during the fieldwork processing if specified in the Project Design.

The Assemblage Categories to which this may apply are

- Clay Pipe
- CBM
- Glass

In this cases, the count and/or weight for the entire group from a context should always be recorded in the class-level attributes (the left hand part of the screen) The count and/or weight by the subdivisions (e.g. for CBM, Tile, Brick, Roof Tile, Decorated Floor Tile) is entered at subclass level (the right hand part of the screen).

You should only do this level of recording if asked to by the PFO. Enter the quantification data using the subclass level attributes in the database (the right hand part of the Assemblages record). Select '***On site quantification***' in the Assessed By attribute for each record.

The PFO decides when this level of recording is appropriate, usually in discussion with the PM. If decided in advance, it will be stated in the Project Design. If decided on site, it will be recorded as in the Notebook/Decision section of the database and noted in the Site Archive Completion report.

5.5.2. RECORDING RELATIONSHIPS

Finds need to be related to

- the contexts or samples they are recovered from
- all photographs, site drawings or sketches they are shown on
- all X-rays they are shown on
- the box they are stored in
- any person or place they are sent to

Relationships **link** records – so if you record that a Small Find Is Shown On a Photograph, the Photograph record Shows the Small Find.

The relationships applicable to Assemblages records are all defined as Contextual relationships in the database.

Has/Collected From

A sample or context Has Assemblages
An Assemblages record is Collected From the Context or Sample it's recovered from. Assemblages **cannot** be Collected From cuts.

Where an Assemblages record is collected from a Sample, it must be related to the Sample but **not** also to the Context the Sample was collected from.

Stores/Stored in

This relationship links finds to the box they are stored in. Note that it is the Id of the Box Record not the Box Number (held in the Name field) which is used in the relationship.

Shows/Is Shown On

A find Is Shown On Plans and Images (photographs and sketches) - but note this relationship isn't used with Sections (see below)

Intersects/Is Intersected By

A finds shown on a section drawing Is Intersected By a Section.

Sent to/Is Receiving

Only use this when the find is taken away from site by a specialist (this includes finds taken to Fort Cumberland before the end of the fieldwork). Note the name of the specialist, the reason and the date the find was sent in the Comments attribute on the Text tab.

Create a Sent to/Is Receiving relationship to the Staff member receiving it. The Staff class includes external consultants – if the person concerned is not already set up as a member of the project staff (see under Project Management in the database), ask an Intrasis superuser to add them.
These are all defined as Contextual relationships in the database.

5.5.3 CREATING FINDS GROUPS

Occasionally objects are found as part of a related group, such as a coin hoard, grave goods, or the parts of a necklace. Each object (e.g. every bead in a necklace) must be given an individual Small Find number.

Create a new Finds Group record (under Interpretative Data in the database object tree) and describe the finds, explaining why you think they are a related group.

Use the Consists of/Part of relationship to link each Assemblages record to the Finds Group. The group Consists of its constituent finds, and the individual finds are Part of the Finds Group.

5.6 BOXING

5.6.1 THE BASICS

Do not mix Small Finds and Bulk Finds.

Bagged **Bulk Finds** should be subdivided into appropriate materials (see Table 5.4 below) and boxed in Context order.

Material **From Samples** should subdivided as for Bulk Finds, but boxed in Sample order. Flots and Residues must be boxed separately from other materials.
Note that some bags of finds From Samples are placed within the appropriate Bulk Finds bag (see Section 5.4.1.5). Check with the PFO.

Small Finds should be subdivided into metals and non-metals at an absolute minimum. Further subdivision will depend on the number and size of finds and the weight of individual items. Do not mix heavy and light or fragile objects - create another box if necessary. Small Finds should be arranged by Small Find number.

5.6.1.1 The Box Index Form

The paper Box Index Form is used to allocate Box Numbers and record box movements on site. A unique number (the Box Number) is allocated to each storage box.
Careful completion of this form is vital to the management of finds, as it tracks the whereabouts of both individual finds and boxes of finds.

There must be a consistent Box Index system for **all** types of materials (Finds, Human Remains and Environmental). This can either be achieved using a single Index file passed between Finds and Environmental processing, or two separate Index files using distinct numbering sequence for each. This will be decided by the PEO and PFO at the start of the project.

As with all paper record sheets, the Box Index Form must show the site name, project code and year of excavation, and sheets should be numbered (e.g. 'Sheet 7 of 9').

Individual small boxes (crystal and small Stewart boxes) should be stored within a larger box, and do not usually require their own box number. Make sure they are labelled with the relevant details and have 'belongs in Box XX' on the box label, if one is used.

Each box must have a box label on both the lid and on the body. The label should have the following information on it:

- Site Name
- Project Code
- Year of excavation
- Material
- Site Sub Division (if used)
- Range of record numbers (e.g. Contexts 91003 – 91875, Small Finds 5673 – 5783, Human Remains 60012, or Samples 51007-51231)
- Box Number
- Bulk Find, Small Find, Human Remains or From Sample, as appropriate.

The Box should also be labelled with manual handling advice where appropriate (for example, heavy, fragile, distribution of weight). Do not over-pack boxes; 10kg is the maximum advisable weight. Do not put heavy bags on top of small bags. If appropriate, large groups of the same material type (such as pottery, ceramic building material, and animal bone) from a single context can be left loose in a box, but the box must be packed out with inert packing material so that the materials cannot move about in the box or all slide down to one end.

Large items (such as architectural stone) that will not fit into a standard box are given their own box number and must have a label with their individual box number and site code, context number, and small find number securely tied to them.

Metal finds (when thoroughly dry) should be placed in polypropylene boxes (the older ones are polyethylene) with snap-fit

lids (often Stewart Plastics boxes). The box must include sealed bags of silica gel (loose in pierced plastic bags or in cotton or Tyvek® bags) placed alongside or underneath the finds. A humidity indicator strip should be clearly visible at the front of the box. Over stacking of boxes causes the lids to deform and the air exchange rate to increase (Rimmer et al 2013).

Fragile finds must be placed in a crystal plastic box with sufficient padding to keep the item stable and in position within the box (see *First Aid for Finds*, Watkinson 2001). All crystal boxes must have a label face up in the lid of the box so it can be read without opening the box. Small crystal boxes (with a label) should be put in a Small Find bag.

Never use acid free tissue paper with damp or wet finds; if necessary crumpled tissue paper in a sealed bag should be used to act as a cushion; if possible use Bubble Wrap but ensure that only the smooth surface is in contact. See section 3.2 and table 4 in the *Waterlogged Organic Artefact Guidelines* (Karsten et al 2012).

Think about the next person opening the bag or box – they need to know how to open the bag or box and prepare for the contents. Never wrap finds as they can fall out when unravelling the packaging. The find should be clearly visible in the bag or upon opening the crystal box. If necessary sketch on the bag / box how the contents are located inside.

5.6.2 THE BOX RECORD

5.6.2.1 Attributes

Id

When the Box record is created in the project database (under Tracking), let the database assign the Id (this will usually be a seven digit number). This number is only used in the database to relate records. Elsewhere the Box is referred to by its Box Number

Box Number (Name)

Use the Name field to note the current Box Number, e.g. 'Box 007' or 'Box 154'.

- The Box Number is taken from the Box Index form
- On site a Temporary Box number is usually assigned.
- The final Box Number will be assigned during post-excavation work. A single sequence is used for each project, covering both finds and environmental boxes (and multiple seasons' work where applicable)
- The final Box Number replaces the Temporary Box Number in the Name field.

Contents type

The method by which the items have been recorded. These should not be mixed (i.e. Bulk and Small Finds should not be placed in the same box).
Record as **Bulk Find**, **Small Find**, **From Sample** or **Human Remains**. This must be written clearly on the box label.

Material

The material(s) from which the objects in the box are made. Composite items should be boxed with the material category of the most unstable (e.g. waterlogged) first, then fragile part. Never write 'gold' or 'silver' on the outside of a box but 'metal'. If only small numbers of *Metal - general* (see below) are found include these with copper alloy.

Table 5.5 Material Categories for Boxing

Bone	(including antler, horn, ivory)
Bone - worked	(including antler, horn, ivory)
Ceramic building material	
Clay tobacco pipes	
Copper alloy	
Environmental remains	(including plant macros, charcoal, insects)
Fired clay	
Flint	
Flot	
Glass	
Human bone	
Industrial debris/slag	
Iron	
Lead	(including pewter)
Leather	
Metal: general	(including alloy, enamel, gold, silver)
Miscellaneous	(including amber, gemstone, jet, shale, textile, unknown)
Plaster	
Pottery	
Residue	
Shell	
Stone	(including chalk)
Wood	

Box type

The type of box. All small packaging boxes used for delicate finds should be placed within the larger, standard box types:

Skull	small, skull sized, archival standard cardboard
Standard	large, oblong, archival standard cardboard
Plastic	large, square, polypropylene/polyethylene 'Stewart Plastics' box
Bucket	blue or white, polyethylene sample bucket
Unboxed	large unboxed finds, such as architectural stone
Crate	open top green crate

Comments
Any other relevant information, including the Context, Sample, Human Remains or Small Find number range (see above).

5.6.2.2 Relationships
Stores/Stored in
This relationship links finds to the box they are stored in. Note that it is the Id of the Box Record not the Box Number (held in the Name field) which is used in the relationship.

It is important that the database relationships between boxes and the things Stored in them is kept up to date. This is used to produce Box Contents Lists when required.

Sent to/Is Receiving
Only use this relationship when the box is sent or taken away from site by a specialist (this includes boxes sent to Fort Cumberland). This field should be updated as necessary. It is presumed that all boxes are sent to Fort Cumberland at the end of the excavation unless stated otherwise, for example when a box is sent to a contract conservator or other external specialist.

Use the Send to/Date field on the paper sheet, and create the **Sent to/Is Receiving** relationship in the project database. Note the reason and date the box was sent on the Text tab. See Section 5.5.2 above for more information about this relationship.

5.6.3 DISCARDING FINDS
5.6.3.1 Discard Policies
In most cases discard or retention policies for finds are only formulated after excavations have begun in response to very large quantities of certain groups of material, usually fragmentary building materials of either ceramic or stone. A single discard policy cannot be applied to all sites and it is agreed on a site by site basis, formulated by the project finds officer and agreed with the project manager.

In no circumstances is a discard policy instigated without the prior agreement of the PFO.

It is the responsibility of the PFO to discard material on site. This may be delegated to the finds supervisor after discussion with the PFO and PM.

The specification for discard policy should:

- be justified in the same manner recording strategies are justified, i.e. the reasons of discarding some category(s) of material;
- be defined against retained samples, and be unambiguous to those carrying it out so it can be duplicated by different people, or at a later date;
- include the names of those involved, the date when the policy was formulated, and if it is to be used on existing, or just on new material;
- include a statement of where and how the discarded material will be disposed of (on site with spoil, in a sealed container with documentation etc.);
- give the names and initials of those involved in selecting material for discard, usually the PFO and/or finds supervisors;

Discard policies must be noted as a Notebook/Decision record in the project database, and fully described in the Site Archive Completion and Assessment reports. Where appropriate, the Project Design should be updated.

The finds archive should also include:

- examples of the categories discarded, numbered or identified as appropriate (e.g. 'peg tile type 2'), with a full description and definition;
- method(s) of quantification used for the discarded material e.g. count, weight, volume;
- a record of what was discarded (plus the initials of the relevant finds staff and date) from each context or sample should be entered into the 'discard' class within 'Tracking' on Intrasis, and then related to that context or sample.
- photographs of the discarded material should also be taken and linked to the Discard record in the project database.

5.6.3.2 Recording Discards in the database

Create a new Discard record from the Relationships tab of the Assemblages record, selecting the Discarded/Discards relationship.

This can be used to discard all or part of the material – complete the details, and note the reasons. An Assemblages record can be related to a Discard record (Discarded) for discarded material and a Box record (Stored In) for the retained material. If all the material in the Assemblages record is discarded after it has been assigned to a Box record, make sure the relationship to the Box is deleted.

5.7 COMPLETION OF FINDS SITE ARCHIVE

5.7.1 THE FINDS ARCHIVE

By the end of the fieldwork stage it is expected that all finds will be processed, packed and boxed as appropriate and following the procedures set out above, and that all necessary records (both paper and digital) will have been created and completed to an acceptable level. **The finds supervisor is responsible for the completion of this work.** The PFO is responsible for checking the standard and progress of work, and for checking the records.

If necessary finds work might continue at Fort Cumberland after the excavation has finished. This is still regarded as part of the fieldwork stage. If circumstances occur that might, or will, result in a backlog the PFO should be informed **immediately** this becomes apparent so steps can be taken to manage it.

In no circumstances is it acceptable to leave all finds processing until the fieldwork is over; a minimum level comprising bagging, labelling, temporary boxing, gross quantification, and the creation of a basic finds record must have been created by the time the fieldwork stage is completed. The only exceptions are small projects where no processing facilities are available in the field.

The on-site finds staff must ensure that the finds archive contains:

- the **material archive**: all the finds recovered, appropriately labelled and packed

- the **documentary archive:** the Small Finds ring binder, containing the Small Finds Index sheets, sketches, the Box Index forms, the Box List (which can be created in the Intrasis database)
- **notes** about any uncompleted work or outstanding issues
- the **database record:** with completed entries for all Assemblages (Bulk Finds, Small Finds and finds recovered From Samples.) and Boxes.

The finds procedures state that the finds archive cannot be regarded as completed until after the processing of environmental samples (including sorting of the resulting residues) has been completed and any finds recovered have been processed and recorded (see Section 9.6.3), and X-radiographs have been taken of all the metal work.

The finds supervisor must note any uncompleted work, outstanding issues, or comments as a Notebook record in the project database. Print the notes and put a signed and dated copy in the front of the Small Finds ring binder (you can copy and paste the Notebook text into Word to print). The finds supervisor must also discuss this with the PFO.

5.7.2 TRANSFER OF FINDS

All finds will normally be dispatched to Fort Cumberland at the end of excavation, or in the case of long running projects, periodically during fieldwork. In some cases artefacts will require the urgent attention of conservators, who should either be asked to visit the site or have items dispatched to them as soon as possible (see Section 5.4.3). Similarly some items may require removal from site for security reasons, in which case arrangements should be made for transfer with some urgency. A record must be kept of all finds leaving site. The Sent to/Is Receiving relationship in the database is used to log this, and the records must be kept up to date.

Boxes should not be overfilled. 10kg should be regarded as an optimum maximum weight; (if you struggle to lift a box so will other people). All partly filled boxes, both Small Finds and Bulk Finds, should be filled with crumpled up bubble wrap (newspaper should only be used in an emergency) to stop the contents moving during

transportation. Big stones should be put in crates if possible. They must be well packed with packing material between individual stones to stop them rubbing together.
If finds are being dispatched to the project conservator for attention and immediate work, they should be accompanied with copies of their records including Small Find/Context records, drawings and images.

Handing over
Arrange to transfer all the finds records to the PFO. The finds and environmental supervisors must notify the PFO about the quantities (e.g. number of boxes) to be returned to Fort Cumberland so that sufficient space is available when the material arrives. The PFO will arrange storage working space at with the Archives and Facilities Teams.

5.8 REFERENCES

Baker, P and Worley, F 2014, *Animal Bones and Archaeology: Guidelines for Best Practice*. English Heritage

English Heritage 2008, Management of Research Projects in the Historic Environment (MoRPHE) *Project Planning Note 3: Archaeological Excavation*.

English Heritage 2010 *Waterlogged Wood: Guidelines on the recording, sampling, conservation and curation of waterlogged wood*. Swindon: English Heritage
https://historicengland.org.uk/images-books/publications/waterlogged-wood/

Fell, V, Mould, Q and White, R 2006 *Guidelines on the X-radiography of Archaeological Metalwork*. Swindon: English Heritage
https://content.historicengland.org.uk/images-books/publications/x-radiography-of-archaeological-metalwork/xradiography.pdf/

Health and Safety Executive (HSE) 2005 *Control of Substances Hazardous to Health (Fifth Edition). The Control of Substances Hazardous to Health Regulations 2002 (As Amended). Approved*

Code of Practice and Guidance. Sudbury, Suffolk: HSE Books

Historic England 2015 *Archaeometallurgy: Guidelines for Best Practice*. Swindon: Historic England.

Karsten, A, Graham, K, Jones, J, Mould, Q and Walton Rogers, P 2012 *Waterlogged Organic Artefacts: Guidelines on their Recovery, Analysis and Conservation*. Swindon: English Heritage https://historicengland.org.uk/images-books/publications/waterlogged-organic-artefacts/

Mays, S A 1991 *Recommendations for processing human bone from archaeological sites*. Ancient Monuments Laboratory Report 124/91. London: English Heritage.

McKinley, J, 2000, The Analysis of Cremated Bone, in M Cox and S Mays, *Human Osteology in Archaeology and Forensic Science*, 403-421, Greenwich Medical Media, London.).

Portable Antiquities Scheme *Advice for Finders of Treasure* https://finds.org.uk/treasure. (Accessed 12/10/2015 – downloaded copy in the 'Site Library' folder.)

Rimmer, M, Thickett, D, Watkinson, D and Ganiaris, H 2013 *Guidelines for the Storage and Display of Archaeological Metalwork*. Swindon: English Heritage https://historicengland.org.uk/images-books/publications/guidelines-storage-display-archaeological-metalwork/

Watkinson, D & Neal, V 2001 *First Aid for Finds*. Rescue/UKIC Archaeology Section. London

Digital copies of Historic England/English Heritage Guidelines are available in the Site Library folder on the site network. They can also be downloaded from the Historic England website.

6 THE DRAWN RECORD

The site drawings on drafting film (permatrace) – plans, sections and elevations - are an integral part of the site record. They provide a detailed record of the archaeology for assessment, analysis and archiving, and form the basis for publication illustrations.

The Basics

- Every drawing must be clear and legible
- Every drawing must have its location, scale and orientation shown
- Every drawing must be fully cross-referenced with the other parts of the site record.

Every drawing must have a Plan or Section record number, and every permatrace sheet must have a Drawing Sheet number. These come from separate number sequences and index sheets.

The outline plans produced by surveying with the total station (see Module 8) complement but do **not** replace the drawings on permatrace. However, they are extremely useful tools during excavation, assessment and analysis. In the project database, they allow excavated features and finds to be viewed readily against background maps, building plans, geophysical surveys, aerial photographic mapping and field survey. They allow easy production of overall site or trench plans, phase plans and group plans.

When you draw a plan, it's **your** responsibility to check it and ensure both the drawing and its record in the database are complete. This includes checking that all georeference points on plans have their co-ordinates shown and that the heights of all the levels are listed. Sections must show the co-ordinates of their end points and the height of the datum. All drawings must show their scale and orientation. Both the drawing sheet and database record must include a description of the drawing and any relevant comments, and the database records must include relationship to **all** the contexts, samples, small finds and human remains shown on the drawing.

Any shortfall in this process on site is likely to lead to delays and inefficiencies in post-excavation work, and can result in loss of essential information. If there are any problems or errors, it's much easier to sort them out on site.

Definition: Georeference
A georeference is a point indicated accurately on a drawing and for which we have recorded the x and y coordinates (easting and northing). Its co-ordinates are established either from a laid-out site grid or baseline, or by marking it with a peg, surveyors arrow or nail, assigning it a Grid Peg record number (see Module 8) and surveying its position with the total station.

Adequate georeferencing is essential so that plans can be correctly located, and scanned drawings can be correctly imported into the project database and related to produce overall plans and publication illustrations.

6.1 DRAWING MANAGEMENT

Day to day responsibility for checking the drawn record for accuracy, consistency, and quality lies with the site supervisors. This includes checking that:

- drawings are clear, legible and intelligible, with annotations as required
- drawings show the drawing sheet and plan or section number, the scale and north arrow
- all context outlines are complete
- section coordinates and datum line and height are shown
- plans show the location of grid pegs/points with their co-ordinates, and the levels heights are listed.
- drawings are clean, with mud and masking tape removed
- completed drawings are safely stored

The drawing standards and conventions are described in Sections 6.4 and 6.5. The project manager or the archaeological supervisor will ensure that all site personnel are made aware of the standards and conventions as part of staff training at the start of the fieldwork, but take time to familiarise yourself with them. There are laminated crib

sheets of the conventions (as shown in Figure 6.1) available for use on site.

Each drawing is a primary record for archive and therefore all drawings must be drawn to a consistent standard meeting archive requirements.

As well as archiving the permatrace sheet, all site drawings are scanned. This provides a security copy, a working digital image which can be georeferenced, and an image suitable for digital archiving. The digital image may be imported into the project database as a raster image or digitised for use in a geographic information system (GIS), and be used in producing publication illustrations. It's therefore important that drawings produce a good clean scanned image.

Use only the 4H Staedtler Mars Lumograph pencils provided for drawing. Other pencils are **not** acceptable for archive purposes.

Before you regard a plan or section as finished, always check the drawing sheet and its database record, including relationships.

6.1.1 PLANNING SHEETS

Standardised pre-printed sheets of drafting film are provided in A1 and A3 sizes. Do not cut sheets down in size, fold them, or glue, tape, or staple them together.

Use A1 planning sheets for:

- planning 10m squares (usually in multi-context planning, for example of large areas after stripping and cleaning and before excavation or sampling of selected features)
- longer sections
- groups of up to eight small drawings (e.g. plans of burials, or sections of post-holes)

Use A3 planning sheets for:

- planning 5m squares (whether single or multi-context plans)
- grid square based single-context planning
- flexible planning

- shorter sections
- groups of up to four small drawings (such as plans of burials, or sections of post-holes)
- for convenience, where an A1 size drawing board would be unsuitable or difficult to use.

If you group a set of small drawings together on a single planning sheet, number each drawing individually. Generally, you should group only plans, sections, or elevations together on a single planning sheet. However, in some cases where there is, for example, a scatter of isolated post holes, it can be useful to put the plan and section drawings side by side on the same sheet. Don't squash drawings closely together – allow plenty of space between them. Don't put drawings from different areas of the site (site subdivisions) on the same sheet.

If a drawing (such as a long section) requires more than one planning sheet record this in the 'Comments' field in the planning sheet title box, and in the 'Sheet No' field on the Drawing Index Form (this module, Section 6.1.5).

Matrix sheets also are available in A3 and A1 sizes See Module 2: Stratigraphy and Matrix Compilation for how to produce a site matrix.

6.1.2 DRAWING SHEET NUMBERS

Each permatrace drawing sheet is numbered sequentially, starting from 1. These sheet numbers are used for archiving the sheets and identifying their scanned images. The sheet number is assigned from the Drawing Sheet Index.

Enter the sheet number on the Plan or Section Index Form entry for every drawing done on it (this module, Section 6.1.5). Where a drawing extends across more than one sheet (e.g. a long section, or an extensive matrix), enter all the sheet numbers.

6.1.3 DRAWING NUMBERS

There are separate blocks of record numbers allocated for

- Plans
- Sections and Elevations.

The reason for having two sequences is that the two types of drawing are different in nature – Sections and Elevations have a spatial identity in the project database (you survey in the section or elevation end points) while Plans don't (which is why it's vital to mark enough grid pegs/points on all plans for georeferencing)

The drawings are recorded on the Plan Index Form or Section Index Form. Take the next available number from the correct form, filling in as much information as you can at that stage. This must include the Drawing Sheet number (see 6.1.3). You may need to go back to the Index to add additional comments or record numbers.

A planning sheet may have more than one drawing on it, but each of these must also have an individual plan or section number.

Matrix drawings on permatrace are recorded as Image, sub class Site Drawing Sheets and Type Matrix. Matrices drawn on the paper Working Matrix Form are treated as sketches. See Module 2 for information on matrices.

6.1.4 STORAGE AND CARE

Drawing sheets are usually sent to site in flat packs or portfolios. These should be stored lying flat, or the sheets should be removed and hung in a plan hanger.

Completed drawing sheets should be filed in the plan hanger or in a separate portfolio, and only removed when required for further use. Store drawings overnight securely in the same place as the rest of the site record.

Avoid rolling up planning sheets for storage, either before or after use, unless necessary for transport or when working out of a vehicle rather than a site office. In these circumstances, keep them in plan tubes and remove them to proper vertical or horizontal storage facilities as soon as possible.

Do not fold planning sheets, either for storage or to fit them onto a smaller planning board.

