

Archaeological recovery and recording methodologies

Excavation protocols for on-going work at Malapa have been adapted to allow for the maximisation of in-field spatial and contextual information regarding fossils, any archaeological residues, cave infills (both soft sediment and breccified), and structural morphology and geology of the cave system. The technical strategy included the use of conventional archaeological recovery techniques from both soft sediments and breccia, coupled with high-resolution three-dimensional non-contact scanning, live digital video streaming of the excavation process to above-ground supervisory teams, as well as more conventional archaeological recording methods to facilitate post-excavation analysis.

Excavation Strategy

Excavation strategy proceeds from a single-context recording and recovery basis, based on the Museum of London Archaeological Service (MOLAS) *Archaeological Site Manual*¹; this manual is used herewith as the standard operating manual for all in-field work at Malapa. The MOLAS Single Context approach acknowledges that the primary route to an understanding of the activity relating to the fossil and archaeological record is through the stratigraphic sequence; as such it is important that all contexts within a site are treated equally with reference to the stratigraphic sequence – ad-hoc in-field decisions regarding validity and importance of finds, particularly sedimentological or geological samples, is discouraged, and instead it is our strategy to recover the record of the site in an unbiased fashion for subsequent analysis or archival placement.

A series of explicit following recording pathways are adopted (table 1) in order to prevent loss of contextual or spatial data, and to maintain effective chain of custody of specimens, finds, blocks and bulk samples recovered. Specific limits of excavation are defined within the site with sketch plans produced where appropriate. All ex-situ material (such as breccia blocks) is collected; coordinates are recorded. All excavation limits and sub-divisions are mapped using total station (TS) based on the rectified coordinate system for the site. Excavation of soft sediments is undertaken with a

combination of standard equipment and non-metallic tools in order to limit the possibility of recovery damage to fragile and friable skeletal material. Bulk sediments are wet sieved on site with recovery and sorting of flot and inclusions on site; all inclusions are dried and bagged for analysis. In-situ breccia blocks are extracted and lifted using hydraulic methods, coupled with mechanical winching.

All excavated samples are double-bagged (where possible) and recovered for analysis. *In-situ* metric measurements are taken where specimens are highly fragmented or fragile. Taphonomic traces are noted where seen (table 2).

MATERIAL	ASSIGN AND RECORD	FORMS
Sediment context	Context number and attributes	Context form
	Photography	Photo log
	Sketch plan and/or section	Section and/or plan log
	Scan	Scan log
	Bulk sample	Sample register
	Breccia block	Breccia block log
	Artefactual material	Artefact find log
Bone	Element number	Fossil specimen log
	Spatial properties	Surface form
		Context form
	Physical properties	Field notes
TS survey log		
	Taphonomy	
	Peri-M trauma	

MATERIAL	ASSIGN AND RECORD	FORMS
		Post-M trauma
		Metrics
	Recovery	Recovery log
Excavation overview	Specimens and samples	Evidence log
and chain of custody	Storage and custody in-field	Hand over form
	