Keep planning sheets as clean and dry as possible. Even small amounts of dirt and grit can scratch the scanner and make additional work for the Archaeological Archives Office. When you're working in adverse conditions outdoors, dry and/or clean your plans as soon as possible afterwards. Soil marks should be removed with a damp cloth, taking care not to smudge any pencil work. Entirely remove all masking tape from a planning sheet immediately after it is lifted from the planning board - the longer tape is left in place, the harder it is to remove

6.1.5 INFORMATION ABOUT DRAWINGS: INDEXES , TITLE BOX AND DATABASE RECORDS

Information about site drawings is recorded in three places

- on the **Plan or Section Index Form**
- on the **Drawing Sheet** itself, especially in the title box
- in the **Plan or Section record in the project database.**

Fill in as much information as you can on the **Plan or Section Index Form** when you assign the number. Include a brief description, the type of drawing (Plan, Section, Timber, Elevation or Matrix) and the numbers of the context, small find, sample and human remains records to be shown. For a section, survey in the section line (see Section 8.4) as soon as possible.

The section record is created in the project database when the survey file is imported. The Plan Index Form is used to create plan records in the database – this should be done every morning before the survey data is imported into the project data base (this allows surveyed plan levels to be imported and related to the correct plan).

Complete the **Drawing Sheet title box** with the necessary information while you are doing the drawing. As with all written site records, you need to enter the Site name, Site code and year of excavation, along with your name and the date the record was created. Note all the sheet numbers if a drawing (such as a long section) extends over several drawing sheets. Make sure you show the Plan or Section number and the scale.

Describe what the drawing shows. The comments should give a simple description of what is shown in the drawing (such as “Plan of grid square 1230/0940 after removal of top soil” or “Plan of layer 367”). For sections and elevations, the direction they face must be included, for example “East facing section of Pit 187”. Comment on weather conditions if they have affected drawing.

Listing all the context, sample, small find and human remains records shown will save you time when you complete the database record.

If you put several drawings on a sheet, write the Plan or Section number, scale, description and record numbers shown clearly next to the individual drawing. Make sure each drawing has enough grid pegs/points (3 or more) shown to locate it. All text on drawings should be in block capitals and at least 3mm high.

See Section 6.5 for completing the database records and cross-referencing the drawings.

Note any corrections or alterations made to drawings on site (for example during checking by site supervisors) or during post excavation, and initial and date your comments. The original information must not be erased in post-excavation even if it is believed to be incorrect – for example, cross out an incorrect number lightly and write the correct one beside it.

6.2 RECORDING METHODOLOGY

There are several ways of producing the drawn site record, and the appropriate methods for each project are chosen during project development and set out in the Project Design. The decisions will depend on the site type and likely conditions, project objectives and the skills and technologies available.

The drawn record will generally comprise plans and sections, and elevations where standing structures are present. Plans are normally drawn at a scale of 1:20 and sections at 1:10.

6.2.1 PLANNING

Whichever planning method is used, it is crucial that the **whole** outline of **every** stratigraphic unit (context) is drawn. In order to ensure this, the technique of **Single Context Planning**, where each individual context is illustrated individually is preferred.

Before planning a context, it is important to ensure that all overlying, later contexts have been excavated in their entirety, and that the whole outline of the context to be drawn is visible.

There are two ways of recording single contexts: by the grid-based system and by flexible planning (Sections 6.2.1.1 and 6.2.1.2 below)

6.2.1.1 Grid-based single context planning

This method is of particular use on sites with deep and complex stratification. It relies on a physical grid of 5m squares being imposed across the site, the corners marked by steel grid pegs to which grid co-ordinate labels are attached (see Section 8.2.3.3).

A3 planning sheets should be used. A 5m area is outlined at a scale of 1:20. The SW corner grid co-ordinate is written on the sheet at the appropriate corner of the square. **It is essential that the grid square is drawn in the same place on every drawing sheet.** This ensures that the plans are drawn so that they can be overlaid to depict the exact relationship of one context to another in plan in each grid square.

The outline of each context is drawn as it lies within the square. If it extends across more than one 5m grid square this should be shown on plans of adjacent squares. However, where the overlap into a neighbouring grid square is less than 0.10m this can be drawn on the planning sheet for the main grid square.

Where a later feature has cut the context being planned, label the cut (truncation line) on the plan with its context number.

For the system to work correctly in post-excavation it needs to be rigidly adhered to, even if small contexts extend over 3 or even 4 grid squares.

For each grid square a 'plan matrix' should be maintained in order to show the sequence of plans. This is **not** a stratigraphic matrix, but a diagram to show adjacent and overlying plans.

6.2.1.2 Flexible single-context planning

Flexible planning can be used as an alternative to grid-based planning. In this case the A3 planning sheet need not conform to a 5m grid square, but is positioned to suit the layout of the context. Each context is planned individually at a scale of 1:20. It is usually not appropriate to merge the two systems. The method to be used should be specified in the methodology section of the Project Design.

Flexible planning may however be used in conjunction with grid-based planning where particular features need planning at a larger scale. For example, Human Remains require planning at 1:10 (see Section 10.4.2). The grave cut must still be planned at 1:20 as usual.

The planning frame can be placed to suit the shape of a context, or to avoid obstacles or awkward terrain on-site. The major disadvantage is that each context might be drawn to a unique orientation, rather than aligned with grid north. This can cause problems in checking drawings and comparing contexts.

This makes it doubly important that the drawing is adequately geo-located. Record co-ordinates on the drawing for each setting of the planning frame, or for a baseline from which the planning frame is offset. Mark the points with nails or surveyors arrows. Each Plan must have at least three and preferably four georeference points. Survey them using the total station – see Module 8 Section 8.4.3.6. The points are recorded as Georeference/Grid Peg records.

Each grid peg must have a record number (Id). For points on a base line or trench grid (which will be used on several plans) assign numbers from the Grid Peg and Georeferences Index sheet and ensure the pegs are labelled.

For georeference points used on a single drawing (e.g. marking the corners of a planning frame), the Georeference record number is 6

followed by the Plan number and a single digit (so grid peg 2 on Plan 2143 has the Id 621432).

The co-ordinates must be written on the plan **as soon as possible** (usually this will be the following morning after the survey data has been imported into the database), **Do not** remove the markers until **after** you have written the coordinates on the plan. A plan without co-ordinates is useless.

Give the co-ordinates to two decimal places in the form Easting/Northing (e.g. 1250.48/220.37) - see Module 8: Survey for further details.

For smaller contexts that fit within the planning frame, record the coordinates for all four corners of the planning frame. Transfer these coordinates to the planning sheet and draw the context. For larger contexts, where more than one setting of the planning frame is required, a temporary base line may be established. Record the co-ordinates of the end points and transfer them to the planning sheet. Place the planning frame as required offset from the base line, and draw the plan of the context.

The archaeological supervisor will check that an adequate number of coordinates (a minimum of three, preferably four) have been included on each plan. But it is the excavator's responsibility to ensure that it is done – **do not remove any markers** (e.g. nails) or the base line used for flexible planning until you have checked the coordinates are shown on your drawing.

6.2.1.3 Multi-context planning

Multi-context planning may be used according to the suitability of the site and stratigraphy. It is particularly applicable to sites which require areas to be stripped and mapped, with limited excavation following. It is also useful where contexts are scattered across an area rather than overlying one another or intercutting.

Make sure that all multi-context plans are as clear as possible. Although a plan might appear clear to the excavator drawing it on-site,

it needs to be equally clear to those using it during post-excavation assessment and analysis.

It is essential that you record **the full outline of every context**. However, in this extensive work not every context may be assigned a number and recorded. So it is vital that you annotate multi-context plans clearly where necessary to explain what is shown. For example, are four closely spaced parallel lines three intercutting ditches or two ditches a short distance apart? Make sure layers are fully defined – don't let them just vanish or merge into each other with no edges shown.

Use A1 planning sheets to cover 10 by 10 m squares or A3 sheets to cover 5 by 5 m squares. Show the co-ordinates of all four corners. All multi-context plans must have both horizontal and a vertical 'plan matrix' in the top right corner of the planning sheet (see Section 6.3.1.5).

6.2.1.4 Survey Instrument planning

As noted at the start of this module, we produce outline plans of each context recorded by surveying with the total station (TST). Very occasionally, this will be the **only** means of planning a particular context or area of a site, If so, it will be stated in the Project Design – do not record in this way unless you are specifically told to do so.

Survey instrument planning alone is normally only used for recording extensive features such as ditches and boundaries in areas where there are few other features. The method can also be a useful way of recording areas where access is not possible – for example, the TST can be used in reflectorless mode to record features under threat of clifftop erosion.

6.2.2 SECTIONS AND ELEVATIONS

Vertical drawn sections of stratigraphy within half-sectioned pits or post-holes, in segments of ditches and other cut features are an essential record of their fill morphology and formation processes. In the case of post-holes, sections often convey valuable structural information. Sections are normally drawn at a scale of 1:10.

Sections within deep stratigraphy are also valuable. Some of these will be **cumulative sections**. To create a cumulative section a section line is established and the co-ordinates of the ends recorded. Each context that crosses the line is excavated up to the line, and its profile added to the cumulative drawing. The remainder of the context is then excavated away and the process is repeated. The section line must be checked and/or re-measured each time.

Elevations are drawn of standing structures, ranging from small surviving segments of walling to entire buildings.

6.3 DRAWING STANDARDS

General points

- Labels and notes on the drawing and in the planning sheet title box must be neat and legible. Use block capital letters about 3mm in height.
- Write text parallel to the base of the drawing sheet unless this is not possible.
- Line work should be of a consistent weight and density, except for thickened lines to emphasise features, which should not exceed 1mm in width
- Do not use large areas of solid black shading
- Lines which are parallel and close to each other should be spaced not less than 1mm apart to avoid merging when scanned or copied.

6.3.1 PLANS

6.3.1.1 Scale

Plans are usually drawn at a scale of 1:20. In some cases a larger scale such as 1:10 or 1:5 is required, for example for recording Human Remains, especially those accompanied by grave goods (see Sections 5.2.5.1 and 10.4.2), or Animal Bone Groups (see Section 5.2.5.3).

Large areas of sparse archaeology where less detail is needed (such as field boundary ditches on extensive rural sites) may be recorded at a smaller scale such as 1:50.

6.3.1.2 Co-ordinates and georeferences

Each plan must include **at least three** and preferably four georeference points. These can be taken from a laid out site grid or base line. For flexible planning, define and mark georeference points grid peg/points and survey them as Grid Pegs with the total station (See Section 6.2.1.2 above and Module 8 Section 8.4.3.6). The co-ordinates must be written on the plan as soon as possible. For flexible planning, show the grid peg/point numbers on the plan and add their co-ordinates as soon as the survey data has been imported into the project database (Section 8.4.5.2).

6.3.1.3 Orientation

Plans should be orientated with north to the top of the planning sheet, and should include a drawn north arrow.

Occasionally when flexible planning is being used, it may be appropriate to orient a plan other than to grid north – for example, drawing a north-east/south west orientated skeleton using a planning frame. In these cases, it's particularly important to include a north arrow and show four georeference points.

6.3.1.4 Levels

Take a suitable number of levels on each plan. Use them to record the general height of the area or context being planned, and in particular changes in level, such as the height of a wall compared to the ground inside or outside it or the direction in which a drain or ditch slopes.

Mark levels on the drawing using the bench mark symbol (see Figure 6.1) and number them. To avoid possible confusion, have a single sequence of level numbers for each drawing sheet and not for each drawing on the sheet.

Levels are normally recorded using the total station (see Section 8.4.3.6). They are recorded as Georeference/Level, and their record number (Id) takes the form Plan number followed by a two digits (01 to 99), so level 15 on Plan 2007 has the Id 200715.

Don't try to read the levels from the TST while you are surveying. Read them off from the project database or daily printout, and list them on the drawing sheet as soon as possible after the survey data has been imported into the database (generally the morning after the levels were recorded).

6.3.1.5 The 'plan matrix'

This is not a stratigraphic matrix - the term 'plan matrix' is used to describe a diagram showing adjacent and overlying plans. Draw these in the top right corner of the planning sheet. Write the **sheet number** containing the adjacent, overlying, or underlying plan(s) in the appropriate spaces.

6.3.2 SECTIONS AND ELEVATIONS

6.3.2.1 Scale

Sections and elevations are drawn at a scale of 1:10, unless a larger scale is required to show more detail of a complex section.

6.3.2.2 Location in plan

The section line is surveyed in using the total station (see Section 8.4.3.5 and the survey crib sheet for further information). Take care to hold the base of the prism pole exactly on the section string to get the datum height correct. It may also be useful to mark the section line on the plan of a feature, showing which side it was drawn from (using the conventions shown on Figure 6.1).

Read the co-ordinates of the section end points and its datum height from the project database (there is a crib sheet to help you with this) and write them on the section drawing as soon as possible. If the section is stepped or changes angle in plan make sure you record these points and mark them (with co-ordinates) on the section drawing.

Note the cardinal direction (N, S, NW, etc.) at each end of a section to show which direction the section line runs, and also note the cardinal direction at any point where a section changes angle in plan.

6.3.2.3 Datum

Mark a datum clearly on a section drawing by use of the bench mark symbol (this module, Section 6.4 and Figure 6.1). On a short section, show a datum symbol at each end. Where a long section drawing is divided into shorter segments, show a datum at each end of each drawn segment. If a section drawing is measured from more than one datum, each datum must be shown as appropriate.

Write the reduced value of the datum above the bench mark symbol. Normally the datum used is Ordnance Datum (OD); if a temporary bench mark (TBM) is being used this must be clearly stated, specifying which TBM was used, and the levels converted to OD as soon as possible.

6.3.2.4 Extents

The ends of a section drawing extend a little beyond the edge of the feature(s) through which it cuts to show the surrounding surface topography. You may need to divide long section drawings into segments, preferably all shown on a single sheet. Letter each segment of the section (A-B, B-C, etc.), and make sure each shows the datum (see Section 6.3.2.3 above). If the section has to be continued on an additional drawing sheet, note this on both sheets, and make sure both sheet numbers are entered into the Sheet No field in the database.

6.3.2.5 Drawing sections in stages

In some cases a deep section may be drawn in stages as excavation progresses. If the original datum is left in place for later use, it **must** be checked and verified prior to measuring and drawing the next segment. Alternatively a new datum is established each time, and shown on the drawing relative to the original datum. If the section is stepped in (usually for safety reasons), the height and location of the new section line must be surveyed in.

6.3.2.6 Cumulative sections

See Section 6.2.2 above

6.3.3 TIMBER DRAWINGS

Annotate timber drawings adequately to differentiate between features such as small fixings, tool marks, axe cuts, trowel marks etc. The drawing of each timber should show:

- the outline of all edges and faces, drawn either horizontally one below the other, or vertically side by side, according to the position of the timber within the structure
- joint details
- tool marks
- the position of knots and nail holes
- the direction of the grain, shown lightly so as not to obscure other information
- which end is the head/foot
- which face is the north/south, etc.

Generally the conventions used in planning (see Section 6.4 and Figure 6.1) are used for timber drawings with the following clarifications:

- sap wood is shown by light shading
- paint, charring, etc is delineated and annotated
- nails, bolts, tacks, etc, are drawn as solid black and annotated
- the orientation of a wedge should be shown if split wooden fastenings are present
- a 3D sketch should accompany the measured drawings

See Module 4 (particularly Section 4.3) for further information about recording timber structural elements.

6.4 DRAWING CONVENTIONS

The general planning conventions used by Historic England are shown in Figure 6.1 (and in a laminated sheet for on-site reference). If any additional drawing conventions have been decided on prior to fieldwork, they will be defined in a key included in the Project Design. Do not change or add conventions without checking with the project manager or archaeological supervisor, and make sure you explain any non-standard conventions on every drawing sheet you use them on.

Avoid the use of conventions, symbols, or abbreviations to represent different soils, unless they are really necessary to make a drawing clearer (this may be the case for small patches on plans or lenses in fills shown in section). Soil conventions should never cover large areas of a drawing – use them sparingly.

Other conventions

- Use a continuous line to show the edge of a context where the edge is certain
- Use a dashed line to show the edge of a context where the edge is undefined or uncertain
- Use hachures to denote the steepness of slope in excavated contexts: the steeper the slope the closer the spacing between hachures
- Use a short dashed line between hachures to indicate a conspicuous change of slope, and also at the bottom of the slope
- Use a bench mark symbol to indicate levels on plans and datums on sections. Write the value of the reduced level above the symbol
- Types of stone are indicated by a description or an abbreviation. See Figure 6.1 for a list of abbreviations
- A small arrow denotes the downward slope of a stone

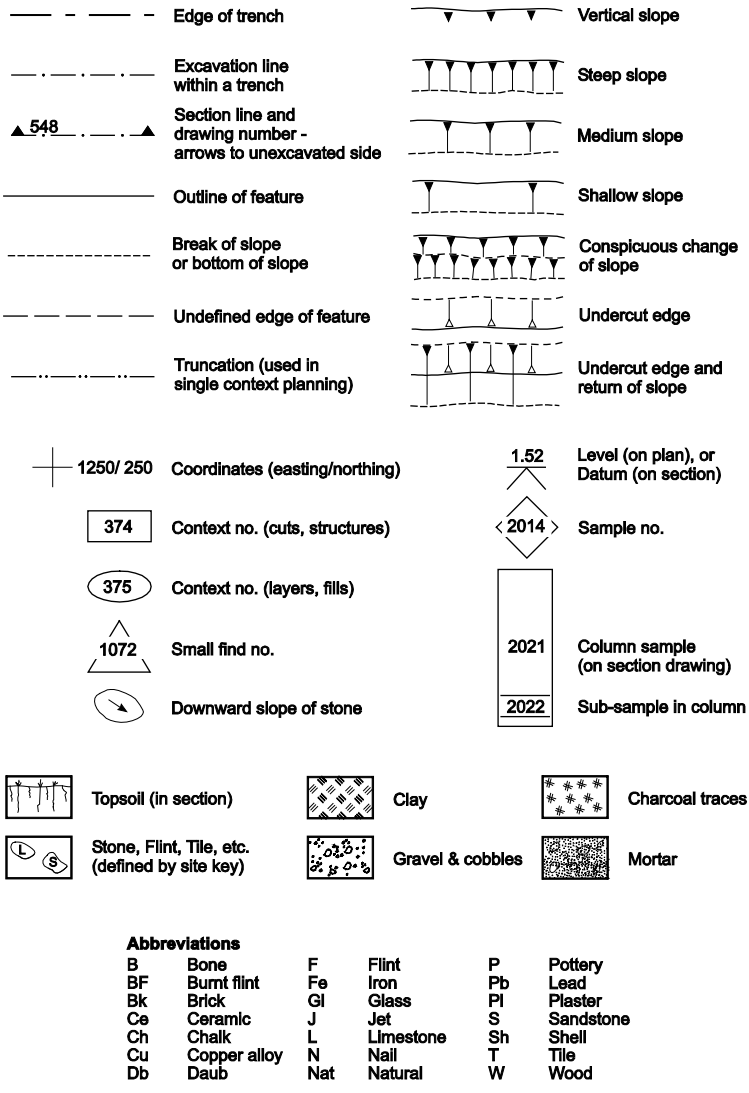


Figure 6.1 Conventions for use in drawing plans and sections

Abbreviations

B	Bone	F	Flint	P	Pottery
BF	Burnt flint	Fe	Iron	Pb	Lead
Bk	Brick	Gl	Glass	Pl	Plaster
Ce	Ceramic	J	Jet	S	Sandstone
Ch	Chalk	L	Limestone	Sh	Shell
Cu	Copper alloy	N	Nail	T	Tile
Db	Daub	Nat	Natural	W	Wood

6.4.1 RECORD NUMBERS

Show the numbers of all contexts, small finds, samples and human remains records clearly, using numbers at least 3mm high. Write the record numbers parallel to the bottom of the plan whenever possible.

Contexts
Place **cut** numbers in rectangular boxes or square brackets and **deposit** numbers in oval boxes or curved brackets

Add descriptions for contexts if necessary (and particularly for features or deposits shown on multi-context plans which may not receive a context number – see Section 6.2.1.3 above)

Small finds are usually located using a small triangle with their number written beside it, although large objects (such as quern stones, whole pottery vessels or building stones) should be represented by drawing their outline. The material an object is made of may be noted by a description or an abbreviation (see Figure 6.1).

Sample locations must be shown on sections. Normally the outline of a sample is recorded using the total station, but smaller samples (such as individual pieces of charcoal) may be shown on a plan in addition to being three dimensionally recorded with the total station. Mark small samples using a diamond symbol and write the Sample number beside them.

Draw column samples on the section, and record the levels of their top and bottom. Any individual subsamples taken within the column are shown schematically at their correct relative levels and also identified by their sample numbers. Annotate monolith samples as such on the drawing.

6.5 COMPLETING THE RECORD: CROSS-REFERENCES AND GEOREFERENCES

It is vital that the drawn record is cross-referenced with the rest of the site archive. This is achieved in the project database by creating **relationships** in the Relation Tab of the Plan or Section record. These relationships are **links** between records, so if a Plan Shows a context, that context Is Shown On the Plan. There's a crib sheet to help you with this process.

Enter the data directly from the drawing sheet into the database. Make absolutely sure that all the context, sample, small find and human remains records shown are related to the drawing. For Plans, use the Shows/Is Shown On relationship, and for Sections use Intersects/Is Intersected By. This is much quicker and easier if you've already listed the record numbers on the drawing sheet.

Complete the other database fields, including the Comments – continue the description and notes on the Text tab if require.

At the same time transfer level values and grid point co-ordinates from the database onto plans, and end point co-ordinates and datum to sections (Section 8.4.5.2). You can find this information in the database, and usually there will be daily printout sheets.

When you complete record sheets for contexts, samples, human remains or small finds (such as animal bone groups), you should note the drawings they are shown on. Check these relationships are present in the database when you enter the information into their database records.

The site drawing sheets are imported into the database at Fort Cumberland, and related to the drawings on them (Plans or Sections) using the Shows/Is Shown On relationship. Do not relate the drawing sheets directly to the contexts etc. shown on the drawings.

7 THE PHOTOGRAPHIC RECORD

The aim of archaeological photography is to provide a visual record of projects as they proceed, showing working conditions and progress, the features excavated and *in situ* finds and samples.

Like drawings, site photographs should convey information about the inter-relationships of archaeological entities for archive and analysis, publication, and popular presentation.

This module covers field and on-site finds photography and processes:

- taking the photograph and completing the Photographic Record Form
- downloading the camera and saving the images to the site network
- re-naming the images and adding the essential metadata ('data about data') to the image files
- importing the photographs into the project database, adding descriptive information and creating relationships to the contexts, finds and samples shown.

All our site photography is taken using digital SLR cameras. Our digital image capture, file storage, metadata and archiving procedures follow the Historic England guidance *Digital Image Capture and File Storage: Guidelines for Best Practice* (2015). This can be downloaded from the Historic England website.

Specialist photographic recording (such as photogrammetry) should be planned in advance, with a Method Statement in the Project Design. Where this is the case, always follow the Methods Statement rather than relying on the notes in this module.

7.1 PHOTOGRAPHIC RESPONSIBILITIES

7.1.1 THE PROJECT DESIGN

Photographic techniques will reflect the project objectives, the nature of the site and conditions of working, and the resources available.

The Project Design must specify the types of photography required and document any special techniques to be used.

Specialist photographic recording (such as photogrammetry, video recording or rectified photography using drones) should be planned in advance. They must be specified in the Project Design, with methods statements and resources allocated for processing and archiving.

For photogrammetry, also known as Structure from Motion (SfM), Project Managers should seek advice from the Geospatial Imaging team. SfM is frequently resource-heavy (see Section 7.8), and project managers must be clear about what they hope to achieve by using these methods. The value of these techniques in recording, interpreting and presenting project results should be balanced against the additional resources required for image processing and archiving. What benefits are expected? What are you aiming to achieve, and what are you adding to standard recording?

Rectified photography forms a standard part of our recording system, for example for inhumation burials and animal bone groups, and it can also be useful for artefact scatters and tile or mosaic floor surfaces. The photographs require precise location using photo targets (see 7.3.3). The images can be rectified and geo-located using ArcGIS. However, RP has limitations (see 7.8.1) and if, for example, burials are expected it is usually worth planning to use photogrammetry to get true ortho-images. These can be obtained from as few as four to six images, and small processing time requirements.

Additional equipment such as a camera mast, step ladder or photographic tower may be needed to achieve near-vertical shots.

Work inside buildings will require artificial lighting. Where a power supply is available, suitable photographic lights should be used. Otherwise it will be necessary to use the camera's in-built flash, possibly augmented with

subsidiary flash units. This must be covered in a methods statement in the PD, noting equipment required.

If artificial lighting is being used, particularly fluorescent strips, either the camera's compensation function can be set accordingly, or lens filters can be considered. Subsidiary flash units need to be connected to the camera by a cable which enables full synchronisation of flash, shutter and meter. Care should be taken on placing flash units to provide balanced light so as not to 'burn out' areas within the image.

In some circumstances, it may be appropriate to arrange for specialist photographers from the Historic England Imaging and Visualisation Team may come to site to take photographs for publication, outreach or specific elements such as small finds.

7.1.2 PREPARATION OF CAMERAS AND TEMPLATES

Each camera used on site will be set so that the images numbers are a continuous unique sequence, starting with the first Photo Record number allocated to that camera. Templates for renaming the images and assigning site-level metadata will be set up in the image management software used (currently Adobe Bridge). This is to minimise numbering errors and speed the import of images into the project database.

Responsibilities:

- The project manager must assign the number blocks in good time and inform the superuser
- The project superuser will set the image numbers for all cameras to be used on site, and create the two site-specific template

7.1.3 DAY-TO-DAY RESPONSIBILITIES

Usually the project manager will designate one of the project archaeologists to carry out the correct site procedures (see 7.2) from camera downloading to completing the database image records and to care for the photographic equipment (including ensuring the batteries are kept charged). This task is usually rotated among the site staff, each project archaeologist taking responsibility for one or two weeks in turn. The finds supervisor is responsible for finds photography in the site office, and may also provide advice on *in situ* finds photography.

7.1.4 SKILLS AND TRAINING

Archaeological photography requires skilled observation and understanding of the subject being photographed e.g. stratigraphy and/or standing structures and finds. It is usual for experienced field staff to take their own photographs.

Familiarisation with the principles of archaeological photography and a guide to the operation of the camera being used on site should form part of staff introductory training.

Staff with no experience of archaeological photography should receive appropriate on-site training before taking photographs. If you are still not confident about using the camera or taking photographs, ask the supervisor to arrange further training which could include working with a more experienced team member until you are comfortable with the camera.

The cameras supplied for fieldwork have a range of automatic, semiautomatic and manual functions. For most work, the automatic or semiautomatic settings will give good results.

However, in some cases it's necessary to have greater control, for example to get a greater depth of field or to determine what's in focus. Before using manual settings, you need a clear understanding of both the functions of the camera you are using and the basic principles of photography.

The manufacturer's 'quick user guide' and more detailed 'user manual' are kept with the camera in its case. If you're unfamiliar with the make and model of the camera, at least read the 'quick user guide'.

7.1.5 CHECKING

The site supervisors are responsible for checking the photography, ensuring that the necessary photographs are taken and the quality is satisfactory.

You are responsible for the quality of the photographs you take – always check your work both

- in the camera monitor as soon as you have taken the shot
- on the computer screen when you are completing your context records (right-click on the thumbnail in the Documents tab to open the photo).

Ask for advice or additional training if you need it.

7.1.6 CARE OF EQUIPMENT

The photographic equipment used on site is provided by the Excavation and Analysis Team.

- Keep all camera equipment in its bag or case when not in use.
- Don't leave camera equipment on site unattended.
- Replace the lens cap immediately after the photograph has been taken.
- Although site cameras are fitted with a rubber casing, avoid handling them with extremely dirty or wet hands.
- Avoid placing the camera on the wet or dusty surfaces including trench edges. Return the camera to its bag between shots.
- Never remove the lens fitted to the camera on site. If wide-angle or specialist lenses are required, a camera pre-fitted with the requisite lens will be supplied.

Problems – faults, damage, loss or theft

- If a piece of equipment is found to be faulty, or is lost or stolen, this should be reported immediately to the project manager and the project logistics officer (at Fort Cumberland) so it can be replaced as soon as possible.
- If equipment has been stolen, the project manager must report the theft to the police (obtain the full manufacturer's identification numbers from the project logistics officer).

7.1.7 END OF FIELDWORK

At the end of work on site, the superuser must ensure that all the image folders, including the daily files, are backed up and copied into their correct locations on the network at Fort Cumberland.

The superuser is also responsible for renaming the image files in line with the ADAPt format, and updating the Filename attribute in the project database to reflect this (See Section 7.9).

7.2 GENERAL PROCEDURES

7.2.1 START OF FIELDWORK

The project superuser will check that the cameras are set to take the correct images formats and quality, and show the correct time and date. The camera image number will be set as a continuous unique series (see 7.1.2) and must not reset if images are removed from the memory card (normally images will be left on the card for the duration of the fieldwork). These settings must not be changed.

We record all photographs as high resolution JPEGs and as RAW files (for the Nikon cameras we currently use, this is the Nikon-proprietary NEF format). The JPEGs are the images we work with throughout the project, and

which are imported into the project database. The NEF files are mainly for archiving – they will be converted to TIFFs later.

7.2.2 RECORDING THE PHOTOGRAPHS

The Photographic Record Form must be completed every time you take a photograph. Each shot (even if very similar or bracketed) must be recorded separately with a unique Photo Record Number. There are separate forms and number block allocations for site and finds photographs, and where several cameras are in use on site, each will have a separate number block allocated to avoid duplication. Start a new Photographic Record Form each day, and when more than one sheet is used record the number of sheets in the space provided.

7.2.3 DOWNLOAD AND PREPARATION FOR THE NEXT DAY

At the end of each day, the designated project archaeologist downloads the day's photographs to the site network (see Section 7.5.4). Use the camera memory card and the card reader on the site laptop – this is a faster and more reliable method than downloading using a cable.

The images are copied to a daily subfolder (these will be already set up on the site network, and there is a site-specific crib sheet to take you through the process). The download must be completed before the daily data backup is carried out.

Check the image files against the Photo Record Sheets. Do the names of the first and last image files in the daily folder agree with the Photo numbers and file names agree on the Photo Record Sheet for that day? If they don't, resolve the discrepancy **before** processing and importing the images. Check the Photo Record forms are present and fully completed – if there are any gaps raise them with the person responsible. The completed sheets are kept in the site office.

Start a new Photographic Record form ready for the following day, entering the next available Record Number and the date.

Check the level of the battery in the camera and replace with the fully charged spare if necessary. Re-charge the battery the next day.
The project manager and site supervisors must ensure that sufficient time is allowed at the end of the day for downloading the cameras and for packing up the equipment, and on the following day for processing the photographs and creating the database records.

7.2.4 IMAGE MANAGEMENT AND DATA ENTRY

At the beginning of the working day, the designated person processes the previous day's download, using the crib sheet provided and the templates set up in the image management software (Abode Bridge) (Section 7.6).

- The image files are renamed to the correct format (icf_i followed by the Photo Record number, e.g. icf_i3209) using the template and copied from the daily folder to a site network folder which mimics the filepath on the HE network, e.g.S:\oldshare\Projects\Pr1234-Projectname\04_Investigation\Images\and the appropriate sub-folder (PhotographsSite or PhotographsFinds).
- Metadata (site details and copyright information) is added to the photographs.
- If necessary, the images are rotated
- The NEF and XMP files are moved to a separate sub-folder (e.g. PhotographsSite \NEF), and nothing further is done to them at this stage.
- The photographs are imported into the project database
- The information on the record forms is entered into the database, and each photograph is related to the contexts, human remains, finds and samples it shows.

Use the check boxes on the record form to record when each task is completed. If you can't create a relationship because the context, find, human remains or sample is not yet present in the database, this may be because the previous day's survey file has not yet been imported. Check again after the survey data has been imported, and if the records are still not present, take this up with the site supervisor and in the Issues Log of the database.

7.2.5 CHECKING AND RECORD MANAGEMENT

Project managers and supervisors must check

- the quality of the photographs taken
- the completeness of the photographic records
- that all the necessary photographs are being taken (Section 7.3.1)

Site supervisors should check the photographs as soon as possible. Where poor shots are noted, they should be used to provide constructive feedback and additional training given as needed. If it's still possible, a new photograph should be taken.

The finds supervisor is responsible for downloading and processing photographs taken with the finds camera and creating the database records for them.

Once completed, both the Site and Finds Photographic Records Forms must be filed in their appropriate site ring-binders or folders and kept safely with the other site records.

7.3 SITE PHOTOGRAPHY

7.3.1 CHOOSING SUBJECTS

The photographic record should enhance the basic recording of individual contexts, and relationships between contexts. It should complement the written and drawn context record, and to a large extent, parallel the drawn record, so that drawings and photographs can be compared during the post excavation process to assist interpretation.

Photographs should be taken to:

Record the progress of the work

- the overall site and general views of areas
- the trenches before excavation and after backfilling and reinstatement

- work in progress, normally including people undertaking activities of public engagement with the project, e.g. organised site tours, open days, school visits or visitors viewing the work
- specialist activities, including specialist visits and sampling
- excavation and/or recording difficulties
- any safety issue which arise (if it is safe to do so)
- a team photograph

As archaeological record shots

- of each context
- of pre- and post-excavated features
- of horizontal surfaces and layers
- of vertical sections or elevations
- of links between deposits and structural elements
- of any aspects of the stratigraphic sequence which are either thought to be particularly significant or unclear
- of details that could not be adequately recorded by drawing (such as close-ups of a buried soil before sampling)
- of human remains, cremation-related deposits and any accompanying grave goods (for guidance on photographing inhumation burials, see Module 10: Excavating and Recording Human Remains, Section 10.4.2).
- *in situ* special finds or groups of finds
- animal bone groups (ABGs) and unusual or fragmented animal bone where a photograph may provide additional information

For outreach and dissemination

- images for illustrating lectures and popular publications – photograph key features and activities, including people working to add interest to the shot
- specialist activities (for example, OSL sampling, coring), including photographs which could be useful in talks, training or producing guidelines
- photographs for publications

Think Publication!

High-quality set-piece photographs for publication must be taken during the excavation. The content and timing of publication photographs will be planned by the project manager. Photographs are the only element of the site record that will be published as they stand.

7.3.2 TAKING THE PHOTOGRAPH

The project manager, supervisors, and photographer should always consider the purpose behind photographs, and should have a good idea of which shots are of most significance. All photographs must be taken to a standard which is suitable for their purpose: a record shot of a layer or feature will require different preparation and techniques from a progress or site visit shot.

Plan and prepare

Consider light and weather conditions, the time of day and proximity to others' working areas. Try to time photography to avoid having part of the photograph in bright sunlight and part in shadow. There is little value in cleaning up an area for a photo if it is going to get dark, rained on or walked over by the time you are ready.

The area should be cleaned to an acceptable standard for the purpose of the shot. Except for working shots, all tools and spoil should be removed.

Composition (what's in the shot?)

- Consider exactly what the subject matter is – are you showing a single context, a context group, a section or a wider area of the site? Ensure that it is centred within the frame.
- For a context record shot, try to avoid showing more than necessary of the surrounding-contexts, unless you are demonstrating a spatial or stratigraphic relationship,.
- Scales should be included in all site photographs except working shots. Use suitable sizes so they don't dominate the picture. Position them parallel to the frame of the camera if possible, otherwise parallel to the subject. Scales should be kept clean.
- Working shots should be composed to show some aspect of the work, the conditions or an event on site. Working shots are often used in presentations and lectures, so plan the photo as an illustration
- Avoid high-visibility clothing in photographs unless the purpose of the shot is to illustrate working conditions or it's necessary for safety reasons. High-visibility clothing can interfere with camera metering and affect colour balance.

Depth of field (how much of the photograph is in focus)

The proportion in focus depends on how far the camera is from the subject

and the size of the camera aperture. More will be in focus if you are further from the subject or if you use a smaller aperture.

Check that the main subject and areas immediately in front of and behind it are in focus. To ensure clarity and depth of field, the aperture should be as small as possible for the light conditions (e.g. stop f22 rather than f4).

Remember that

- a smaller aperture requires a longer exposure time (slower shutter speed)
- the larger the f number, the smaller the aperture (f22 is smaller than f4).

If the camera's programmed automatic exposure mode does not give a sufficient depth of focus, switch to aperture-priority auto mode and select the appropriate aperture size. The camera will select the best shutter speed for the image – if this is more than 1/60th of a second, you need to use the tripod (see below).

Depth of field is particularly important when you are taking large scale plan, elevation or distance shots. When photographing small subjects in detail, a shallower depth of field is acceptable. The macro setting must be used for close-ups of finds *in situ*.

Shutter speed (how fast the camera takes the photograph)
The correct exposure for a photograph is a balance of shutter speed and aperture size. Often the camera's automatic exposure mode will achieve good results (but see section on depth of focus above).

Hand held photos must **never** be taken at a speed of less than 1/60 of a second. Any speed slower than this is likely to result in camera shake and a blurred image, so a tripod must be used. Use the cable release to avoid shake when you take the picture (if a cable is not available, use the camera's timer instead).

Focus

Ensure the subject of the shot is properly in focus, with sufficient depth of focus (see above). Often automatic focussing will achieve good results, but the camera's auto-focus may not work well in some conditions, such as poor lighting, sharply contrasting areas of brightness and shade, little or no

contrast between subject and background, or background objects which are larger than the photo's subject. In these cases manual focus over-ride should be used. Check the camera manual for instructions.

- In automatic and semi-automatic modes the camera's metering and focus is set when the shutter-release button is depressed half way. Upon confirmation of focus the shutter-release button may be depressed fully to take the shot.
- In manual mode adjust the focus ring on the lens until the required result is achieved.
- Different cameras have different methods of indicating focus. In auto-focus mode there is usually an in focus indicator. In manual focus there is usually an indicator in the viewfinder, e.g. a split circle that requires levelling or a haze in the centre that becomes clear. Check the camera manual if you are in doubt.
- For large plan or distance photographs, a rule of thumb is to focus a third of the way up the subject area. This generally ensures a balanced focus.

Finally – check!
Take a good look at the picture - make sure you're not photographing your feet or your shadow! Check round the edges for unwanted tools, buckets or people. For working shots, check your composition has not changed.

Number of shots and bracketing images
Usually one or two shots of a subject should be sufficient. Each shot must be given a separate Photo record number.

Bracketing (the process of an under- and an over-exposed image around the preferred exposure) is usually not necessary and should be kept to a minimum. It may be needed where light conditions vary across the picture, on an overcast and dark day or within a building where the results of flash in-fill are uncertain. Most digital cameras have an automatic bracketing function.

Each of the three images must have a separate Photo record number.

Remember: if you have used any special functions/settings on the camera, such as automatic bracketing, turn them off before taking the next shot when you have finished.

Reviewing
As soon as you have taken a photograph, review the shot in the camera monitor. If it's unsatisfactory, delete the image and re-take it immediately (note this on the record form – you can re-use the record number but the camera's image numbers will have changed). Check particularly for out of focus shots, and ask for advice on how to improve the shot if necessary. If the image is poor because of weather or light conditions, don't delete the image but see if you can retake the photograph later if conditions improve.

7.3.3. RECORDING LOCATION USING PHOTO TARGETS

Some types of photographic recording need detailed location information. This can be provided by including **Photo targets** in each photograph, and surveying their locations with the total station. Where this is planned, it will be specified in the Project Design, but the need may arise unexpectedly during excavation.

For example, features such as flint scatters may need photographing as part of their 3D recording. Include at least four Photo targets in each image, and ensure they are surveyed in. Photo targets (see Module 8. Section 8.4.3.7) are a subclass of GeoReferences.

Note the numbers of the Photo targets used in the Comments field of the photograph record, and relate them to the image in the project database.

There may be specific requirements for photo targets used in block lifting (Section 5.2.6.3) – check in the Project Design or with the project conservator.

See Section 7.8 for use of Photo targets in photogrammetry and rectified photography.

7.3.4. USING FLASH

Flash photography can be used (indoors or out) to 'fill in' dark areas where light around the subject is variable. The cameras supplied have an automatic flash that activates when the light is poor. Or set manually where part of photo area is in shade.

When work is taking place inside buildings, the Project Design will specify the photographic methods to be used. This may involve suitable photographic lights, or the camera flash and subsidiary flash units. Refer to the Methods Statement in the PD.

7.4 THE PHOTOGRAPHIC RECORD

The key identifier for every photograph is the Photo Record Number, taken from the unique site number sequence. There is a separate number block allocated to each site and finds camera, and separate recording sheets are used for each. As part of the daily download process, the designated project archaeologist will start a new sheet for each site camera for the following day, entering the site information, date and the first available Photo Record number. The finds supervisor does this for the finds camera.

If you need to start a new record sheet, fill in the site information, and date and Sheet number.

The paper sheets are used to record information on site, and it is important that they are filled in fully. The check list at the base of these forms is used to monitor progress during the download and database import process. It is important that all the stages are completed as soon as possible after photographs are taken.

In future we hope to phase out the paper sheets and move to having the Photo Records entered digitally.

7.4.1 THE SITE PHOTOGRAPHIC RECORD FORM

All fields must be completed except those with an asterisk where information may not be applicable to the type of photograph, e.g. working shots.

Photo Record Number

The next consecutive number taken from the number range allocated to the camera you are using. This should tally with the photo's file name in the camera – e.g. Photo 3456 should have file name DSC3456. You can see the file name by previewing the image (this is **not** necessarily the same as the camera's sequence number, although because of the way we set up the cameras, it usually will be).

If the Photo number and the file name don't agree, raise this with the supervisor as soon as possible so the discrepancy can be resolved.

Photo file name

The file number used by the camera, e.g. DSC1234. The file number can be established by previewing the image. This should tally with the Photo number – recording it here is a cross-check in case there are any recording issues.

SSD*

The site sub-division such as the trench or area number.

Facing

The compass direction **that you are facing** when taking the photograph, using the abbreviations *N*, *S*, *E*, *W*, *NW*, *NE*, *SW*, *SE*.

Shows*

This is used specifically to list the record number/s (context, *in-situ* small find, sample, skeleton etc.) that appear on the photograph.

Comments

Describe the principal subject of the photograph and note any supporting information that will assist in its interpretation and allow captioning for archiving. Typically, this will include whether the shot is pre- or post-excavation, what is shown, whether it is a detail, general or working shot, and extent to which additional contexts appear. If it shows a drawn section or elevation, note the section number. Bracketed shots should be indicated. Also include factors that may affect the quality of the photo or were the reason it was taken, such as weather conditions, or a visit by a group, school or individual.

For working shots, especially those illustrating particular tasks or activities, record the names of the individual(s) shown where possible or practicable. If it shows specialist sampling or the location of a specialist sample, note the specialist's sample number here (external specialists often assign a lab number themselves in addition to our sample number).

Scale(s)*

A description of the scales used (e.g. 1x2m, 1x1m).

Recorded by
Your name or initials (in the database, select the photographer's name from the drop-down list).

7.5 FINDS PHOTOGRAPHY

Two types of on-site finds photography are undertaken: *in situ* photographs of objects and photographs taken in the finds office. In both cases it is important to be clear what you are trying to record, and to work out the best way to take the photograph to show it.

7.5.1 FINDS I*N SITU*

These photographs, taken with the general site camera(s) and recorded on the Photographic Record Form, capture information that otherwise would be lost. They are taken to:

- record fragile or unstable objects which may disintegrate or decay on removal from soil contexts
- show the relationships between artefacts and their stratigraphic contexts
- show relationships with other artefacts
- show depositional conditions
- record methods of conservation, handling, and lifting

The techniques used to take such photographs are similar to those for site photography. For close-up shots, it may be necessary to use the macro facility (see manufacturer's user manual).

Think about what you are trying to show, and the best way to achieve this.

It will often be necessary to use manual settings on the camera, particularly to ensure a good depth of focus (so that the entire object is in focus). This will often require a small aperture (f22/f32) and longer exposure, and so you will need to use a tripod. The photograph must include a suitable sized scale bar and a colour balance chart.

Module 5 Section 5.5.5.2 describes recording finds needing special care. All of these will usually require *in situ* photography (human remains and grave goods, cremation related deposits, animal bone groups and industrial debris).

7.5.2 IN THE SITE FINDS OFFICE

Following removal from the ground, selected finds may also be photographed in the site finds office. The project finds officer will advise what types of find should be photographed – it is not usually necessary to photograph all Small Finds. In general it is a good idea to take photographs of anything particularly interesting or unusual.

Photographs may be taken to provide a permanent record of the objects shortly after recovery, but are often taken to send to the project finds officer and other specialists in finds, Ancient Technology or Conservation to ask for their advice. In either case, you need to think about what you are trying to show and the best way to achieve this.

On most sites we use a dedicated camera with macro lens and a specialist set-up with a stand to enable vertical, evenly lit shots and avoid camera shake.

The photographs are recorded on the Finds Photographic Record Form using a defined sequence of record numbers (see the project's Record Number Allocation form).The images must be imported into the database promptly, and the database record fully completed, including relating the images to the find(s) shown on it.

The choice of background and style of the photograph should complement the photograph's use. Non-reflective, neutral backgrounds with sufficient contrast with the object being photographed are preferred; darker backgrounds work better than lighter ones.

For a good finds photograph, you will need to use the manual settings on the camera. It's essential to achieve good depth of focus (so that the entire object is in focus). This will mean using a small aperture (f22/f32) and a longer exposure. If the photography stand is not available, use a tripod. Use the cable release (or the camera timer) to take the shot (to avoid camera shake).

Several photographs of an object from different angles may be necessary to depict all the required details. Both sides of a coin should always be photographed, and for coins, other flat objects and items with incised marking, you need to use raking (directional) light to make the detail visible..

Each object must be photographed with a suitably sized scale, a colour balance chart and the finds label showing the record number included in the shot. For small items, this can be a 'reference shot', and you should then take further shots where the object fills the frame and shows the detail required.

Frame the photograph carefully – apart from reference shots where needed, the object should fit the frame. Don't show a tiny object in a big frame. Orientate objects so that they align with the frame of the picture, e.g. if an object has a straight edge ensure that it is parallel with one of the sides of the frame of the image.

Check your photograph carefully after you've taken it, preferably on the computer screen not just the camera. Retake the photo if the image isn't clear or doesn't show what you need it to.

Further finds photography will take place off-site. Historic England conservators often record finds at different stages of their work, and where block-lifted objects (such as cremation urns) are excavated in the lab. The project finds officer may take photographs to send to other specialists for opinions or advice. Finds photographs to be used for exhibition, display, lectures, or publication will usually be taken by the Historic England Imaging and Visualisation Team in the studio at Fort Cumberland.

7.5.3 THE FINDS PHOTOGRAPHIC RECORD FORM

All fields must be completed except those with an asterisk where information may not be applicable to the type of photograph, for example, working shots and photographs taken for presentations or training.

Finds Photo Record Number

The next consecutive number taken from the number range allocated to the camera you are using. This should tally with the photo's file name in the camera – e.g. Photo 3456 should have file name DSC3456. You can see the file name by previewing the image (this is **not** necessarily the same as the camera's sequence number, although because of the way we set up the cameras, it usually will be).

If the Photo number and the file name don't agree, raise this with the Finds/Enviro supervisor or the project superuser as soon as possible so the discrepancy can be resolved.

Photo file name
The file number used by the camera, e.g. DSC1234. The file number can be established by previewing the image. This should tally with the Photo number – recording it here is a cross-check in case there are any recording issues.

Assemblages Number*
Record the Assemblages record numbers of the objects illustrated in the photograph.

Photographed by
Your name or initials (in the database, select the name from the drop-down list).

7.5.4 FINDS PHOTOGRAPHY DOWNLOAD AND FILE PROCESSING

Finds photos are downloaded into daily folders (e.g. S:\Pr1234_SiteImages\ Pr1234_SiteImages_Week_n\Month_dd_Weekday\Photos_Finds.

After they have been renamed and given the appropriate metadata (as for Site Photographs, see Section 7.6 below), they must be copied into the correct folder (e.g. S:\oldshare\Projects\Pr1234-ProjectName\04_Investigation\Images\ PhotographsFinds).

7.6 PREPARING THE IMAGE FILES FOR IMPORT INTO THE PROJECT DATABASE

Site photos are downloaded into daily folders (e.g. S:\Pr1234_SiteImages\ Pr1234_SiteImages_Week_n\Month_dd_Weekday\Photos_Site.

All photographs taken on site form part of the site archive. The daily download folders are included in the daily backup process, and at the end of week a copy of all the site data is sent to Fort Cumberland for secure storage on the Historic England computer network.

The on-site processing has three stages:

- Adding metadata

- Re-naming the files and copying them to the correct location on the site network
- Rotating the images (if necessary).

It should be done either straight after the files are downloaded or at the start of the next working day, and must be completed before the photographs are imported into the project database.

The image management software we use for this is currently Adobe Bridges, and there are guidance notes to help with this process: **Photo processing for Intrasis with Adobe Bridge**.

Always start by checking the Image files on the network against the Photo Record Sheets. Do the names of the first and last image files in the daily folder agree with the Photo numbers and file names agree on the Photo Record Sheet for that day? If they don't, resolve the discrepancy **before** processing and importing the images.

7.6.1 ADDING CORE IMAGE INFORMATION

Key metadata ('data about data') must be embedded in the image file soon after it is downloaded. We record the copyright status ('Copyrighted')and ownership (©Historic England); the name of the original source file; the location of the excavation, including a central National Grid Reference for rural sites, and the full name of the Project, county, year of excavation and the Project Code. This information is included in a site-specific template HE{projectnumber] – use the APPEND METADATA tool and the template to add the metadata.

If there are any restrictions on the use of the some or all of the images, this information must be included in their metadata.

Additional information such as a caption and keywords to assist searching (at least three, based on Historic England thesauri) will be added later, as required.

7.6.2 RENAMING IMAGES AND COPYING THEM

The cameras are set so that the Photo Record number is included in the file name, e.g. DSC_3456. For easy import into the Intrasis database, the files are renamed to e.g. icf_i3456. Use the BATCH RENAME tool. In the renaming dialogue box, select the template DSC2ICF and ensure 'copy to other folder' is

selected to copy the photographs to the correct folder (PhotographsSite or PhotographsFinds) and the S drive.

7.6.3 ROTATING IMAGES

Where photographs need rotating, this **must** be done using the specialist image management software and before importing the image file into the project database. **Do not** rotate the images while viewing them in the Microsoft file manager or image viewers, as this will result in the loss of information and resolution in the image.

7.7 PHOTOGRAPHY AND THE PROJECT DATABASE

7.7.1 IMPORTING THE PHOTOGRAPHS INTO THE PROJECT DATABASE

Use the **Photo procedures for Intrasis** poster (or crib sheet) and the site-specific poster on **File names and locations** to take you through this process. The Intrasis Reference notes on 'Images and Documents' are also available on the site network

Before you start importing the photographs, make sure the images are all **stored in the correct place on the site network**. This is essential, as the file path is imported into the database and changing it later is tedious and time-consuming. The file path used on site mimics the file path on the HE network at Fort Cumberland.

The Import function imports the photographs into the Intrasis database– that is, it creates an image record with an attached thumbnail of the image, along with a link to the actual image file on the computer network. Select Import from the Object menu, and pick Document as the type of file to be imported, and click the Select Files button. Remember it's the JPG versions of the photographs which are imported.

The new Image records are created with the Photo Record number as the Intrasis **Id**, and the **Name** field will show the file name (e.g. Id 3456 and Filename icf_i3456), and the file path is also entered automatically.

Once the images are created in the database, all the data from the Photographic Record sheet must be entered.

The images must be related to all the contexts, small finds, skeletons, samples and photo targets that they show, using the Shows/Is Shown On relationship. This data entry is usually done each day by the designated project archaeologist, but other staff may be asked to help if there are a lot of records to do.

7.7.2 CHECKING YOUR PHOTOGRAPHS IN THE PROJECT DATABASE

When you are checking your records – finds or site – you should check that the photographs you took are correctly related to the relevant contexts, small finds, skeletons, samples, etc. Delete any redundant relationships – for example, a context record shot should not be related to the site sub division as well as to the context. Look at the photographs in the Image record's **Documents** tab – right click on the thumbnail and select **View** to open the full image file. Has the photograph come out as you intended?

7.8 PHOTOGRAMMETRY AND RECTIFIED PHOTOGRAPHY

Photogrammetry and rectified photography can be very useful in archaeological recording (Historic England, 2017 Photogrammetric Applications for Cultural Heritage: Guidance for Good Practice). Best results are achieved where work is planned in advance to meet the project's aims and objectives.

Project Managers must seek advice from the Geospatial Imaging team. The value of these techniques in recording, interpreting and presenting project results should be balanced against the additional resources required for image processing and archiving. What benefits are expected? What are you aiming to achieve, and what are you adding to standard recording?

When it has been agreed that photogrammetry or rectified photography is be used, this will be set out in a Methods Statement in the Project Design. In this

case, you must refer to and follow the Method Statement and not rely on the brief guidance in this section.

These techniques do not replace standard recording (planning, section drawing, surveying) unless this is specifically stated in the Project Design. They must not be used on an ad hoc basis as 'time saving' alternatives to traditional recording. Tasks such as excavating, recording and lifting burials must be started in time to finish the work in a day (see Module 10, Section 10.4)

Two methods can be used on site with our usual digital SLR camera: photogrammetry (sometimes now also called Structure from Motion, SfM) and Rectified Photography (RP).

Rectified photography forms a standard part of our recording system, for example for inhumation burials and animal bone groups, and it can also be useful for artefact scatters and tile or mosaic floor surfaces.

7.8.1 RECTIFIED PHOTOGRAPHY (RP)

A standard photograph distorts what it shows due to the effects of perspective and the tilt of the camera when the photograph is taken. The rectification process transforms a single image to remove these tilt and perspective distortions. Note that it does not remove any "barrel" distortion from using wide-angle lenses, and is best done with a 50mm fixed lens, or the zoom set to neutral.

RP is a 2-dimensional recording technique and so works best for flat or nearly flat surfaces, and where the camera can be held as parallel to the surface being recorded as possible (for example, looking vertically down on an object being photographed). There is inevitably some remaining distortion of scale after processing because of surface unevenness or the height of objects being photographed (for example, the bones of an extended inhumation are not flat, and measurements cannot be accurately taken from a rectified photograph).

Make sure you have sufficient depth of focus in the photo, and don't use a very wide angle lens. Minimise distortion by minimising the tilt of the camera relative to the subject (e.g. by taking a shot of a horizontal surface as close to vertically as possible).

Accurate survey control is essential. Use *at least* four photo targets (Section 7.3.3 and Module 8 Section 8.4.3.7) surveyed in with the TST. This must be in the same plane as the feature you are recording (for example, in the base of a grave not on the surface around the outside of the cut). Distribute the photo targets evenly, generally in a rectangle around the feature but not at the extreme edges of the image.

If the camera offers an in-built rectification option, don't use it (it can prevent accurate rectification of the image during processing).

7.8.2 PHOTOGRAMMETRY (SfM)

Photogrammetry is a three dimensional technique, using multiple 2D images to create a 3D model. It can be useful for crouched or multiple burials, burials in cists or with vessels, and standing structures. If it's possible to raise the camera using a mast, it is also useful for wider area ortho-images.

Processing the images is time consuming, and resources for this must be planned and agreed if it is to be included in a Project Design. The PD must include a full methods statement, and the notes below are not an alternative to that. If SfM is used unexpectedly, always try contact the Geospatial Imaging team for advice first.

The essential requirements are a sequence of good photographs (sharp, in focus and with a good depth of field) and accurate survey control. GPS (GNSS) positioning of targets is **not** accurate enough – use the TST in reflectorless mode (focussing the TST directly onto the targets without using the prism). This method is described in the *Recording Survey Data for Import into Intrasis* reference guide (see Module 8).

- Keep the focal length of the camera constant (that is, don't zoom in and out).
- A wide angle lens (14 to 28mm) can be used to show a larger area, but don't use a wider angle as it can cause distortion
- Use a small aperture (generally f/8 or f/11, or f/16) to get good depth of field, with as much as possible in focus. If this requires a long exposure (anything over 1/80th of a second), use a tripod and take the photos using the camera's timer.
- Avoid high ISO values, as they can result in noisy images. It's almost always preferable to use a longer exposure and tripod.

- Take multiple photos, from different angles, with additional shots where there is complex geometry (e.g. to show the underside of a skull). If any part of the photograph is not shown on **at least** two images it cannot be reconstructed in the model.
- Don't take multiple images from the same position – move the camera for each shot.
- Don't use fill-in flash unless it's absolutely necessary.
- Have **at least 5** evenly spread photo targets to allow the model generated to be geo-referenced; one of these should be central to the area covered, and the other targets should not be too close to the edges of the area being photographed. They do not all need to be visible each photo.
- Avoid taking images in rapidly changing light conditions – try to keep image exposure as even as possible throughout the shoot.
- Don't change the colour balance setting during shooting.
- Include a scale bar (as a failsafe in case the control does not process correctly).
- The first image in the sequence should show the whole area being recorded, including all the photo targets.

Remember to take the usual record photographs, plus photographs suitable for use in reports, publications and presentations.

7.8.3 RECORDING AND DATA ENTRY

Images for SfM and RP are recorded as Site Photography in the usual way, and each image must have a unique photo number.

SfM images must have a full record in the Intrasis database for the first photograph in the sequence. Describe the reason why SfM was used and what is being photographed. Relationships must be created to all contexts, human remains and finds shown, and the georeferences (photo targets) must be listed. The remaining photos should have 'Part of SfM sequence – see Photo 1234' in their Short Comments attribute.

7.9 PREPARING THE IMAGES FOR THE HISTORIC ENGLAND NETWORK AND ARCHIVING

At the end of fieldwork, all images (the JPEGs and the NEFs with the XMPs) must be copied to their appropriate locations in the project folder on the Historic England network.

The project superuser must then use the template ICF2HE in Adobe Bridge to rename all the Image files to their correct HE ADAPt format names (e.g. icf_i3456 becomes HE1234- 3456, where HE1234 is the project number). This needs doing for the PhotographsSite, PhotographsSite/NEF, PhotographsFinds and PhotographsFinds/NEF folders.

The Filename attributes of the Image records (PhotographsSite and PhotographsFinds) must then be updated in Intrasis, by exporting the tables, editing the data in Excel to replace the Filename and re-importing a table containing just the IntrasisID and the updated Filename. Check the links are working properly by opening the some photographs from within Intrasis.

The images should then all be deleted from the camera memory cards before the cameras are returned to the Facilities and Logistics Team at Fort Cumberland.

7.10 REFERENCES

Andrews, D, Bedford, J, Blake, B, Bryan, P, Cromwell, T and Lea, R 2009 *Measured and Drawn: Techniques and practice for the metric survey of historic buildings*. Second edition. English Heritage, Swindon

Historic England, 2017 *Photogrammetric Applications for Cultural Heritage: Guidance for Good Practice.*

Historic England, 2015 *Digital Image Capture and File Storage: Guidelines for Best Practice.*

8 SURVEY

This module provides an outline of the principles and requirements of spatial data capture and recording in the Historic England excavation recording system.

It isn't a 'How to' guide – there are separate notes on using our surveying equipment on site, and training and mentoring will be provided. But it's important all staff understand the basic requirements for capturing the spatial data we need to record and how their work affects the quality and value of the data collected.

We have specific surveying procedures in place to support our recording system and database use. These may differ from how you have worked previously. Please do follow them carefully – they are there for a reason.

Read this in conjunction with the other modules – for example, the Human Remains module if you are surveying in a skeleton (see Module 10, Section 10.4.2). Know what's required in the spatial record and how it relates to the written and drawn record.

As with all site tasks, we expect a flexible and responsible approach to survey work from our site staff. Site staff are required to survey in the contexts, samples, human remains and small finds they excavate and the plans and sections they draw, just as they are expected to record, describe, draw and photograph them. In return we offer you the chance to develop your skills and experience in this area. Our approach is set out in Module 1, Sections 1.1.1 and 1.1.2.

Survey requirements must be taken into account throughout the whole project life cycle, from initial planning to dissemination and archive.

This module consists of an introductory section (8.1) outlining our approach and some basic points which are covered in the rest of the manual. Section 8.2 on project planning and site set up is aimed mainly at project managers and superusers, but Section 8.2.4 describes the survey responsibilities of site staff during fieldwork.

Survey data archiving is covered in Section 8.3. Every site will have its own information sheet on file naming and on data storage locations, which should provide all the information needed by the site team during fieldwork.

Section 8.4 describes our excavation survey methods, procedures and workflow. Please read through the section. As 8.4 is designed for use as on-site reference, you will find that key information is repeated in several places. Section 8.4.5 covers the importance of checking and completing your database records and site drawings.

Section 8.5 outlines some traditional survey methods, including how to continue recording spatial data if TST problems occur. The superuser/surveyor will always prioritise resolving problems or getting a replacement instrument to site, but Section 8.5.2 describes an emergency stopgap.

We would welcome your comments on the Recording Manual and suggestions for improvements.

8.1 SOME BASICS

8.1.1 THE SURVEY INSTRUMENTS

Our equipment currently comprises two Leica TS16 Total Stations (TSTs) and one Leica GS14 global positioning system (GPS) antenna. These are controlled using the CS20 Field Controllers, which also store the data. All the instruments use Leica's Captivate software.

A real advantage of this equipment is that you can see the things you're surveying on screen as you work. You can see them in relation to other surveyed features and background plans, and you can check you are surveying enough points to give a good outline.

However, there are a couple of specific extra steps needed to show the linework correctly. The TST software and the Intrasis database need different instructions to close an outline or end a line and ensure the line work doesn't get tangled on the controller screen or in the database. These will be explained during training and in the guides.

There are two reference guides to using the TST and Captivate software. These take you through the usual site tasks, and are illustrated with screen shots from the Leica Captivate software you'll see on the TST or GPS controllers as you work.

Recording Survey Data for Import into Intrasis covers the routine survey work done on site, and will be relevant to all site staff.

Total Station Set Up and Data Export covers the daily set up and download tasks which will usually be done by supervisors or designated project archaeologists (see Section 8.2.4.1).

There's an A6 size copy of each in the survey equipment boxes, and copies are also available in the site office. Copies (A5 size) are available if you want a personal copy for reference in the field or to make notes on.

Jobs

For each TST used on a project, there will be one **Fixed Point Job** (the list of survey stations) used in setting up the TST, and a **Project Data Job** in which all the survey data recorded throughout the project is

stored. Make sure you record your data in the **Project Data Job** (the *only* exception to this is if you are creating a new Survey Station).

Do **not** create any other jobs unless told to do so by the project's superuser/surveyor (because multiple data jobs can result in confusion and possibly data loss). If you think there is a problem with the existing job, consult the superuser/surveyor immediately.

Care of equipment

Survey kit is both expensive and essential to the success of a fieldwork project. It must be properly cared for, and treated with respect when in use, being transported or stored.

Ensure the instruments are set up firmly and securely, safe from knocking by livestock (or people!). Don't leave the equipment unattended and out of sight (e.g. during breaks).

The kit can be used in the rain, but keep the TST, GPS and controllers covered when it's raining if they are not actually in use (there's a yellow rain cover in the box). After use, the TST, GPS and controllers must be dried thoroughly with kitchen towel before being replaced in their boxes. The boxes must be left open in a warm dry place overnight so the instruments can dry off and ventilate. This is particularly important after a wet or damp day. *Leaving the kit damp in a closed box will damage it*.

Always pack the equipment properly in the boxes before carrying or transporting them. Stow the boxes carefully in vehicles so they can't fall out when the doors or boot are opened, or be knocked by tools moving during transit. The kit must not be left in vehicles overnight.

Report any damage or problems to the project manager and the project's superuser/surveyor *immediately*.

8.1.2 HOW WE WORK

Working together

All site staff contribute to the spatial record, working flexibly, taking responsibility, and checking their own work. Supervisors and project managers check the data quality and completeness regularly, and provide feedback and additional training where required.

In addition, we ask some projects archaeologists to take additional surveying responsibilities, setting up the equipment, downloading the data and ensuring the kit is cared for properly. Training is provided, and this can be a good opportunity to gain survey experience.

The project's Intrasis 'superuser' and surveyor is normally responsible for ensuring site set up, training staff and providing reference material. The superuser/surveyor will be available to advise, on site or by phone. If he/she can't be contacted, one of the other superusers will be happy to help (phone Fort Cumberland on 02392 856700 to contact them).

The different surveying roles and responsibilities are set out in Section 8.2.4 below.

Our recording procedures

Our site procedures, recording system and database template are integrated and designed to ensure the smooth flow of data throughout the project lifespan. Changing one part on site can result in unforeseen problems further down the line.

This is why we need you to follow our procedures carefully, even if they differ from your usual way of working. If you have any questions or suggestions, please speak to the superuser/surveyor. We welcome constructive comments, and on several occasions we have made improvements based on them.

Creating the record

For objects surveyed on site (contexts, samples, small finds and skeletons, plus trench outlines, sections, grid pegs and levels on plans) the database record is created when the coded survey data are imported. The coded data carries basic information about what's being surveyed:

- The record number and type of record
- The outline, line or point representing the record – this is referred to in the database as a **GeoObject**
- A key relationship, where appropriate (for finds and samples, this is the context from which they were collected; for levels, it's the plan they are shown on).

8.1.3 ENSURING DATA QUALITY AND SECURITY

The surveyed outlines and locations of features, finds and samples are essential to assessing, analysing and presenting our results.

So we need to make sure that the data we collect are as complete and as accurate as possible, and securely stored, documented and managed.

- Understand what you are recording and why
- Record each context, sample, find or skeleton carefully
- Ensure you have a **complete** record for each context, sample, find or skeleton (read the Manual!)
- Make sure every permatrace drawing shows enough grid points (see Sections 8.4.3.5 and 8.4.3.6)
- Always follow the on-site procedures for ensuring survey data is downloaded, stored and backed-up securely

Remember

- **If in doubt, ask**. We can't go back and re-survey once a context has been removed or a small find or skeleton has been lifted
- **Look at what you're surveying** on the Controller screen – does it look right? Are you recording enough points to produce a good outline?
- **If you make a mistake** (and we all do - it's how we handle them that matters!), stop recording and start again. Record an X STOP point, note the problem in the Survey Book and re-survey. Ask for advice if you're uncertain what to do
- **Don't** ever edit survey data in the Project Data Job on the instruments or controllers (errors will be corrected in the database after the data are imported)
- **Always** fill in the Survey Book (Section 8.4.4.1), taking care to describe any errors that have occurred
- **Always** follow the download and backup procedures, and ensure data are exported, stored and backed-up correctly.

8.1.4 SAFETY

- Never look at the sun through the TST
- Never look directly into the TST laser
- Always ensure that metal grid pegs have safety caps in place

8.2 PROJECT PLANNING, SITE SET UP AND SURVEY RESPONSIBILITIES

8.2.1 PROJECT PLANNING

Project managers and project superuser/surveyors must collaborate from the start of the planning process so that the best survey support can be given to achieving the project's aims and objectives. Kit selection, planning and (when appropriate) customising the survey process can ensure this is done in the most effective way practicable.

The Project Design

A Project Design must include a section on survey methods, and any specific requirements should be identified and discussed as early as possible.

For work on English Heritage properties, there may be existing survey control points, and the project manager should ensure that the superuser/surveyor is supplied with the relevant documentation.

The type of work will determine the kit required. Generally the TST is preferred for excavation recording, but there are times that GPS may be preferred (for example, surveying intertidal peat deposits, or recording test pits scattered over a hillside with limited vehicle access). If these are also in areas where the mobile phone signal and hence the internet connection (required for real-time GPS correction) is patchy or unreliable, consideration should be given at the planning stage to using differential GPS. This will require hiring a second antenna, or borrowing one from another team within the Research Department. Once the base station GPS antenna has been located using the real-time correction, the roving antenna does not need an internet connection.

The size and layout of the site will also determine whether one or two TST kits will be required. The effective operating range of the TST controllers must also be considered.

A site visit by the superuser/surveyor is usually needed. Factors such as the strength and reliability of mobile phone signals and any limits to sky visibility for satellite coverage due to standing buildings or tree cover must be planned for. If livestock or heavy plant is likely to be present in

the working area, secure places for TST setup must be identified and fencing planned. The project manager must ensure the Logistics Team are aware of this.

Additional surveying codes can be used when required by the project aims – for example, peat layers can be distinguished from other deposits, or finds can be recorded by subclass (the Assemblage category) as they are surveyed. This may require minor changes to the Intrasis database for the project.

A background image or map should be imported into TST and GPS controllers, allowing users to see relevant background information as they survey. This can be any georeferenced image (for example, geophysical survey interpretation, historic mapping, aerial photograph), and modern OS mapping can be added. The controller can be set up with several background images, and the most useful made visible as required. When the project manager has selected the images and map, the superuser/surveyor will import them.

Survey and Intrasis training are usually integrated and delivered by superusers. As well as an initial training programme, the Project Design must include continuing support and mentoring on site. All excavation staff need survey training, with additional training required for supervisors and designated project archaeologists.

The project's Risk Log should include planning to mitigate the effects of equipment damage or failure.

Site information

The superuser/surveyor will need a trench plan, and a text file listing the trench corner co-ordinates ready for setting them out. Documentation for any existing survey control points to be used is essential. It is also useful to know where cabins, spoil heaps and polytunnels (if used) will be before establishing survey stations. Stations need to be visible and convenient but not where they are liable to be knocked by site staff.

Workflow and site logistics

The project manager and superuser/surveyor should also discuss site workflow, and in particular the need for daily backup of survey data (see

Sections 8.2.4.1 and 8.4.4.4). This means there will be a short period at the end of each day when the TST is not available. In cases where the site office is distant from the excavations, it may be necessary to agree an alternative secure backup routine.

Superuser/surveyor preparation
Once the Project Design is agreed, the project superuser/surveyor will ensure the correct codes list and format files for data export are on the instruments, and create the Fixed Point and Project Data Jobs. The code list is an essential part of the Project Data Job but is **not** included in the Fixed Point Job.

If any customised codes are required, the project superuser/surveyor adds them to the code list, making and documenting any corresponding minor changes to the database.

The project superuser/surveyor will also plan the site setup (Section 8.2.3), and prepare a survey training plan and training materials (including site-specific crib sheets). Superuser/surveyor responsibilities are also discussed under Section 8.2.4.3.

8.2.2 GPS USE

We use a GPS antenna with real time correction for locating our fieldwork by surveying in fixed points, setting out trenches and at times for recording archaeological data.

Real time correction requires internet connection to the Leica SmartNet via a mobile phone signal, and at some locations the signal is absent, poor or intermittent. Where the signal is poor, the setup tasks can take longer than expected, and once the fixed points are established, it will be better to lay out trenches using the Stakeout application on the TST. Signal strength and reliability must be checked early in the planning process.

The SmartNet contract is for a fixed number of hours a month, and if GPS-only survey is planned this must be discussed well in advance with the licence holder (the Senior Geospatial Imaging Officer in the Imaging Team) to ensure it does not conflict with another team's fieldwork plans. The Internet connection should always be closed which it is not needed.

For recording archaeological features and finds, a TST has significant advantages over GPS.

- Each GPS reading has its own independent inaccuracy (the 3D error). This is small (typically less than 0.03m) but for dense archaeological features and particularly finds scatters it can be significant. With care, TST data can be more consistent.
- The TSTs can be used in reflectorless mode, with the telescope manually focussed on individual objects. This allows highly accurate recording without the need for a prism or antenna pole. It's particularly useful for groups of very small finds, such as beads, or for recording points on standing buildings or sections.

8.2.3 SITE SET UP

Site set up is normally the responsibility of the project's superuser/surveyor.

8.2.3.1 Survey Stations

Survey Stations ('Fixed Points') are usually initially established on the OS Grid using the GPS with real-time correction. The antenna must be set up on a tripod over the station point, and at least 100 observations used for maximum accuracy.

Station points can be non-moveable points on the ground, such as nails set in tarmac or permanent survey pegs. Otherwise firmly located wooden (**not** metal) grid pegs with a small nail in the top are used. The pegs should be painted bright yellow or orange to make them conspicuous and reduce the risk of tripping. Mark the station name (e.g. STN001) clearly on the peg, and make sure any old labels or writing are removed. Each station also needs a record number, assigned from the Grid Peg index.

Start by setting out two survey stations as far apart as practicable. All GPS data have some inaccuracy (the 3D combined error), and a long gap between the initial stations minimises its effect on the orientation established. For good data consistency, set up the TST over one of the stations and use the second as the backsight. There may be a small set-up distance error due to the GPS error. Ideally this should be less than 15mm – if it's larger than about 25mm, check the set up again.

Set out the remaining stations required, and survey them in using the Fixed Point Job. The point ID is the station name (e.g. STN001). Note that no coding is used in the Fixed Point Job. Record the stations IDs and how they were established (GPS or TST) in the Survey Book.

If two TSTs will be used on site, copy the Fixed Point Job onto the controller for the second TST.

Establish more station points than you need for recording (three is the minimum), in case one is knocked or becomes loose. If you need to replace a disturbed peg, at least two others are required, especially as the GPS kit may have been moved to another site. Ideally have a couple of 'spare' stations well out of the way where they are less likely to be knocked.

Survey stations must be intervisible (you should be able to see at least two others from each) and must cover all the areas to be excavated. Take into account the position of cabins, spoil heaps and polytunnels (if used) when locating stations. They need to be in convenient locations but not where they are in the way or will be a trip hazard. It must be possible to protect the TST and backsight prism tripod from livestock and machinery.

If a survey station marker becomes loose or is moved, it should be replaced by surveying in a new fixed point nearby with a **new** station name and ID.

Download the data and enter the survey stations into the project's Intrasis database. This can be done by typing the data directly into the database to create the Survey Station record and its point GeoObject. Alternatively, the data can be imported into the Project Data Job. The Intrasis ID (the record number, taken from the Grid Pegs Index) and code (SURVEY STATION) are added to the code page for each station before the data are exported and imported into the database in the usual way.

Complete the database records, including the stations' Names, and a description of when and how they were established.

Establishing survey stations is the only time that data should be recorded in or exported from the Fixed Point Job.

For longer-term stations (any nails or permanent pegs which will be left in place so they can be reused in later seasons), take a photograph showing its position and create a 'witness statement' sketch with notes and measurements to features such as standing buildings or fence lines. Scan the sketch, and relate the photo and sketch to the station record in the database.

On some projects, survey stations will be set up from an already established survey control points (this is often the case at English Heritage sites where previous survey or excavation has taken place) to ensure consistency between the current fieldwork and previous events such as standing building recording or earthwork survey. These points must be assigned project record numbers and station names and entered into the Fixed Point Job and the project database. The source of the data and the ID it uses for the station there must be specified in the Description (Text tab) for each station record.

8.2.3.2 Setting out trenches

Setting out trenches is often the first task on site, so machining can start as soon as possible. This is why the GPS is often preferred for the task, although the same Stakeout app is available on the TSTs.

The project manager should supply co-ordinates for all corners of the trenches in advance, as a comma or tab delineated text file. This is formatted and imported into the TST or GPS controller by the superuser/surveyor. The surveyor should also have a plan of the trenches to hand during the set out.

Set out the trench corners using the Stakeout app on the TST or GPS (see Stakeout guide). These pegs are temporary guides for machining or hand excavating – they should not be treated as grid pegs. If grid pegs are required close to trench corners, they should be set up and surveyed in after machining has finished or after topsoil has been removed by hand. Pegs actually at the trench corners are too unstable to use as grid pegs.

The trench corners are marked with either metal grid pegs with safety caps or surveyors arrows. To mark the trench edges, string between the pegs and spray along the string with road paint (the string can then be removed). Survey the trench outline in with the TST once machining has finished.

8.2.3.3 Setting out grids

The Project Design may also require a grid to be set out for planning, sampling or finds retrieval. Normally this is set up at a convenient position and orientation relative to the trench or the deposit being investigated. Where a planning grid covering the site is required, the position of the Grid Pegs can be entered into a Stakeout job and surveyed in. If grids are to be set out as required during the excavation, it is often as convenient to establish them using tapes (see Section 8.5.1) and then survey in the individual grid pegs.

For **Planning Grids** each Grid Peg **must** have an ID (a Grid Peg record number, from the Grid Peg Index), so that the record number can be shown on plans. They are surveyed into the Project Data Job to create their database records. Pegs must be clearly labelled with their record numbers (remove any old labels). To avoid confusion, don't assign arbitrary co-ordinates to planning grids.

Metal pegs are usually used for planning grids – they must always have a safety cap ('mushroom') in place. Don't attach tapes directly to a survey station peg or a grid peg in case they pull it out of place.

All pegs, wood or metal, must be removed at the end of the excavation, unless the landowner has given permission for a permanent survey peg and marker to be left in place.

Grids for finds retrieval or sampling must have Grid Pegs record numbers assigned to their corners. The individual grid squares will be identified by the sample or context sub-division record number and, as for other contexts and samples, the outline of each of these must be surveyed.

8.2.4 SURVEY RESPONSIBILITIES DURING FIELDWORK

All staff excavating contexts, taking samples or lifting small finds and skeletons are responsible for ensuring they fully record them as they do so. This includes making the required spatial record using the TST and checking their records in the project database (see Section 8.4).

The need to back up the survey data means **there will be a short period at the end of each day when the TST is not available**. Staff should take this into account when planning their work.

Project managers, site supervisors and designated project archaeologists must ensure that **enough time is allowed** for the download and back up to be completed before the end of the working day.

8.2.4.1 Designated project archaeologists

Generally, some of the project archaeologists are assigned the responsibility for setting up and downloading the TST each day, and ensuring the day's data is securely saved onto the site network.

Designated project archaeologists will be given full training, and there is a detailed reference guide ***Total Station Set Up and Data Export*** to take you through the process. If you haven't set up a TST before, it may take you a few days to feel comfortable with the process, so ask for additional help as required.

For longer periods of fieldwork, the responsibility will usually be assigned to several individuals for two or three weeks each. Where two TSTs are used on a site, it is best to assign a different designated project archaeologist to each to minimise site delays due to the daily set up.

The designated project archaeologists set up the TST at the start of day ready for others to use. Ensure the TST is set up securely in a safe location, inaccessible to livestock, and with the tripod's feet set firmly in the ground.

Level the TST and set its orientation, following the instructions in the reference guide. Record the setup details in in the Survey Book.

For each TST used, there will be one Fixed Point Job (the list of survey stations) used in setting up the TST, and a Project Data Job in which all the data recorded throughout the project is stored. Do **not** create any other jobs unless told to do so by the project's superuser/surveyor (as this can result in confusion and possible data loss). If you think there is a problem with the existing job, consult the superuser/surveyor.

If the TST is removed from the tripod over a break, you need to repeat the set up and orientation process again. Note the new set up in the Survey Book.

If the TST has been closed down over a break or to replace the battery, check the setup – **don't** assume it's still OK. Use the Check Point tool (see the setup notes). If the TST is knocked slightly, it will give an error message and you must check its level and orientation (see the Trouble Shooting section of *Recording Survey Data for Import into Intrasis*).

Survey data must be downloaded onto a data stick and backed up on the site network before the end of each working day. Use the filter to select and download the day's new data. Note the time of the download and the file name in the Survey Book. The output files (in .GSI format) must be named following the conventions set out in the site-specific crib sheet supplied. This is essential for effective data management.

At the end of each week, all the project data to date must be downloaded from the Project Data Job into a separate output, which is also copied to the Survey folder of the Intrasis database folder along with the daily file.

The survey data download files must be copied into the Survey folder of the Intrasis database **before** the daily Intrasis backup is made. This ensures the data is both backed up and ready for importing into the database on the next working day.

Photocopy the day's pages from the Survey Book (the site supervisor needs to have these to hand for checking any issues which arise when importing the data into the database).

An important part of the designated project archaeologists' responsibilities is caring for the kit. The TSTs, GPS and controllers must

be dried thoroughly and packed correctly in their box, and stored securely in a dry room overnight with the box opened to allow ventilation and thorough drying *especially after a wet day*. The TSTs and controllers can work in wet conditions, but storing them damp in a closed box can do considerable damage.

Make sure the batteries are re-charged overnight - you should start each day with two fully charged batteries for each instrument and controller.

8.2.4.2 Site supervisors

The site supervisors' key **survey** roles are

- Importing the survey data into the Intrasis database
- Checking the survey data for quality and completeness
- Checking the Issue Log for any survey data problems
- Monitoring the progress of the work
- Providing feedback and additional training to site staff when required.

This process also helps the supervisors to get a good picture of how work is progressing overall.

It's usually the site supervisors who import the survey data into the Intrasis database and check it. This should be carried out at the start of the next working day, but at times it's useful to download and import data more frequently.

It's important to import the data promptly, so any survey issues can be dealt with and the finds and environmental supervisors have the information they need. They cannot create Assemblages records until the Context or Sample records the material was collected from are in the database. Sample records need to be in place before processing can start.

You need to have a photocopy of the relevant pages of the Survey Book to hand. Check where errors were noted in the field, as this will indicate where to correct the data in the database and what should be discarded as incorrect. If you are unsure, leave the data in the import file and check with the excavator. Ask the superuser/surveyor for advice.

Records with queries, errors or poor data quality (too few points, obvious wobbles) should be discussed with the person who surveyed them.

Where necessary (and possible) the feature should be re-surveyed, and you may need to offer some additional training or support.

Minor blips (for example, one clearly wrong point in an outline caused by a sudden gust of wind) can be easily corrected **after** the data have been imported (**don't** try to do this during the import process: it won't work properly at this stage because of the way we've implemented Intrasis). Data is only corrected in the project database, **never** in the Project Data Job in the instrument itself.

Print out the list of levels, grid peg co-ordinates and section lines end points and datum heights each day. Site staff must add this information to plans and sections as part of drawing completion and checking (see Section 8.4.5 and Module 6), and supervisors should check this is done.

The Plan Index needs to be entered into the database regularly, as you won't be able to import levels until the Plan they are shown on has a database record.

Check that full outlines have been surveyed for Contexts and Samples (this should have been recorded on the Index sheets).

If outlines are missing or incomplete, is the Cut or Deposit still available to survey? If not, can it be 'cloned' from another record? For instance, a 100% Sample outline can be cloned from the Deposit outline. Or will the outline have to be digitised from a site drawing? Create an Issue Log record in the database to note what needs to be done.

Cloning is a useful tool, but it **must not** be routinely used instead of recording an outline. It means additional work, and is a less accurate record of what was excavated. Make sure staff are aware of this.

Importing and checking the data should also help you (and the project manager) to see the progress of the work on site. You can print out plans to take into the trench to check or annotate, and this can be very useful.

8.2.4.3 Project superuser/surveyor

The project superuser/surveyor advises the project manager on the Project Design and planning, especially with any non-standard surveying

(Section 8.2.1). The Code list can be augmented to differentiate features, finds and samples by sub-class if required (for example, pottery and flint could be surveyed in with different codes if this was useful for a fieldwalking project).

He/she will create the project's Fixed Point and Project Data Jobs, set out trenches, establish survey stations and lay out a site grid (if required), and will also ensure that the data download and backup routines are clearly set out for staff to follow. See Section 8.2.3 for more detail about these aspects.

The superuser/surveyor provides training to core and site staff, supplying training and reference materials and site-specific crib sheets. Where training is held at Fort Cumberland, more than one superuser/surveyor is likely to contribute to the programme. Support and mentoring will be available on site, particularly at the start of a project, but superuser/surveyors will also be available by phone. If you can't contact the project superuser/surveyor, phone Fort Cumberland and speak to one of the other superusers who will help you instead.

8.3 ARCHIVE REQUIREMENTS

We need to leave site with a complete, checked and well documented spatial data set, ready for

- use during the site assessment, analysis and publication stages of the project
- making the data available to colleagues in Historic England, English Heritage or elsewhere, whether working on the same project or combining data from various interventions or locations
- archiving to allow re-use of our data by other researchers in the future

These requirements apply to both the paper and the digital records.

Paper archive

- Site drawings: Plans must have at least three and preferably four, grid points clearly and accurately marked and labelled, with their co-ordinates written on the drawing. If the plan consists of more than one drawing sheet, there must be at least three points shown on each sheet. The levels must be listed on the sheet (s).
- Site drawings: Sections must have the co-ordinates of both ends (and any points changes in the line) and the level of the datum clearly shown. Where a long section is drawn in parts, each must have two end points marked and labelled to enable them to be linked, and the datum must be clearly marked on each.
- The Site Survey Book
- Copies of any previous documents detailing survey control points which were used during the current fieldwork (where these are not available digitally).

Digital archive

- Files containing all the digital site survey data as recorded, downloaded at the end of fieldwork. This will comprise a complete download from the Project Data Job(s) in Intrasis format, and a complete download (including the set up data) of all data from each Project Data Job and Fixed Point Job used. The data will be in .GSI files (which can be converted to delineated text files).
- The processed and corrected digital spatial data. This is held in the project's Intrasis database

- 'Witness statements' for any survey fixed points to be left in place, to enable them to be located for future work
- Documentation for other survey control points used (for example, where these were established during previous fieldwork or survey). If a digital version is not available, a printed copy must be included in the paper archive
- A text file explaining the survey methods and the source and current location of any external spatial data sets used. This information should also be included in the Project Design. Any changes in methods made during the fieldwork along with any significant surveying errors (and the steps taken to rectify them) must also be noted. Where applicable, an updated methods section and note on data issues should be included in the Site Archive Completion Report.
- All digital files must be formatted, saved, named and given appropriate metadata in line with Historic England's ADAPt procedures (Archaeological Digital Archiving Protocol).

Naming and formatting files during fieldwork

Each site will have a site specific crib sheet setting out

- File naming conventions
- File formats
- Where the files are saved on the site network

The naming convention used for the daily and weekly survey data download files is essential for effective data management. In particular, it enables us to locate the relevant file if any data issues arise.

After fieldwork

At the end of fieldwork, it is the project manager's responsibility to ensure all files and data are transferred to the correct locations on the network at Fort Cumberland following the ADAPt procedures. The surveyor/superuser will assist with this process. This transfer is an essential part of Site Archive Completion. Ask the Archaeological Archives Team for guidance on using ADAPt.

8.4 TOTAL STATION SURVEYING AND THE INTRASIS DATABASE

8.4.1 INTRODUCTION

Our recording system uses a database/GIS system called Intrasis to process, store, query and present site data. We need to leave the field with a complete, good quality and checked record, and this includes the spatial data captured with the survey instruments.

For contexts, samples, skeletons and 3-D recorded small finds, surveying with the TST is the first stage in creating their database records.

The new record is created automatically when the survey data are imported. Each point or outline surveyed has an ID number and a code describing it, and (for many record types) a second reference relating the thing being surveyed to another record. Each record also has its **GeoObject** attached – the outline, line or point which represents it spatially.

So, for example, the TST input for a coin will include its ID (the Assemblages number for the Small Find), the code for the Assemblages Class, and the ID for the Context:Deposit it was recovered from. When this data is imported into the project database, a new Assemblages record for the coin is created, along with its relationship to its context. A point marking its location is shown in the Map tab of the database.

The spatial data captured with the TST and imported into the database is not a replacement for drawings on permatrace, but it provides an outline record of each context which enables us to see overall site and trench plans, produce plans of phases and structural groups, and create plans showing the location of samples and the distribution of finds and environmental materials. These plans are used during assessment and analysis and included in reports, and may be used as the basis for publication figures. The survey data must therefore be of good enough quality to allow this; that is, it must be recorded with care, and surveyed ensuring the prism pole is vertical and capturing enough individual points to produce reasonably smooth lines.

We survey:
The layout of the site:

- Trench edges (and other site subdivisions such as test pits and sondages)

Fixed points for locating (georeferencing) site drawings and, where required, photographs:

- Grid pegs for locating plans
- Section line end points and datum (string height)
- Photo targets – points visible on photographs which can be used to precisely locate them, rectify them or allow the creation of a 'structure from motion' 3D model.

Levels on plans

- Levels for plans (these should be recorded using the TST, but are not 'fixed points' suitable for locating plans as the location of the level taken is not shown precisely on the permatrace drawing)

The archaeological features, finds and samples we record:

- Contexts – Cuts, Deposits and Masonry or Timber features
- Samples
- Human Remains (skeletons)
- Objects recorded as Small Finds, including Animal Bone Groups

The recording and survey requirements for these differ. They are summarized in Section 8.4.3, but **check the relevant sections of the Manual** to be sure you know what's needed.

All staff excavating contexts, taking samples or lifting small finds and skeletons are responsible for ensuring they fully record them. This includes making the required spatial record using the TST, checking it in the Map tab of the project database and adding co-ordinates and levels to the plans and sections they draw.

Some of the project archaeologists are assigned the responsibility for setting up and downloading the TST each day, and ensuring the day's data is securely saved onto the site network. The role of these **designated project archaeologists** is described in Section 8.2.4.1.

It's usually the **site supervisors** who import the survey data into the Intrasis database and check it. They're also responsible for checking the database Issue Log for any survey data problems, monitoring the progress and quality of the survey work, and providing feedback and additional training to other site staff when required. This process (see Section 8.2.4.2) also helps the supervisors to get a good picture of how work is progressing overall.

The **superuser/surveyor** provides training to site staff, supplying reference materials and site-specific crib sheets. Support and mentoring will be available on site, particularly at the start of a project, but superuser/surveyors will be available to help by phone throughout the project, and will visit site when necessary. If you can't contact the project superuser/surveyor, you can phone Fort Cumberland and speak to one of the other superusers who will help you instead.

8.4.2 SURVEY WORK FLOW

Getting the survey workflow right is key to

- Achieving a complete spatial record of the site
- Working efficiently
- Support the workflow of the rest of the project team

Gaps in the spatial record can cause considerable extra work later in the project and result in poorer data quality. Recording a label on a context and returning to survey the outline later takes additional time.

Database records for Contexts and Samples aren't created until their spatial representation is imported into the database. Failure to survey them at the right time can delay sample and finds processing (finds records can't be created until the context or sample they are collected from exists in the database).

Survey a Context or Sample as fully as possible as soon as you've assigned its record number, preferably surveying the whole outline. If you need to record just part of the outline (a segment) or a label, make sure that's noted on the Index sheet. And remember to go back and survey the full outline as soon as you can.

SURVEY WORK FLOW

Assign a record number from the appropriate Index sheet
Fill in all the required information on the form.

▼

Decide on the correct TST code
This depends on what you're surveying and the sort of spatial data required (outline, segment of an outline, line, point or label).

▼

Immediately survey the context, sample, skeleton or small find *as fully as possible*
Note on the Index sheet where the survey is not complete (for example, if only part of a context outline could be surveyed).

▼

Fill in the Survey Book
This is essential – see Section 8.4.4.1 for what's needed

▼

Check your work
Look at outlines on screen as you survey them. Check again in the database when you fill in written record. Is the data complete?

▼

Return and complete the surveying if required
For example, record the outline of a cut feature after it's been excavated, or survey the complete outline of a context for which only a segment or label was surveyed initially

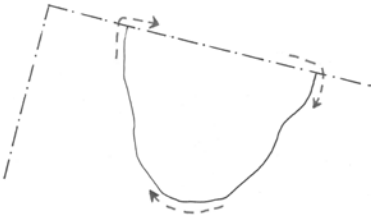
8.4.3 SURVEY REQUIREMENTS

There are different recording and survey requirements for Contexts, Small Finds (including Animal Bone Groups), Samples and Human Remains. You'll also need to survey Section lines, Grid Pegs and Phototargets. The main points are summarised here, but also **check the relevant sections of the Manual** to be sure you understand what's needed.

Direction matters!
The order in which points are recorded affects how the database GIS interprets the shape, so it's important to get this right. Outlines must always be surveyed clockwise, section lines from left to right (facing the section), and skeletons from head to feet.

8.4.3.1 Contexts

- **Contexts** should have their outlines surveyed as soon as they are defined. All outlines must be surveyed in a clockwise direction.

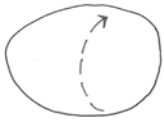


Where a context extends beyond the trench, survey along the trench edge to close the context outline.

If you need to assign a context number before the full outline is visible, survey the part of the outline you can see (using the CUT SEGMENT or DEPOSIT SEGMENT code), and return later to survey the full outline.

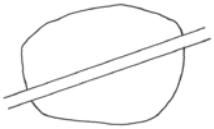
- For **cut features**, the first context fully defined will be the upper fill, so survey that first. A Cut should be surveyed after its fills are removed, so when you start excavating a feature, you can just record a single point (label) for the Cut. Remember to return and survey the full cut outline after excavating the feature.
- Avoid surveying just a label on a Context in other cases, as it duplicates work and it's very easy to forget to return to survey the full outline. But you can do this if it's necessary (for instance, if a Small Find urgently needs recording and lifting before the deposit it's from is adequately defined, you can assign a context number and record a label for the deposit).
- **All fills** must have their outlines surveyed, to allow the distribution of bulk finds to be plotted. *This includes the lower fills of pits, ditches, etc.*

- **Marked breaks of slope in cuts** should be recorded using the CUT BREAKLINES code



- **Stake holes** can be represented by a single point. Generally each stake hole will have a separate number for recording, but if it is decided to record a cluster of stake holes under a single Context number, the CUT MULTIPOINT or DEPOSIT MULTIPNT code is used.

- **Breaks in Deposits** are recorded in two ways.



Where a Deposit (such as a floor layer) has been cut into parts by a later feature such as a ditch or service trench, the outline of each part is surveyed separately, using the same Context number and code. You must record a point with an X STOP code between the parts.

If the layer is continuous but has been cut through by a pit or posthole, survey the outline of the layer using the usual Deposit code DEPOSIT OUTLINE, and then survey the outline of the gap using the DEPOSIT INNR BND code

8.4.3.2 Small Finds

Small Finds are normally recorded by a single point, but large objects and Animal Bone Groups are recorded with an outline (see Module 5, Section 5.2.5.3). **Never** stand the prism pole directly on a find.

Groups of very small Small Finds (such as beads) are best recorded using the TST in reflectorless mode – that is, by focussing the TST manually onto each bead without using the prism. You may need to have the TST set up closer to the finds to do this (if there isn't a handy survey station available, the TST can be set up using the Resection method). This is covered in the *Recording Survey Data for Import into Intrasis* reference guide, but ask the superuser/surveyor for advice if it's new to you.

8.4.3.3 Samples

Select the correct type of sample from the drop-down list in the TST.

Flotation and Coarse Sieved Samples must have their outlines recorded (see Module 9, Section 9.2.2) when you take the sample. This is required even where it's a 100% sample of a context you've already surveyed.

If you are surveying more than one sample from a context, you must record an X STOP point between them. If you don't, the database will join all the points into a single outline which will have to be picked apart by editing the GeoObjects in the database.

Most Specialist Samples also need their outlines surveyed, though a few small samples are represented by a single point (for instance, individually collected pieces of charcoal or samples for optically stimulated luminescence dating). For pollen sampling using monolith tins, survey the top right-hand corner of the monolith tin (and see Module 9, Section 9.4.2).

8.4.3.4 Human Remains

Skeletons are represented by a line with points at the top of the head, at the pelvis, by the knees and by the feet, and a point at the top of the head. **Always** start at the head and work towards the feet. See Module 10, Section 10.4.2 for more information, including complex cases such as incomplete skeletons or decapitations.

When you plan the skeleton, you must also take levels on the grave floor by the skull, sacrum and feet.

Never stand the prism pole on a bone.

8.4.3.5 Sections

Record the two endpoints of **Sections**, starting at the left hand end as you face the section. If there are any changes of line in the section, record the points at which the line changes as you move to the right, before finishing at the right hand end. Mark these clearly on the drawing.

You must ensure that the point of the prism pole is on the string, so that the correct datum height is recorded. You may need someone to help

with this. Alternatively, you can use the reflectorless mode of the TST to survey the end points (see the *Recording Survey Data for Import into Intrasis* guide).

8.4.3.6 Site Drawings

See Module 6, Sections 6.2.1 and 6.3.1
All site drawings must show enough fixed points to enable them to be related accurately to the OS Grid (**'georeferenced'**) and imported as raster images into Intrasis, ArcGIS or AutoCAD as required.

This can be achieved by setting up a planning grid (see Section 8.2.3.3). Long narrow trenches may use a single base line with several Grid Pegs along its length. Alternatively, temporary pegs or six inch nails can be used for individual drawings, for example marking the corners of a planning frame. These must also be given a Grid Peg record number and surveyed in immediately. Ideally the pegs/nails should be left in place until the survey data has been downloaded, imported into the database and checked.

Plans: Levels and Grid Pegs

- Plans must show at least three (preferably four) **Grid Pegs**. These can be pegs from a set-out grid or pegs specifically set out for planning.
- Grid Peg numbers are assigned from the Index sheet. However, where temporary grid pegs (such as nails marking the corners of a planning frame are used), the grid peg numbers take the form 6 followed by the Plan Number followed by a single digit (so grid peg 3 on plan 2031 has the Id 620133).
  The grid pegs must be accurately shown on the plan (with their record numbers) as soon as it is drawn. The OS co-ordinates must be added as soon as possible afterwards.
- Record numbers for **Levels** have the form Plan number followed by two digits (so level 3 on Plan 2007 is 200703). The number doesn't automatically increment, so you need to type it in for each level. Don't try to read the levels off as you survey – add them to the plan from the printout in the site office or directly from the Intrasis screen.

8.4.3.7 Photo Targets

Where photographs need to be located precisely, rectified or used to create a photogrammetry (structure from motion) 3D model, surveyed Photo Targets must be included in the image (see Module 7, Section 7.8). There should be at least four photo targets on a photograph, but the number of targets to be shown will vary depending on the purpose of the photography, so check the Project Design.

For maximum accuracy, survey photo targets in reflectorless mode, focussing the TST manually on the target without using the prism. Using reflectorless mode is covered in the *Recording Survey Data for Import into Intrasis* reference guide.

Records numbers for Photo Targets take the form 6 followed by the Photo number followed by a single digit (so the second target on Photo 6134 is has the Id 661342). You need to create the relationships between the photographs and the photo targets in the database (unlike grid pegs and levels on plans, these relationships are **not** created when the survey data are imported).

8.4.3.8. Survey stations

If you need to create a new survey station, use a wooden (not metal) grid peg hammered as firmly into the ground as possible. Knock a small nail in its top to provide an accurate reference point. Label the peg with its record number (taken from the Grid Peg Index), and make sure any old labels or coordinates are removed.

Set up a tripod and prism centred over the nail. In the Project Data Job, survey the point in, using its record number and the SURVEY STATION code.

Then close the Project Data Job and open the Fixed Points Job. Survey the point changing the POINT ID to the Name you want to refer to the station by (e.g. STN007 - check the name hasn't already been used first). You don't enter the code or record number into the Fixed Point Job.

Now close the Fixed Point Job and return to the Project Data Job.

Once the day's survey data has been imported into the database, complete the record by entering the co-ordinates of the grid peg, its name and how it was created (in this case, using the TST).

New Survey Stations are normally created by supervisors or the designated archaeologist for survey. This is the **only** task where

data are stored in the Fixed Point Job and where the Point ID is edited in the TST.

8.4.3.9 Site Sub-Divisions

Survey the outlines of trenches, sondages and other SSDs, always working clockwise. Trenches should be surveyed in once machining has finished, to ensure their outlines are accurate. If a trench is extended during the fieldwork, re-survey the outline.

8.4.4 GOOD WORKING PRACTICE

It's important that you survey carefully and accurately to avoid errors and omissions. The *Recording Survey Data for Import into Intrasis* guide takes you through using the TST, and this section of the manual contains more general guidance to achieving a good survey record.

Before you start to survey, **always** check that the prism type and prism height are correctly shown on the instrument. You can adjust the prism height if it's helpful (making it lower on a windy day or higher when you're recording a deeper feature) but **make sure** you change the height in the instrument as well.

Enter the information into the TST accurately – make sure you select the right code and enter the record numbers correctly. Be particularly careful incrementing the numbers for Levels and Phototargets.

Record carefully:

- Make sure the pole is completely vertical when you record each point
- Record enough points on an outline to give a reasonably smooth line (some people find it helpful to think how many points they'd measure if they were drawing it at 1:100 scale on permatrace)

- Never stand the prism pole on the Small Find, Human Remains or Animal Bone Group you're recording
- Remember that direction matters: outlines of Contexts, Samples, large Small Finds and Site Subdivisions must be recorded clockwise, Skeletons from head to feet, and Sections from left to right as you face the section
- Close outlines and end lines correctly (see Section 8.4.4.3).

Watch the screen as you survey:

- Does the outline look OK? Are you recording enough points?
- Is what you're recording appearing in the right place? If not, the TST orientation may be wrong and you need to get this checked *immediately* (see Section 8.4.4.2).

The *Recording Survey Data for Import into Intrasis* guide explains how to navigate around the 3D Viewer. Centre the viewer on the prism location before you record your first point.
Remember that although many errors and omissions can be rectified later, this is time consuming extra work and the resulting data is likely to be less reliable than data captured during excavation.

Additional training, support and mentoring is available from the project superuser/surveyor as required. Always ask if you're not clear about something.

We have specific surveying procedures in place to support our recording system and database use. These may differ from how you have worked previously. Please do follow them carefully – they are there for a reason.

If you have any questions or suggestions, do discuss them with the project superuser/surveyor – we're happy to explain why we do things in a particular way. We welcome constructive ideas and we've often made changes based on helpful suggestions from site staff. Comments on how we could improve this manual, the training and reference guides, site crib sheets and the recording sheets are particularly welcome.

8.4.4.1 The Survey Book

Completing the Survey Book is essential.

The notes made in the Survey Book are an important record of what's surveyed, and they help us to sort out errors and locate missing data. You must fill in the Survey Book **every time** you:

- Set up the TST
- Check the set up and orientation
- Survey anything
- Notice an error or problem
- Make a mistake surveying

Every time the TST is set up, and every time the set up and orientation is checked, you need to record**:**

- Your name, and the date and time
- The name of the Project Data Job being used
- The ID (name) of the station the instrument is set up over, and the Instrument height above the station marker
- The ID of the Backsight station, and the Target height (the prism height above the station marker)
- The differences (errors) in horizontal distance and height from the Backsight, as shown on the Orientation screen during set up (you can note these as Δ distance and Δ height)
- The height at which you set the prism on the controller before you start surveying
- The Point ID showing on the instrument

Every time you survey, you need to note**:**

- Your name and the date
- The prism pole height (check this is correctly shown on the instrument too)
- What you're surveying (e.g. Deposit 92453 outline; Small Finds 52031-52038 from Context 92458)
- The Point IDs (from the instrument) of the first and last points you survey

Every time you make or notice a mistake (see Section 8.4.4.2), record it in the Survey Book.

Record a point under the X STOP code and stop surveying if

- the prism height or prism type are incorrectly shown in the instrument
- you have recorded something wrongly (incorrect record number, gone round an outline anti-clockwise, decided you got the edge in the wrong place, etc)
- the things you're surveying seem to be in the wrong place

Make **as full a note as possible** in the Survey Book, including the Point ID of the X STOP. Start the note with ***ERROR*** so that it stands out clearly (this will greatly help the person importing the data into the Intrasis database).

8.4.4.2 Errors

We **all** make mistakes surveying – it's how we handle them that matters.

Don't ever edit or delete data in the Project Data Job on the instrument.

As soon as you realise something is wrong, record an X STOP point and **note it in the Survey Book** (see Section 8.4.4.1 above).

- If the prism height or prism type are incorrectly shown in the instrument, correct them, and re-survey anything you've just recorded
- If you've recorded something incorrectly (for instance, entered incorrect record number or the wrong code, gone round an outline anti-clockwise, or decided you've got the edge in the wrong place) re-survey it. You need to start a new line or outline by increasing the string number in the code box before re-surveying (see the Troubleshooting section of the *Recording Survey Data for Import into Intrasis* guide)
- If the things you're surveying seem to be in the wrong place, there may be a problem with the instrument set up. Speak to the supervisor or the designated project archaeologist and ask them to **check the set up immediately, before anything else is surveyed**

Problems with the instrument set up and orientation can result from the initial set up, but are more likely to arise when the instrument is shut down over a break or to change batteries. That's why it should be checked each time that happens.

If the set up and orientation is wrong, the set up procedure must be repeated, checked carefully and noted in the Survey Book. Then the supervisor or the designated project archaeologist must check the Survey Book and ask everyone who had surveyed since the previous set up to check their data by viewing it on the instrument controller screen.

If something looks wrong, re-survey immediately (filling in the Survey Book again). If it can't be re-surveyed (for example, a Small Find which has been lifted), note this in the Survey Book. It may be possible to use the incorrect data later to work out where the correct position was (but this is time consuming and it's always better to re-survey if possible).

The database Issues Log
Major errors and mistakes which can't be remedied by re-surveying must also be **noted in the Issues Log** in the Intrasis database.
This flags up to the supervisors and project manager where data may be inaccurate and where remaining errors will need to be dealt with during site archive completion (if possible).

8.4.4.3 Linework in Leica Captivate

Being able to see outlines, lines and points appear on screen as you survey is a real advantage of Leica Captivate and greatly helps you monitor the quality of the data you're capturing. However, the TST software and the Intrasis database need separate instructions to close an outline or end a line.

For the Captivate linework visible on the controller screen, lines are ended and outlines closed in different ways. Refer to the instructions and screen shots in the *Recording Survey Data for Import into Intrasis* guide and make sure you understand how to do this.

- To finish an outline, you need to use the **Select Linework** screen and change the linework style to 'Close line' ***before you survey the last point***. Your last point should be ***close to but not at*** the first point you surveyed.

- For lines, you need to increase the string count in the code box ***before starting*** a new line (such as a context segment, skeleton or section)

Unless you close the outlines and end the lines, the linework you see on screen will get confused. If you find this is happening, stop surveying, record a point using the X STOP code and refer to the **Troubleshooting** section of the *Recording Survey Data for Import into Intrasis* guide before restarting the line.

Don't ever try to correct the linework by yourself – always ask the superuser/surveyor to help you sort it out.

For the Intrasis database, recording a point using the X STOP code ***after you've finished surveying*** the line or outline marks the end of the preceding line or outline. In most cases, Intrasis will automatically end the line or close the outline when a new code or record number is entered, but using the X STOP routinely means you don't have to remember what the exceptions are.

8.4.4.4 Data Security

It's essential that survey data are correctly and securely handled and stored both in the instrument and after download.

In the instrument

- **Don't change any TST settings** unless you are specifically instructed to do so by the superuser/surveyor
- **Don't ever edit the data in the Project Data Job**
- **Don't create new jobs:** this can cause confusion and result in data going missing (it's far harder to locate and resolve problems where there are multiple jobs)
- **Don't record data in Fixed Point Job** (except for new Survey Stations)

Download and backup

Follow the daily, weekly and end of site backup instructions carefully. You'll find these in the *Total Station Set Up and Data Export* reference

guide, and there's a site-specific crib on file naming and storage locations.

The new data **must** be exported from the instrument onto the supplied data stick and the .GSI file copied into the Intrasis database's Import folder **at the end of every working day**. This must be done **before** the day's Intrasis zipped back up is made. The data are **not secure** until this has been done.

Project managers, supervisors and the designated project archaeologists must ensure that **enough time is allowed** for this at the end of each day.

If there is a *compelling* reason why the data cannot be copied into the correct folder on a particular day, the data stick containing the exported .GSI file must be kept **safely and separately from the instrument** until this has been done.

Problems
If you think **any blocks of data are missing or inaccurate**, or think there are **any problems with the equipment or the Jobs**, you must **raise this immediately** with the site supervisor. If there is not a straightforward solution (see Section 8.4.5.1), the site supervisor or project manager **must contact the superuser/surveyor immediately**. If we're not on site, phone us, and if you can't get hold of the project's designated superuser/surveyor, speak to any of the other superuser/surveyors.

Use the database Issue Log to flag up any unresolved data issues.

8.4.5 CHECKING AND COMPLETING

Records and site drawings aren't finished and 'Ready for checking' until you've checked them and added all the necessary information.

8.4.5.1 Checking Your Records In The Database

As well as entering the descriptive data for the contexts, samples and human remains you record, you should check their spatial record as soon as practicable after they are imported into the database.

Look at your Context and Sample outlines. Are they shown in the Map view? Are they in the right place? Have you surveyed enough points (does the line look smooth enough)? Are there any errors, such as accidental wobbles or spikes in the line?

If the outlines are in the wrong place, talk to the supervisor or superuser/ surveyor **immediately** as this suggests a set up and orientation error (which will have affected other data too).

If the outline is missing, check that you surveyed it (refer the Index sheets and the Survey Book). If you're sure it was surveyed, speak to the supervisor or superuser/ surveyor so that he/she can try to locate the missing spatial data. It may be necessary to repeat the day's survey download (for example, if the time filter was set incorrectly).
If you forgot to survey something, can you go back and survey it now? If not, can it be cloned from another outline (e.g. a 100% Sample from the Deposit outline) or created at least approximately from an existing outline and a sketch? Could the outline be digitised from a plan? Create an Issues Log related to the Context or Sample explaining the problem and how it could be resolved.

If the line is too angular, remember to survey points closer together in future (but *don't* insert additional vertices to smooth the curve in the database at this stage).

Wobbles and spikes in lines and outlines can be corrected in the database (usually this is done by the supervisor or project manager). Create an Issues Log related to the Context or Sample to flag up what needs doing.

8.4.5.2 Adding Spatial Information To Drawings

All site drawings must show enough fixed points to enable them to be related accurately to the OS Grid ('georeferenced') and imported as raster images into Intrasis, ArcGIS or AutoCAD as required. The drawing sheets cannot be scanned until the co-ordinates and level heights have been added. See Sections 8.4.3.5, 8.4.3.6 and Module 6.

It's your responsibility to ensure co-ordinates and levels are written on to the plans and sections you draw. They are shown in metres, to two decimal places.

The grid pegs and section endpoint co-ordinates and the level heights will be exported from the Project Data Jobs and printed out as a daily list. They can also be read from the Intrasis database.

Plans
Every plan must have at least three (preferably four) surveyed grid points shown and labelled with their record numbers. The co-ordinates of the grid pegs must be written clearly on the plan, either adjacent to the grid peg or as a list. The Level heights must be listed; you can use the Intrasis Level records and Map screen to check their locations.

Sections
The co-ordinates of the section end points (and any points where the line changes direction) must be written on the drawing, and the datum (string height) shown.

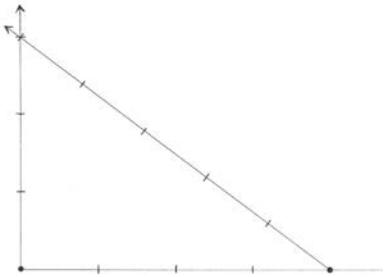
8.5 SURVEYING WITH TAPES AND A DUMPY LEVEL

8.5.1 SETTING OUT GRIDS FOR SAMPLING AND FINDS RETRIEVAL

Grids for planning, finds retrieval or sampling can be set out using the TST, but it is often more convenient to create them using tapes.

Grids for finds retrieval or sampling can be set up a suitable position and orientation relative to the deposit being sampled. The grid square size depends on sampling strategy.

3:4:5 Triangle



Set up a suitable baseline, and then use 30m tapes to set out a right angle using the 3:4:5 triangle method. Make the triangle as large as possible (e.g. 15:20:25 metres rather than 3:4:5 metres) as extending lines out from a small triangle is likely to be inaccurate.

Then set out a second 3:4:5 triangle to establish the third side of the area to be gridded. Measure the side opposite the baseline to check it's the expected length.

For sampling and finds retrieval grids, mark the corner points with grid pegs, assign record numbers and survey them in them. Make a sketch of the grid (on record sheet for context being sampled or a separate sketch sheet) scan it and relate the sketch image to the context and the grid pegs.)

The grid squares will be identified by the sample or context sub-division record number. As for other contexts and samples, the outline of each must be surveyed.

Where grids are set out for planning (see Section 8.2.3.3) every grid peg must be assigned a record number, clearly labelled and surveyed.

8.5.2 TOTAL STATION PROBLEMS

If there are problems with the Total Station, report it to the superuser/ surveyor immediately, and we will get it fixed or replaced to site as soon as possible. In the interim, you can continue to record using basic survey methods, tapes and a dumpy level.

Any contexts, samples, skeletons, small finds and section end points should be planned on permatrace. Try to use Grid Pegs which have already been surveyed. If that's not possible, make sure the grid points you use are securely marked (metal grid pegs or six inch nails firmly located), labelled with a new Grid Peg record number, and left in place until they can be surveyed with the TST. If possible, also triangulate* their positions from known grid pegs.

Small Find locations can be marked with labels after the finds are lifted, but if labels are likely to be disturbed, you should measure the positions of the find spots and record their level with the dumpy level. Triangulation* is more accurate than offsetting from a base line. Record the information in the Survey Book. If the finds locations can't be surveyed later, plot the triangulated points on permatrace so their co-ordinates can be calculated.

*Triangulation: measure the distance to an unknown from each of two known points (established Grid Pegs). Make sure you note which two points you are measuring from, and measure how far they are apart. Record this information in the Survey Book, including the direction or drawing a sketch with north arrow.
e.g. Baseline from GP 62006 to GP 62015 = 9.25m
SF 52137: 6.72m NE of GP 62006 and 7.55m NE of GP 62015.
SF 52138: 7.32m NE of GP 62006 and 5.79m NE of GP 62015.

8.5.3 USING A DUMPY LEVEL

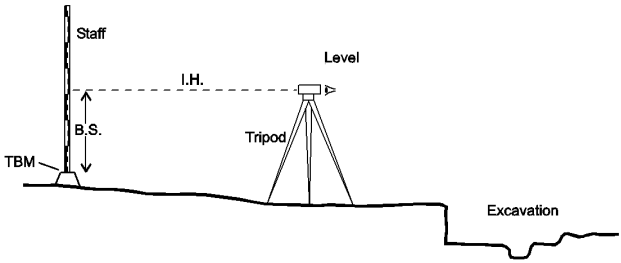
We record heights (Levels) using the TST (see Section 8.4.3.6), and only use a dumpy level if problems arise with the TST.

If it becomes necessary to use the dumpy level, start by creating a temporary benchmark (TBM) in a suitable position (such as a mark on a fixed stone, a nail in tarmac, the top of a firmly sited wooden grid peg). Measure the TBM's height OD by using one of the Survey Stations as a

backsight (don't use a Survey Station itself as a TBM, as even slight knocks can affect its position).

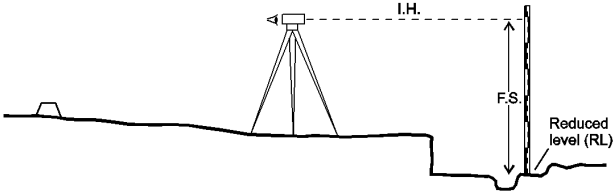
Set up the dumpy level where you have a line of sight to the TBM and the points to be levelled. Level the instrument and take a backsight (BS) reading to the TBM, making sure the staff is vertical. The Instrument Height (IH) is the height of the TBM plus the backsight reading.

Using the Dumpy Level: Backsight



Then take a Foresight (FS) reading with the staff on the points you want to level (but never directly on a find!). The height OD of the target point (its Reduced Level or RL) is the Instrument Height minus the Foresight.

Using the Dumpy Level: Foresight



Record the readings in the Survey Book:
e.g. Using TBM 62201 at 342.19m OD
Backsight to TBM = 1.35m
Instrument Height (IH) = 342.19 +1.35 = 343.54m OD

Point	FS	RL (= IH - FS)
SF 52137	1.72	341.82
SF 52138	1.84	341.70

9 ENVIRONMENTAL SAMPLING

In addition to artefacts, many other kinds of material can be preserved on archaeological sites. These include human skeletons, animal bones, charcoal, seeds, and other animal and plant remains, all of which can provide valuable archaeological, environmental, economic, and behavioural information. Human skeletons and cremation-related deposits tell us about funerary rites, as well as human health and populations. Food remains (both plant and animal) divulge details of diet, food preparation and production (farming, hunting and gathering). Pollen, ostracods and molluscs, inform us about environmental conditions in and around sites. The geological study of archaeological deposits tells us about site formation, thus providing us with a better understanding of the archaeological record.

What is preserved depends on the burial conditions, and can be very variable. As a general guide, bones and shells are better preserved on sites with neutral and alkaline soils; pollen, other plant remains and insects are best preserved in waterlogged conditions; while charcoal and other charred plant remains survive on most sites, unless subject to mechanical damage such as freeze-thaw processes. As a modern beetle or pollen grain does not differ greatly from a Neolithic one, context and contextual information are of great significance, and it is important to avoid contamination. For further detail on the types of material that can be recovered from archaeological excavations, and contributions that the different types of evidence can make to our understanding of past human activities and the historic environment, see English Heritage, 2011, *Environmental Archaeology: a Guide to the Theory and Practice of Methods from Sampling and Recovery to Post-excavation (second edition)*, English Heritage, Swindon. For further detail on the recovery of animal bone see Baker and Worley 2014.

This module outlines sampling procedures for commonly occurring archaeological remains. It does not attempt to deal with the more unusual sites and situations; these will always need detailed consultation with appropriate specialists.

It also covers sampling for retrieval of artefacts and animal bones (see Section 9.4.3.1)

For details about the care, recording, and investigation of human bone see Module 10: Excavating and Recording Human Remains, and for hand collected animal bone see Module 5 and Baker and Worley 2014.

9.1 PROJECT PLANNING

Appropriate specialists will have been consulted at the project planning stage so that recovery and sampling strategies can be planned, and budgeted. Adequate provision will have also been made for specialist visits during excavation. Some specialists, e.g. in geoarchaeology, pollen and land molluscs, will normally take their own samples. Specialists must be informed quickly if unexpected finds are encountered; good communication is of paramount importance.

9.2 TAKING SAMPLES ON-SITE

Before taking a sample consider the purpose of the sample in relation to the aims of the sampling strategy. Enter the reason for sampling onto the Sample Record sheet and in the database. The sampling strategy for each site is part of the Project Design. Fort Cumberland Environmental Studies section are always happy to give advice on which deposits to sample, either during site visits or over the phone. These discussions increase the potential of the samples to answer the questions set out in the Project Design. Section 9.4 describes the main types of samples frequently taken on site.

As far as possible take samples from well-dated, or datable, well-sealed deposits. Avoid deposits containing obvious intrusive or residual material. Remember that in some cases the biological remains themselves can be used to date a deposit.

Where layers within a feature can be distinguished, these should be sampled separately. Where no layers are visible, sampling in spits may be necessary. When a sample is required, assign a sample number on

the Sample Index Form and enter basic information concerning the sample on this form (see Section 9.2.1).

9.2.1 THE SAMPLE INDEX FORM

The Sample Index Form acts as a recording and organisational check list. It should list ALL sample numbers, their context number, description, the type (Simple Name) of sample, and the sample size and the initials of the person taking the sample and date.

Take the next available number from the appropriate Sample Index Form (this may cover the whole site, or there may be separate blocks of numbers and Index sheets for each site sub-division).

Begin your entry on this form before you take the sample and check it afterwards to make sure it is complete.

It's important to give an informative brief description (for example "sample of grave floor near feet after excavation of Human Remains 234') and to record the type (Simple Name) of sample. The project environmental supervisor needs this information as soon as the sample buckets arrive for processing.

9.2.2 SURVEYING THE OUTLINE OF THE SAMPLE

As soon as you have assigned the sample record number, survey in the sample using the total station (TST). See Section 8.4.3.3.

You need to record an outline for almost all samples. Only use points for very small specialist samples (such as individual pieces of charcoal or samples taken for optically stimulated luminescence (OSL) dating), or for cores and monolith tin samples (for example, pollen samples - see Section 9.4.2).

Survey the whole outline of the deposit (or part of a deposit) being sampled, recording in the Sample as a percentage field what proportion of it has been taken. If only part of a deposit is being sampled (for example, a patch where burnt material is noted within a larger deposit, record just the outline of the sampled area. Read Section 9.2.3 below.

Survey the outline **even if** the sample is 100% of a deposit you have already surveyed. The sample record is created in the project database when the day's total station survey file is imported.

9.2.3 COLLECTING THE SAMPLE

Clean the area for sampling thoroughly with a trowel and check it is free of debris. Collect the sample promptly from the cleaned area as contamination may occur if left exposed for any length of time. Clean tools between sampling of different deposits to avoid contamination, and make sure you are using clean or lined buckets. Do not smoke or eat while taking samples to avoid contamination.

All flotation and coarse-sieved samples must consist of **whole earth**. Remove nothing unless subsequent processing would have a detrimental effect on the materials or finds themselves. The sample will be more representative of contents of the context if it is collected from different areas of the context rather than taken as a single block, and all at once (English Heritage 2011, 9). So try to do this as far as is practical. If a clearly defined area within a context is being sampled, then it is desirable to take a second, general, sample from the same context as a comparison.

If fragile finds or other remains are removed from a sample, these must be bagged or boxed, with a label showing both the sample and context numbers, handed over to the finds team, and recorded on the Sample Record (in the 'Contains' field) as having been removed. If appropriate, they should be assigned Small Find numbers and, if seen while still *in situ*, surveyed using the total station. Less fragile items can be put in a bag labelled with the sample and context numbers and placed in the top of the sample bucket.

Individual bones that are likely to fall apart during excavation and processing should be bagged up individually (all fragments in the same bag). This is particularly important for mandibles which might lose their teeth as we cannot use them for ageing unless we know which teeth belong to the mandible. Label the bag with the sample and context numbers, and put it into the top of the sample bucket (kept with the sample)

Place the sample in the buckets provided and label them on the side with self-adhesive labels bearing the project code, context number, sample number, and bucket number (see below). Always remove old labels from buckets. Place a waterproof label marked with waterproof ink holding the same information inside the bucket. Buckets from each context or sample should be labelled as **1 of 5**, **2 of 5** etc. Do not give an individual sample number to each bucket.

If a sample is being recovered for analysis for insects, waterlogged plant remains, or radio-carbon dating etc '**DO NOT SIEVE**' should be written on the Sample Record Form and the bucket labels.

9.2.4 BLOCK LIFTING

Block lifting is described in Section 5.2.6.3. The block is recorded as a sample, and there is a specific ***Block lift*** subclass (Simple name)

9.2.5 TRENCH SIDE SIEVING

Trench side coarse sieving is **always** recorded as a sample (unless it is specifically stated otherwise in the Project Design).
The subclass (Simple name) is ***Trench coarse-sieved***.

It is **essential** that sieve mesh size and the volume of soil sieved are recorded. Count the number of buckets sieved and check their capacity. Blue or white sample buckets are 10 litres; yellow site builders' buckets are usually 14 litres (3 gallons) but may be 15 litres.

Trench side sieving (wet or dry) is usually done either

- For finds retrieval
- To reduce the volume of whole earth samples where a lot of stones are present. In this case, the sieved material is retained and recorded as a sub-sample of the sieved sample. Assign the sieved material a new sample record number, and complete a record sheet for it. Estimate its volume, Note on the sub-sample record sheet how the sub-sample was collected, and that its outline (geo-object) should be cloned from the parent sample.

9.3 RECORDING THE SAMPLE

9.3.1 RESPONSIBILITIES

The person taking the sample is responsible for completing the Sample Record Form in the trench and then entering the data into the project database. When external specialists are taking their own samples they will need assistance with filling in sample sheets from project supervisors or assistants.

The record sheet must be filled in while you are taking the sample, and the information should be entered into the project database as soon as possible after the survey data has been imported. You will be given training in using the database, and crib sheets are available. The requirements are broadly the same for recording on the sheet and in the database – information specific to the database is shown in square brackets.

The project environmental staff cannot start processing the sample until they have access to the information from its record sheet.
In the project database, information about the sample is given in its **attributes**, and the sample is linked to other records (contexts, finds, drawings, etc.) using **relationships.**

9.3.2 ATTRIBUTES

As always, ensure that the site name, site code, year of excavation and the record number are written on **both** sides of the record sheet.

SSD

Site subdivision - the trench or area number, letter or name.

Context numbers

On the Sample Record sheet, list clearly the number(s) of the individual stratigraphic units from which the sample was recovered. A monolith sample can come from more than one stratigraphic unit, in which case all the numbers must be listed clearly on the paper sheet.

Samples can come from deposits, timber or masonry contexts – they can **never** come from cuts.

In the project database, the context(s) must be linked to the sample using the Has/Collected From **relationship** (the sample is Collected From the contexts). See Section 9.3.3 below.

For samples taken from a single context, enter the Context number in the Name field of the database record.

Simple Name

Select the appropriate category on the record sheet [and from the drop-down list in the database]:
Block lift
Coarse-sieved
Flotation
Specialist
Specialist core or monolith
Trench coarse-sieved
The type of specialist sample is entered under Purpose of Sample.

Purpose of Sample

Reasons for taking the sample, for example 'charcoal sample taken for C_{14} dating of post-hole – building 13' or ' Recovery of charred plant remains and bone (routine as PD)'. For specialist samples, record the type here (for example, 'Pollen recovery'). You can select from a drop down list of the most common reasons or enter free text.

Material

The main constituent of the sample. Normally soil, but might be charcoal or bone.

Sample method

A description of how the sample was taken, for example "from a section", "during excavation"; "sample of gridded area"; "soil monolith".

Sample volume

One blue or white sample bucket holds 10 litres of soil. Any part buckets should be estimated

Condition

The condition of the sample at the time of excavation. Select the appropriate description:
Desiccated
Dry
Damp
Wet
Waterlogged

Desiccated material is normally only found within buildings (e.g. sealed within plaster). Waterlogged contexts can generally be recognised in the field from the presence of organic material in the context and/or the smell of bad eggs emitted during excavation or exposure.

Co-ordinates

Tick the boxes on the record sheet to confirm you have surveyed the sample outline. If you've only surveyed a single point explain why (for example 'OSL dating sample').

If you haven't surveyed the outline and it's possible to get it by cloning the outline of a surveyed context, note the context number and any additional necessary information (for example, 'western half of fill 9127'). Then explain why the outline wasn't surveyed on site. Cloning geoobjects (that is, copying the outline of a deposit and attaching it to the sample record) is possible but time consuming and you should always survey the actual sample outline where possible.

Notes

A detailed free text description of the sample's position and a description of the deposit being sampled. This may be different from the overall context description. If only part of the context is taken as a sample, be sure to describe the location of the sample within the context. Details of other related samples can be added. Note also the context type (for example, 'Pit', 'Ditch') and any additional comments. Enter this information in the Comments attribute on the Text tab in the database.

Sketch, with annotation

Provide an annotated sketch of the siting of the sample in the space provided on the back of the form. Draw a plan and/or section as appropriate.

The sketch must be scanned and the image imported into the project database.

Sampled By

Note your name on the recording sheet [and select your name from the drop down list in the database].

9.3.3 RELATIONSHIPS

Records are linked in the project database using relationships.
Note all the relevant record numbers clearly on the sheet while you are taking, photographing or drawing the sample. Then create the relationships when you are entering the data into the project database. Also relate samples to any scanned sketches and working matrices which show them.

This includes

- the Small Find number of any object removed from the sample due to its fragile state
- the numbers of all site drawings (plans and sections) on which the sample appears
- the numbers of all site photographs on which the sample appears

Note relationships on the paper sheet, and create them using the Relation tab in the database. The relationships **link** records – so if you record that a sample Is Shown On a Photograph, the Photograph record Shows the sample.

Is Sub-Sampled By/Is a sub-sample of

Sub-sampling is more likely during sample processing (see Section 9.5) than on site (but see Section 9.2.5 on trench side sieving). There's not a specific Class for sub-samples – they have a normal sample

record. Tick the Is Sub-Sample attribute in the database record and create the relationship between the sample and its sub-sample.

A sample Is Sub-Sampled by a sub-sample.
A sub-sample Is a sub-sample of a sample.

Has/Collected From

A sample Has Assemblages
A sample is Collected From the deposits(s) it's taken from.

Shows/Is Shown on

A sample Is Shown On Plans and Images (photographs and sketches) - but note this relationship isn't used with Sections (see below).

Intersects/Is Intersected By

A sample Is Intersected By a Section.

Sent to/Is Receiving

Only use this when the sample is taken away from site by a specialist. This includes samples taken to Fort Cumberland before the end of fieldwork on site..

Note the name of the specialist and the date it was sent on the Sample Record Form. In the database, create a Sent to/Is Receiving relationship to the Staff member receiving it. Staff includes external consultants – if the person concerned is not already set up as a member of the project staff (see under Project Management in the database), ask an Intrasis superuser to add them.

These are all defined as **Contextual relationships** in the database.

9.4 TYPES OF ENVIRONMENTAL SAMPLING

9.4.1 GEOARCHAEOLOGY

The term geoarchaeology covers a range of activities, and can involve both on and off-site work, as well as chemical survey and laboratory analysis. The core of the subject is a specialised approach to stratigraphy, using analytical methods from earth-sciences. It requires a detailed understanding of site formation processes resulting from human and natural agencies, and a wide knowledge of the range of techniques that can be used to study them.

Geoarchaeologists will have discussed a programme of sampling at the Project Design stage, so it is clear what is being examined and why. Site visits by specialists are essential and most of the sampling will be carried out during those visits.

Geoarchaeology is usually used to solve stratigraphic problems, and may involve elements of research and novel methodologies. Some features (e.g. dark earth deposits) have been studied for many years, while others (e.g. floors and fills of sunken feature buildings) have only recently started to come under examination. For further details see English Heritage, 2007, *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record*, 2nd Edition, English Heritage, Swindon.

The specialist will keep full details of all samples taken whilst on-site and in the laboratory. In order to keep the site records a Sample Record sheet (see Section 9.3) must be completed for each sample or sub-sample taken by the person taking the sample (specialists may requires assistance from the site staff).

9.4.2 POLLEN SAMPLING

On-site sampling for pollen in archaeological contexts is the responsibility of the specialist. Background information is presented here to help site staff make the most of the specialist's time on-site.

Organic-rich waterlogged deposits generally contain well-preserved pollen, although archaeologically useful pollen spectra may be present

in apparently unpromising mineral-rich deposits. Good preservation of pollen does not always guarantee good results in archaeological terms. The design of a sampling strategy depends very much on the questions being asked of the material.

In Britain the most commonly analysed deposits are peat, lake sediments (including those in moats, ponds and wells), buried soils, pit and ditch fills, estuarine and river alluvium, cave deposits, faecal material and residues in pots and other containers. Well-preserved pollen has also been found in archaeological contexts in association with copper corrosion products.

Sampling of deposits for pollen analysis is normally by way of either metal monolith tins (of appropriate size) in the case of open sections; or various forms of closed-chamber coring equipment in the case of deposits only accessible from the existing ground surface. Gouge augers are fine for prospecting for suitable deposits but not suitable for actual sampling as they are very prone to contamination. Spot samples may be taken in plastic bags, glass vials etc. When taking monolith samples, and especially spot samples, a detailed record of the composition and stratigraphy of the sample deposits should be made in the field prior to sampling. The exact location of the top and bottom of the monolith sample, or the spot sampling point, should be marked on the section drawing and the position levelled. The top right-hand corner of the monolith tin should be surveyed using the TST.

The stratigraphical integrity of the sedimentary sequences is of great importance and it is often necessary to sample several profiles from a site in order to ensure that fully representative material has been collected.

Avoiding contamination by either modern or ancient material is crucial. Any deposits that are exposed during the main flowering season of April to August (and particularly during May, June and July), should be protected or cleaned prior to sampling for pollen analysis, particularly in the case of spot sampling. Similarly, sampling implements should be scrupulously clean. Monolith samples are less vulnerable to contamination as they provide much more material, and

the exposed surface can readily be cleaned in the lab before removing samples for analysis.

Only small amounts of sediment are needed for pollen analysis, approximately 2g from each sampling point. However, larger samples (such as those taken in monolith tins) are very desirable as they enable further detailed recording of the sediment stratigraphy in the lab, and allow complementary techniques such as plant macrofossil, insect and various chemical analyses, to be undertaken. Larger samples are also often needed for radiocarbon dating.

The specialist will be responsible for an appropriate sampling strategy and will record full details of all samples taken on-site and in the lab. The person taking the sample must complete a Sample Record for the each of samples they take (external specialists will require assistance from site staff).

Monolith tins can also be used for sampling for ostracods, foraminifera and diatoms, and parasites. As for pollen samples, the top right-hand corner of each tin should be surveyed using the TST.

9.4.3 SAMPLING FOR MACROSCOPIC PLANT REMAINS, SMALLER BONES AND INVERTEBRATES

Samples have to be large in order to ensure a representative sample, in terms of both quantity and diversity. The ultimate aim is to gain as accurate a picture as possible of the population being sampled (eg the contents of a pit). In turn, the best interpretation of a feature is obtained through combining different types of evidence and for this reason sampling is usually done with many different classes of material in mind.

All flotation and coarse-sieved samples must consist of **whole earth**. See Section 9.2.3, Collecting the Sample.

Samples can be taken from dry or waterlogged deposits, the two often differing quite considerably in the amount that needs to be taken and in the way the samples are processed.

9.4.3.1 Dry deposits

The types of material that are obtained from dry deposits include, plant remains, mammal bones, bird bones, fish bones, molluscs, and artefacts. Samples taken principally for the recovery of charred plant remains and charcoal, should comprise a minimum of 40 litres of deposit, or, in the case of small features or contexts consisting of less than 40 litres, 100% of the deposit. These samples are known as **flotation samples** because of the way in which they are processed (see section 9.5.1). These samples can also be used to recover small bones, mineralised plant remains and artefacts.

Larger samples known as **coarse-sieved samples** are taken principally for the recovery of animal bone and artefacts. 100 litres or more is required in order to ensure the recovery of large enough assemblages. Coarse-sieved samples are often taken from bone rich or marine shell rich deposits, or from deposits containing interesting assemblages of artefacts, or artefacts that are hard to spot during excavation. Seek the advice of the appropriate specialist before taking such samples.

Smaller **coarse-sieved samples** for animal bone and/or artefact retrieval are taken in some cases, for example from around articulated animal bones (see Section 5.2.5.3, Animal Bone Groups)

Retrieval of land molluscs for the purposes of environmental reconstruction is best done from column samples and should normally be undertaken by a specialist. Samples of between one and ten litres are taken in spits vertically at intervals of between 10cm and 25cm. The exact location of the top and bottom of the monolith sample, or the spot sampling point, should be marked on the section drawing and the position levelled (see Module 6: The Drawn Record, p13). As for pollen samples, detailed recording of the composition and stratigraphy of the deposits should be made in the field prior to sampling. The top right-hand corner of tins should be surveyed using the TST.

Charcoal is normally recovered from flotation samples. However, in some cases, this will need to be supplemented by hand recovery of larger fragments of charcoal (>2cm diameter). Examples include

sampling of destruction layers of buildings, cremation pyre sites, or for radiocarbon dating purposes. Where this type of sampling is undertaken each fragment should be numbered and bagged separately and its position be surveyed using the TST.

Complete the Sample Index Form and the Sample Record for each sample (see Sections 9.2.1 and 9.3).

9.4.3.2 Waterlogged deposits

The types of material that are obtained from waterlogged deposits include: insects, macroscopic plant remains, molluscs, and microfossils: pollen, diatoms, ostracods, and parasites. Permanently waterlogged deposits are often encountered on dry sites where there are deep features such as wells cesspits, pits, drains, channels, ditches. In some cases the majority of the contexts may be waterlogged.

Where pollen sampling has been carried out, samples for macroscopic remains of insects and other invertebrates should be taken from the same sequence. Samples should comprise 20 litres of soil in order to be able to distribute sub-samples to specialists if necessary. Ideally the same samples can be used to retrieve all classes of material. These samples should be recorded as ***Specialist*** samples on the Sample Record. The purpose of the sample can be recorded as **General Biological Analysis** (GBA).

Coarse-sieved samples (40 to 100 litres), similar to those taken for dry deposits, will also be required where deposits are large or extensive.

Samples should be kept wet and cool, with as much air excluded as possible. They should be bagged in plastic bags and placed in the square plastic, air-tight buckets, labelled on the side. If processing is to take place in the laboratory, this label should be clearly marked 'DO NOT SIEVE'. One label in a small plastic bag should be placed inside each bag; another label should be placed between the bag and the container.

Complete the Sample Index Form and the Sample Record for each sample (see Sections 9.2.1 and 9.3).

9.4.3.3 Sampling cremation related deposits for charcoal, charred plant remains, artefacts and human bone

Identification of the type of cremation deposit, as far as is possible in the field, is essential. 100% sampling of most deposits is recommended, with the exception of large deposits of pyre debris, where specialist advice should be sought. Generally cremation deposits should be half-sectioned to allow the vertical distribution of the deposits to be recorded and then dug in spits.

Larger fragments of charcoal (>2cm diameter) should be individually sampled as ***Specialist*** samples and their locations surveyed with the TST (see Section 9.4.3.1)

Samples should be carefully dry-sieved through a mesh of 8mm to remove larger fragments of bone, but no attempt should be made to break up clods of earth. Samples should then be carefully floated to minimise fragmentation of bone. Residue meshes of 2mm and 4mm should be used. See Mays 1991 for further information.

Samples from cremation related deposits are ***Specialist*** samples: enter the Purpose of Sample.as 'Cremation related deposit'.

Block lift burials in urns or pots. Urned or contained burials must be X-rayed before processing. Do not excavate or sample urns on-site (see Section 10.1). ***Block lifts*** are a subclass of Sample - see Section 5.2.6.3 for more information about block lifting.

9.4.4 SAMPLING FOR RADIOCARBON DATING

Samples for radiocarbon dating are usually taken from excavated bone, flotation samples, or specialist samples including monoliths and core samples. Occasionally samples may be taken specifically for dating, for example if charred deposits or other organic layers rare noted during excavation.

Where larger fragments of charcoal (>2cm diameter) are hand collected for dating, each fragment should be recorded and bagged as

a separate ***Specialist*** sample and its position surveyed using the TST (a single point is sufficient).

Any material which may be dated must not undergo any sort of conservation treatment.

Refer to the relevant section of the Project Design, and contact the Scientific Dating team for advice. For general information on radiocarbon dating see
https://c14.arch.ox.ac.uk/embed.php?File=dating.html

9.4.5 ANCIENT TECHNOLOGY

Careful grid-based excavation and sampling is crucial for understanding past industrial processes (see Section 5.2.5.4). All charcoal associated with metalworking or glassworking features must be collected for species analysis and dating. If such features anticipated, the methods will be set out in the Project Design. If they are unexpected, or if you have any queries, always seek advice from the project Ancient Technology specialist.

9.5 PROCESSING

On the majority of sites the coarse-sieved and flotation samples will be processed in their entirety. However on rare occasions, sub-samples of these may be processed. For example, where clay-rich deposits are present, flotation of samples can be very time consuming. In these cases smaller sub-samples may be floated. The resulting flots and residues can then be scanned by qualified specialists as to their content. The decision on whether to process the rest of the sample, and how, will be dependent on the results of this scanning. For example if the sample contained no charred remains but quite a bit of bone the rest of the sample might be wet-sieved for bone on a mesh of 2mm. However, given the uneven and unpredictable distribution of material within a particular deposit, sub-samples will be less representative of the deposit as a whole, and so this should be avoided if at all possible. See English Heritage 2011 (9-10, Figure 5).

Where sub-samples are processed they should be given a new sample number and treated as a sub-sample of the original sample - that is, each sample should only receive one treatment.

Let the project manager know if you come across evidence for industrial processes (see Section 9.6.2 below) – it may be necessary to consider if the area which produced it needs additional sampling or a change in excavation methods. See also Section 5.2.5.4.

9.5.1 PROCESSING OF SAMPLES FROM DRY DEPOSITS

Processing of flotation and coarse-sieved samples normally takes place on-site.

Coarse-sieved samples are wet or dry-sieved, depending on the soil conditions and, in the case of artefacts, the need to ensure minimal damage. A minimum mesh size of 2mm is normally used. Additional guidance on processing samples taken to retrieve marine molluscs can be found in Appendix 1 of Campbell (2016).

Flotation samples are normally processed using a flotation machine. The flotation process is a method of separating charred plant remains and charcoal from the rest of the sample. It uses the fact that charred plant remains are less dense than bone, gravel, and pottery, etc.,, and thus have a tendency to float or be held in suspension when a soil sample is added to water. The floating material is poured off from the rest of the sample onto a sieve leaving the heavy material behind. Flotation can be done using just a bucket and sieves. This ensures a good control of recovery but is too time consuming for the processing of large quantities of material. Use a 0.25mm or 0.3mm mesh for the flot (the material which floats). Use a mesh of between 0.5mm and 1mm inside the machine to hold the residue (the material that does not float). Rinse and then dry the flot from the retaining mesh. Pack dry flots in plastic bags with a label inside and details on the outside white strips. Where large numbers of roots are present wash these free of other material and bag them separately. Rinse and then dry residues. Sort 100% of the greater than 4mm residue, and a minimum 25% of the 2-4mm on-site. Sorting of the finer fractions will normally take place in the laboratory. Bag unsorted residues in double strength

plastic bags, or in buckets with labels inside and outside. Bag the sorted items from the residues in plastic bags by category. Pass finds and bone onto the finds team as quickly as possible.

Complete the Sample Record, including the mesh sizes used and the percentage of the residue sorted. See Section 9.6.1.

9.5.2 PROCESSING OF SAMPLES FROM WATERLOGGED DEPOSITS

In most cases waterlogged material is processed off-site in a laboratory, except where large numbers of waterlogged contexts are present (therefore the following is for information only). If specialists are situated at a number of locations, Fort Cumberland staff will centralise and organise the distribution of samples to the specialists.

Retrieval is carried out by wet-sieving through a nest of sieves. The smallest sieve mesh should be 0.2mm. Insect retrieval requires further processing using paraffin flotation.

After examination in the lab, most biological remains recovered from waterlogged samples should be stored in IMS (Industrial Methylated Spirits 70%), which should be regularly topped up. IMS is covered by COSHH regulations – read the COSHH Assessment before using it. Samples must not be stored in IMS if they may be required for AMS dating. See the *Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains* (English Heritage 2008).

Bones and charred plant remains can be dried slowly but should be monitored carefully and advice sought from the project conservator. In some cases it is preferable to dry animal bones (especially animal bone groups) in controlled conditions after X-radiography.

When finds are retrieved they **must not** be allowed to dry out (see Section 5.4.1.2 for advice) and the project conservator must be consulted. Dried bones should be placed in plastic bags as above. Unprocessed samples should be kept in a cold store or fridge.

9.5.3 SPECIAL CASES

9.5.3.1 Samples from inhumation burials

Samples taken from grave floors after Human Remains are removed are recorded as ***Specialist*** Samples, with the Purpose of Sample given as 'Grave floor, bone and artefact retrieval'. See Module 10 Section 10.4.5 for sampling and Section 10.5 for processing.

Remove all visible finds from the samples prior to sieving, treating them as Small Finds or finds From Samples as appropriate. The samples should then be wet-sieved through 2mm and 4mm meshes and sorted to recover loose teeth, bone fragments and small objects.

9.6 RECORDING DURING SAMPLE PROCESSING

9.6.1 SAMPLE PROCESSING INFORMATION

Record how each sample was processed directly into the Samples subclass level fields in the project database. The attributes to be recorded depend on the subclass (Simple Name ***Coarse-sieved, Flotation*** or ***Specialist***). The project environmental officer will provide appropriate training.

9.6.2 EVIDENCE FOR INDUSTRIAL PROCESSES

Evidence of industrial processes may be identified during processing of environmental samples, for example small (~3mm), magnetic flakes and spheres of hammerscale are produced during ironworking, particularly smithing, and small threads, rods and droplets of glass are produced during glassworking. Please contact the project Ancient Technology specialist for advice.

9.6.3 RECORDING FINDS DURING SAMPLE PROCESSING

Materials recovered during processing are recorded as Assemblages, with their Recording method as either ***Small Find*** or ***From Sample*** (the equivalent of bulk finds during excavation). All metal and glass objects are treated as Small Finds, as are a range of other materials (see list in Module 5, Section 5.4.3.1). The project design

will also specify which objects are to be treated as Small Finds. If in doubt, please ask the finds supervisor for advice.

The PEO, PFO and PM will decide on a site-by-site basis whether Assemblages recovered 'From Samples '(see Section 5.1.1) will be processed, recorded and bagged and entered into the project database by the finds or environmental site staff (Module 5, Section 5.4.2).

Small Finds recovered from samples (see Section 5.2.3) are processed and recorded by the finds staff in the same way as other Small Finds.

Create new Assemblages records carefully, ensuring you create the relationship to the Sample at the same time. Complete the database record as described in Module 5 (Section 5.5.1). It's **essential** to record which Fraction of the sample they were recovered from.

The materials recovered From Samples are quantified in different ways – weighing, counting and/or estimating abundance. See Tables 9.1 and 9.2 for details.

Where charcoal, mortar, plaster, tile/brick, fired clay, clinker, coal, stone, slate, marine shell, and hammerscale are present in the 2-4mm fraction note the abundance but do not pick out the material. Where charred plant remains are abundant in the 2-4mm residue note their abundance but do not pick out the remains. In this case retain the 25% sorted residue and seek specialist advice. Further flotation may be necessary.

There's a crib sheet and a list of FAQs to help finds and environmental supervisors and assistants use the project database.

Table 9.1: Sample processing prompts

Material	**>4mm**		**2-4mm**	
	Weigh	Quantify	Weigh	Quantify
Bone - Animal	Yes	Abundance	Yes	Abundance
Bone - Burnt	Yes	Abundance	Yes	Abundance
Bone - Human	No	Abundance	No	Abundance
Ceramic	Yes	Count	Yes	Abundance
Ceramic Building Materials	Yes	Yes	No	Abundance
Ceramic - Clay pipe	No	Count	No	Count
Charcoal	No	Abundance	No	Abundance
Clinker	Yes	Abundance	No	Abundance
Coal	Yes	Abundance	No	Abundance
Coprolite	No	Abundance	No	Abundance
Flint - Burnt	Yes	Abundance	No	Abundance
Flint - Worked	No	Count	No	Count
Fired Clay	Yes	Abundance	No	Abundance
Glass	No	Count	No	Count
Industrial Debris - Hammerscale	No	Abundance	No	Abundance
Industrial Debris - Slag	Yes	Abundance	Yes	Abundance
Insect remains	No	Abundance	No	Abundance
Mortar	Yes	Abundance	No	Abundance
Plaster	Yes	Count	No	Abundance
Plant macrofossils	No	Abundance	No	Abundance
Shell - Marine	No	Abundance	No	Abundance
Shell - Snail	No	Abundance	No	Abundance
Slate	No	Yes	No	Abundance
Stone	No	Yes	No	Yes
Wood	No	Abundance	No	Abundance

Table 9.2 Abundance Scale

Abundance Scale	**Estimated numbers**
Rare	1 - 5
Frequent	6 - 25
Common	26 - 100
Abundant	101 - 500
Super-abundant	500+

9.7 BOXING

9.7.1 THE BOX INDEX FORM

The paper Box Index Form is used to allocate Box Numbers and record box movements on site. A unique number (the Box Number) allocated to each storage box.

Careful completion of this form is vital to the management of finds, as it tracks the whereabouts of both individual finds and boxes of finds.

There must be a consistent Box Index system for **all** types of materials (Finds, Human Remains and Environmental). This can either be achieved using a single Index file passed between Finds and Environmental processing, or two separate Index files using distinct numbering sequence for each. This will be decided by the PEO and PFO at the start of the project.

As with all paper record sheets, the Box Index Form must show the site name, project code and year of excavation, and sheets should be numbered (e.g. 'Sheet 7 of 9').

Each box must have a box label on both the lid and on the body. The label should have the following information on it:

- Site Name
- Project Code
- Year of excavation
- Material
- Site Sub Division (if used)

- Range of record numbers (e.g. Samples 5673 – 5783)
- Box Number
- Contents type: From Sample or Human Remains, as appropriate.

The Box should also be labelled with manual handling advice where appropriate (for example, heavy, fragile, distribution of weight). Do not over-pack boxes: 10kg is the maximum advisable weight.

9.7.2 THE BOX RECORD

9.7.2.1 Attributes

Id

When the Box record is created, let the database assign the Id. This number is only used in the database to relate records - elsewhere the Box is referred to by its Box Number

Box Number (Name)

Use the Name field to note the current Box Number (e.g. 'Box 007' or'Box154').

- The Box Number is taken from the Box Index form
- On site a Temporary Box number is usually assigned.
- The final Box Number will be assigned during post-excavation work. A single sequence is used for each project, covering both finds and environmental boxes (and multiple seasons' work where applicable)
- The final Box Number replaces the Temporary Box Number in the Name field.

Contents type

The method by which the items have been recorded. For finds recovered during sample processing, this will be From Sample (except for Small Finds).

Material

The material(s) from which the objects in the box are made. This attribute is glossary controlled – see Module 5b, Table 5.5.

Box type
The type of box. This is glossary controlled; select from ***Skull***, ***Standard***, ***Plastic***, ***Bucket Unboxed*** or ***Crate***,

Comments
Any other relevant information, including the Sample number range.

9.7.2.2 Relationships
Stores/Stored in
This relationship links finds to the box they are stored in. Note that it is the Id of the Box Record not the Box Number (held in the Name field) which is used in the relationship.

It is important that the database relationships between boxes and the things Stored in them is kept up to date. This is used to produce Box Contents Lists when required.

Sent to/Is Receiving
Only use this relationship when the box is sent or taken away from site by a specialist (this includes boxes sent to Fort Cumberland). This field should be updated as necessary. It is presumed that all boxes are sent to Fort Cumberland at the end of the excavation unless stated otherwise, for example when a box is sent to a contract conservator or other external specialist.

Use the Send to/Date field on the Box Index sheet, and create the **Sent to/Is Receiving** relationship in the project database. Note the reason and date the box was sent on the Comments attribute on the Text tab. See Module 5B Section 5.5.2 for more information about this relationship.

9.8 COMPLETION OF SITE ARCHIVE

The on-site environmental staff must ensure that the archive contains:

- the **material archive**: all the residues, flots, finds From Sample and any unprocessed samples, appropriately labelled and packed

- the **documentary archive:** the Sample Index sheets, sketches, the Box Index forms, the Box List (which can be created by the Intrasis database), and any other notes or lists created on site
- **notes** about any uncompleted work or outstanding issues
- the **database record:** with completed entries for all Samples, Assemblages recovered From Samples, and Boxes)

The finds will normally be dispatched to Fort Cumberland at the end of excavation, or periodically during fieldwork in the case of long running projects.

Handing over
Arrange to transfer all the environmental records to the PEO. The finds and environmental supervisors must notify the PFO and PEO about the quantities (e.g. number of boxes) to be returned to Fort Cumberland so that sufficient space is available when the material arrives.

9.9 REFERENCES

Baker, P and Worley, F 2014, *Animal Bones and Archaeology: Guidelines for Best Practice*. Swindon: English Heritage.

Campbell, G 2016, *Archaeological Marine Shell: Guidance for their Collection, Retention and Disposal.* Unpublished text, available from the Site Library folder on the site network.

Historic England, 2014, *Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record*, 3rd Edition. Swindon: Historic England.

English Heritage 2008, *Guidelines for the Curation of Waterlogged Macroscopic Plant and Invertebrate Remains*. Swindon: English Heritage.

English Heritage, 2011, *Environmental Archaeology: a Guide to the Theory and Practice of Methods from Sampling and Recovery to Post-excavation (second edition)*. Swindon: English Heritage

Kenward, H K, Hall, A R and Jones, A K G, 1980, A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged deposits. *Science and Archaeology* **22**, 3-15.

Mays, S A 1991 *Recommendations for processing human bone from archaeological sites*. Ancient Monuments Laboratory Report 124/91. London: English Heritage.

The Guidelines are available in the Site Library folder on the site network, and can be downloaded from the Historic England website.

10 EXCAVATING AND RECORDING HUMAN REMAINS

Human remains are different from other classes of archaeological materials in that they are parts of once-living people. **They should at all times be treated with dignity and respect.**

10.1 THE BASICS

10.1.1 INHUMATION BURIALS

Give Human Remains Record numbers to articulated human remains, or clusters of disarticulated but associated bones. Record them as contexts on the **Human Remains Record** sheet, and also complete an **Inhumation Burial Group Record** sheet. Individual, disarticulated human bones do not require this. Treat them like other finds categories (see Module 5). If in doubt about what requires a Human Remains Record, ask the archaeological supervisor or the project manager.

10.1.2 CREMATION RELATED DEPOSITS

Don't create Human Remains records for cremation burials. Cremation related deposits are excavated as **Samples**. See Module 9, Section 9.4.3.3 for details.

Complete a **Cremation Related Group Record** sheet for each group (see Section 10.7 below)

Block-lift cremation urns with their contents.
Cremation urns must be block lifted for X-radiography and excavation under laboratory conditions. Lifting requires the skills and expertise of a project conservator or field staff experienced in lifting. In the first instance, the project conservator should be contacted for advice (see Section 5.2.5.2). Block lifts are recorded as Samples, with subclass (Simple Name) ***Block Lifts***. Fill in the database record, making sure you include the method of lifting and geolocation attributes (how the block is marked to ensure it can be correctly orientated in the lab). As for most samples, the outline must be surveyed. Give the urn and its fill

separate context numbers – the urn should also be assigned a Small Find number (see Section 1.4).

Pit fills containing cremated bone or pyre debris should be 100% sampled.
See Section 9.4.3.3 for details.
Take 100% of the fills for processing if possible, then sieve the deposit and sort it to remove bone fragments. Record these as ***Specialist*** samples (because they have specific processing requirements), and give the Purpose of sample as 'Cremation related deposit'. Excavate larger deposits in half-sections or gridded areas and spits (see Section 1.4), treating each division as a separate whole earth sample, so that the distribution of remains within the fill can be studied.

10.2 HEALTH AND SAFETY

Human bodies which have been buried in the soil for long enough to allow soft tissue to decay, leaving only the skeleton, present no biological hazard to health. However, the length of time the decay process may take is dependent on the type of burial as well as the soil conditions. The most obvious concerns are:

Microbiological hazards
In English conditions, pathogens are extremely unlikely to survive in viable form for as long as a century. There are minor concerns over anthrax and smallpox, but the risks from these sources have almost certainly been overestimated. Attempts to culture smallpox from preserved scabs from crypt remains have failed; anthrax spores could possibly survive but are of low infectivity. Fungal spores may be present in high concentrations in crypts, so masks covering nose and mouth should be worn. Where soft-tissue is preserved, disposable gloves should be worn.

Psychological stress
This may occur, particularly among staff working for long periods with human remains preserving soft-tissues. Under these circumstances staff are free to withdraw at any time from work involving human remains, and should discuss any issues with their line managers.

Lead coffins
Lead coffins may, particularly in confined areas such as crypts, present significant risk of lead inhalation. Lead coffins must not be opened on site; they must be opened under controlled conditions because there is potential for preservation of soft-tissue and other organic materials.

Lead is subject to the Control of Lead at Work Regulations (third edition) 2002. Where lead coffins are expected, excavation methods and precautions will be specified in the Project Design and covered in the Risk Assessment. If they are encountered unexpectedly, the project manager will stop work in the vicinity until the necessary planning and risk assessment can take place.

Further information on Health and Safety issues is contained in the Research and Standards Department Fieldwork Health, Safety and Fire Procedures Manual.

10.3 LEGAL ISSUES

It is unlawful to disturb human remains without legal authority.

Unless they are on land under Church of England jurisdiction, authorisation to disturb human burials is given (or withheld) via the Ministry of Justice. If it was known at the project planning stage that human remains would be encountered, the project manager should at that stage have contacted the Ministry of Justice to arrange proper authorisation for their disturbance.

Excavation of human remains from land currently under Church of England jurisdiction (in general this means churchyards and churches in current use) requires permission under ecclesiastical law. This should always be obtained in advance from the Church authorities by the project manager.

If you encounter human remains unexpectedly, **stop excavating** and immediately notify the project manager, who should make contact

with the Ministry of Justice by telephone. Authorisation for excavation of human remains can normally be issued rapidly.

Human remains must not be left exposed overnight. Ensure they are covered and secure until permission to excavate is granted. If it is necessary to partially backfill to safeguard them, cover the bones and grave fill with clean permeable sheeting (e.g. Terram) to prevent contamination (don't use plastic sheeting as it can trap water and cause mould on the bones). Make sure you don't damage the bones, and protect the area from accidental damage by others.

10.4 EXCAVATION OF INHUMATION BURIALS

The Human Remains Record and Inhumation Burial Group Record numbers should be assigned as soon as possible from the appropriate Index sheets (Section 10.4.3).

Recovery of inhumation burials includes removal of grave fill(s), recording of the skeletal remains, lifting of the bones and recovery of any soil left in the grave floor. The time this takes will vary with the nature of the site and the experience of the excavators, but for each grave, planning is needed so that these procedures can be completed before the end of the working day.

Graves encountered towards the end of the day should be left *in situ* for the following day; skeletal remains should not be left exposed overnight.

10.4.1 REMOVAL OF GRAVE FILL

Remove the grave fill carefully by trowel to reveal the skeleton. Once you have revealed the bones, clean their exposed surfaces of adherent soil using soft brushes, not trowels or any tools that could mark the bone surface. Start from the skull and work down toward the feet, taking care not to dislodge any of the bones. Good results can often be obtained using small paint brushes, spoons and dental tools. Before any bones are lifted, photograph and plan the inhumation and complete an Inhumation Burial Group Record sheet and a Human Remains Record sheet (including the Skeleton Diagram).

Take particular care in excavating and recording all finds - read Section 5.2.5.1 – and ensure they are also noted on the Inhumation Burial Group Record sheet. If there a finds such as beads, where evidence for stringing might be preserved, the potential for block lifting should be assessed (consult the project osteologist, PFO and project conservator).

10.4.2 RECORDING

Survey

As soon as you assign a Human Remains Record number from the Index, you must record the skeleton's location using the total station. Details are given in the ***Recording Survey Data for Import into Intrasis*** guide. **Don't** ever rest the prism pole on any bones.

First use the HUMAN RMNS BODY code to record points by the top of head, at the pelvis, by the knees and at the feet, always starting at the head. Record an X STOP point. Then use the HMAN RMNS SKULL code to record a point at the top of the head.

For a decapitated burial, use the HUMAN RMNS BODY code to record points by the top of neck, at the pelvis, by the knees and at the feet.

Record a STOP LINES point, and then use the HMAN RMNS SKULL code to record a point at the top of the detached head.

Use the same Human Remains Record number for both parts. Surveying the skeleton in this way allows in to be depicted as a stick figure in the Database View.

If the skeleton is not complete, use the Survey Comments field to note which points were surveyed.

You don't need to survey in Inhumation Burial Groups – the spatial record for these is formed by the outlines recorded for the contexts they consist of.

Photography

First, take vertical photographs that include the whole skeleton and an appropriate scale. Then take additional close-up shots and photos from other angles as necessary to show, for example, details of grave goods or

unusual features of the burial. Informal working shots may be a useful addition to the photographic record.

Take an additional photograph suitable for rectification, including at least six photo targets (see Module 7, Section 7.10.1).

Planning
Plan skeletons at a scale of 1:10. Plan associated contexts (grave cut, fill, etc.) in the normal fashion at 1:20. Supplement the plan, if necessary, by redrawing selected areas at a larger scale to record details of grave

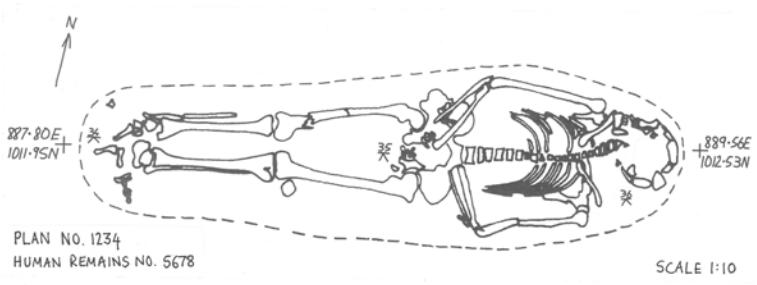


Figure 4.2 Example plan of a human burial. Note where the levels are taken.

goods, coffin fittings, and so on. As a minimum, take levels, on the floor of the grave by (not on) the skull, sacrum and feet, and also take a level by the knees if the burial is flexed or crouched. Take further levels if the skeleton is disturbed or lying in an unusual position.

10.4.3 THE HUMAN REMAINS AND INHUMATION BURIAL GROUP RECORD SHEETS

Articulated human remains or clusters of disarticulated but associated bones require both a Inhumation Burial Group Record and a Human Remains Record. The Inhumation Burial Group Record can cover more than one individual (where there are several skeletons in a grave or pit), but each individual must have a separate Human Remains record.

Record numbers are assigned using the Human Remains and Inhumation Burial Group Index Forms.

Human Remains are treated as contexts analogous to other deposits, but since the information required is different, they have different recording forms and form a separate class in the project database. A separate block of numbers is allocated on the Record Number Allocation Form (see Section 1.6).

Important elements to be recorded include body position, surviving bones and stratigraphic relationships, orientation, and associated finds and samples. For detailed instructions see section 10.6 below.

Stratigraphic recording of Human Remains
Usually human remains are stratified between distinct contexts. For example where a body is laid on the base of a grave without evidence of a coffin, the context beneath it will be the grave cut and that above the (lowest) grave fill.
When a skeleton appears to be lying wholly within another context, the relationship can be described in two ways.

- The Human Remains record is related to the deposit using the Contains/Is Within relationship. This is used, for example, where an infant burial lies within a ditch fill and there is no visible grave cut.
- The deposit surrounding the skeleton is excavated and recorded as two separate spits, one overlying and one underlying the skeleton. This should be used when the skeleton is in a grave but does not lie directly on the base of the cut. The spits are recorded as Divisions Of the lowest grave fill.

See also Section 10.6.2 below.

10.4.4 LIFTING THE BONES

Once recording of the burial is completed, carefully lift the bones. Sometimes this may require a little additional removal of soil from around the bones so that they lift easily. Never try and pull a reluctant bone free. Even for fragile bones, **never** administer conservation treatment in the field, unless you are specifically asked to do so by the project osteologist. Check with the project osteologist if there is evidence of anything wrapped around the head, etc. - in that case the bones may be better lifted within a soil block and excavated in the lab.

Lift different skeletal areas and bones from left and right sides separately. Normal separation is: skull, torso, left arm, right arm, left leg, right leg as well as four separate bags for the left and right hand and foot bones (see Section 5.4.4.1). Keep any disarticulated bone in the grave fill separate from bone from the articulated skeleton.

Skeletons in mass graves (plague pits, etc) are often very closely packed together. Articulated portions of skeletons which cannot immediately be assigned to their counterparts should be given a unique Human Remains Record number: refitting will then be possible at the post-excavation stage. See Section 5.5.4.1 for guidance on marking, bagging and boxing human bone.

10.4.5 SAMPLING

After lifting the bones and all the finds you can see, recover all the soil remaining on the grave floor as three separate samples: from the head, the torso and the leg/foot areas. If the skeleton has been truncated, take the appropriate number of samples; i.e. if the legs and feet are missing, take just two samples (head and torso). Record in the Notes on each sample record (the Text tab in the database) whether the sample is from head, torso or leg/foot. For crouched burials, sketch the area of each sample on its record sheets. If any further objects are found during sampling, excavate and record them in the usual way.

The samples should be recorded as ***Specialist*** Samples, with the Purpose of Sample given as 'Grave floor, bone and artefact retrieval'. Remember to survey in the sample outlines.

These samples should be wet-sieved and sorted to recover loose teeth, bone fragments and small objects (see below). Remove all visible finds from the samples prior to sieving, treating them as Small Finds or finds From Samples as appropriate. Bag the finds separately with the relevant sample number written on the bag. These finds must all be related to the sample they were Collected From in the project database

If small grave goods, such as beads, are encountered during the initial removal of the grave fill, take further samples from over and around the bones, and record and process them in the same manner. Block lifting of grave goods is preferable (see Section 10.4.1 above and Section

5.2.6.3), and if samples are taken they will require careful treatment. Consult the project osteologist, PFO and project conservator about how best to proceed.

10.5 POST-EXCAVATION PROCESSING

Carefully clean bones with water. Gently remove adhering soil with a toothbrush. Leave the bones to dry slowly, away from direct sun or artificial heat sources. When dry, mark the bones with the project code and Human Remains number in waterproof ink. Then bag them in labelled, self-seal, clear polythene bags. Bag the different areas of the skeleton separately (see Section 10.4.4 above), with four separate bags for the left and right hand and foot bones.

Place the bags in acid-free cardboard boxes. Box the skull separately from the rest of the skeleton, with packing to cushion it. For further information see AML Report 124/91, which is available in the Site Library folder on the site network.

Wet-sieve the three soil samples from the grave floor through 2mm and 4mm meshes. Hand-remove the bone from the residues and leave it to dry. Bag it when dry. Place the bags in the box with the rest of the skeleton, clearly labelled to indicate whether they came from head, torso or leg/foot areas and whether from 4mm or 2mm mesh.

For procedures for sieving and sorting cremated remains see Section 9.4.3.3.

10.6 RECORDING HUMAN REMAINS ON THE PAPER RECORD SHEETS AND IN THE PROJECT DATABASE

10.6.1 THE HUMAN REMAINS RECORD

Fill out the paper record sheet in the trench, and use it to complete the database record. Provided you've made good notes in the trench, you can write the comments and interpretation directly into the project

database. Scan sketches, including the skeleton diagram, and import them into the database.

Coffin/Cist

Note the presence of evidence for a container for the human remains (for example a coffin, cist or box). These should be assigned context record numbers and recorded as usual.

Survey comments

Tick the points surveyed, and if you are unable to record all four survey points, use the Survey comments field to describe why.

Articulated

Record whether the skeleton was ***Articulated*** and ***Disturbed*** or both– a partly articulated skeleton should be recorded as articulated ***and*** disturbed. Note further details about presence/absence and disposition of individual elements in the Comments field /Text tab.

Condition

Good	most bones are complete and show no sign of erosion
Fair	bones mostly complete but some damage to their surface
Poor	most bones are incomplete and/or show substantial erosion or damage to their surface

Orientation

Select from the list, noting that the head end is always recorded first (for example a skeleton with head to the east is oriented E-W).

Body Position

Select the appropriate term. Crouched means tucked or curled-up position, knees by chin; flexed means the knees are bent.

Crouched on Left Hand Side
Crouched on Right Hand Side
Extended on Left Hand Side
Extended on Right Hand Side
Flexed on Left Hand Side
Flexed on Right Hand Side
Prone (extended face down)
Supine (extended face up)

10.6.2 STRATIGRAPHY

Human Remains are recorded stratigraphically as contexts (see Section 10.4.3 above)

The stratigraphic sequence of the site is the key to understanding the order of events on the site (see Module 2: Stratigraphy and Matrix Compilation). It is the keystone of phasing and most other interpretation that takes place during assessment and analysis.

The mini-matrix on the Human Remains Record sheet and the stratigraphic relationships recorded in the project database are the first stages in the compilation of the overall Harris matrix.

It is important that you fully understand and accurately record the stratigraphy of inhumation burials. Confidence in the sequence in which individual burials were deposited is very important if they are to be radiocarbon dated, as it allows the dates to be modelled and a more precise dating assigned.

For a complex burial group (such a several skeletons or part skeletons in a single grave or pit) or where one burial has disturbed another, a

working matrix drawn during excavation can be very useful during post-excavation analysis (see Section 2.2.2)

10.6.3 OTHER RELATIONSHIPS

As with other contexts, create a relationship to the SSD (site subdivision).

Relationships to Plans and Photographs should be noted on the record sheet. Check the relationships in the project database (they may have already been created from the Plan and Photograph Index sheets), and create the relationships if they aren't already present.

The sketches on the Inhumation Burial Group Record sheet and the Skeleton Diagram on the Human Remains Record sheet must be scanned, imported into the database and related to the records for the Human Remains they show. The same applies for working matrices.

10.6.4 FURTHER DESCRIPTION

Comments

Use this space on the record sheet to describe the skeleton and burial practice in general terms, and to add detail to the descriptive fields above, such as unusual body positions, variations in the degree of preservation or articulation. Also note any discrepancy between the degree of survival in situ and the collection quantity, for instance if the bones are not all collected or disintegrated on lifting.

This information should be entered into the Comments attribute on the Text tab in the database.

Every Human Remains record **must** be assigned to a Inhumation Burial Group, and there's no need to duplicate the overall description of the Inhumation Burial Group here (see Section 10.6.5).

Skeleton Diagram

Shade in the skeleton outline as appropriate to mark the bones that are present (as far as you can tell). After completion the skeleton diagram should be scanned and imported into the database.

10.6.5 THE INHUMATION BURIAL GROUP RECORD

Inhumation Burial Group is a subclass of the Structural Group class (see Module 3, Section 3.9.1). Numbers are allocated from the Index for Inhumation Burial Groups and Cremation Related Groups.

On the Record sheet, note the record numbers of

- all the Human Remains present
- the grave cut, and its fill(s)
- the coffin or cist, where applicable
- any other structural feature present in the grave

These must be related to the Inhumation Burial Group in the project database, using the Consists of/Part of relationship.

Note the presence of Grave goods and Grave furniture on the record sheet and in the database record, and list the Samples taken. You can summarize the finds, for example:

Grave goods: 13 beads (53420-3, 53431) and two brooches (53424-5)
Grave furniture: 9 coffin nails (53461-6, 53472-4).

But **don't** create database relationships from the Group directly to finds or samples, as this duplicates their existing relationships with the deposits they were collected from. Instead, check that the samples and finds are all correctly recorded by using the Intrasis Graph View.

Record the overall dimensions of the group, as for Contexts.

Further description
Use the Comments and Interpretation fields on the sheet and the Text tab in the database to

- describe the burial practice in general terms, noting significant associated finds and any other notable features.
- give a basic interpretation of the group explaining the evidence for, and reasoning behind, the conclusions that have been reached.

Draw a sketch of the group as this can be very useful during post-excavation work (but don't just duplicate the permatrace plan). Annotate your sketches with co-ordinates, dimensions, record numbers and comments, and show a north arrow and an approximate scale (or note 'not to scale'). You can include an element of interpretation in your sketch, but make clear which aspects are interpretative (if necessary, make two sketches!).

Scan the sketch, import it into the project database, and relate it to all the contexts, finds and samples it shows.

10.7 RECORDING CREMATION RELATED GROUPS ON THE PAPER RECORD SHEETS AND IN THE PROJECT DATABASE

Human Remains Records are **not** created for cremation burials.

The **Cremation Related Group Record** summarises the evidence recorded during excavation. It is a subclass of the Structural Group class

(see Module 3, Section 3.9.1). Numbers are allocated from the Index for Inhumation Burial Groups and Cremation Related Groups.

On the Record sheet, note the context numbers of

- the cuts, fills and layers making up the Group
- the cremation urn or cist, where applicable
- any other structural features present in the grave

These must be related to the Cremation Related Group in the project database, using the Consists of/Part of relationship.

Note the presence of Grave goods and Grave furniture on the record sheet and in the database record. This includes the Assemblages record numbers for cremation urn(s) and any other vessels present. As the cremation related deposits will be 100% sampled, most finds will be probably recovered during sample processing, but note the numbers of any small finds which were hand-collected and recorded during excavation.

Summarize the finds, for example:
Cremation urn 55561 (this is context 95219)
Grave goods: ceramic vessel (53327); 2 beads (53419; 53437)

List the Samples taken.

But **don't** create database relationships from the Group directly to finds or samples, as this duplicates their existing relationships with the deposits they were collected from. Instead, check that the samples and finds are all correctly recorded by using the Intrasis Graph View.

Describe the Group and your interpretation of it and make a sketch (as outlined for Inhumation Burial Groups above).

10.8 REFERENCES

Mays, S A 1991 *Recommendations for processing human bone from archaeological sites*. Ancient Monuments Laboratory Report 124/91. London: English Heritage.

AML Reports can be downloaded from the Historic England website. There is a copy of this report in the 'Site Library' folder on the site network.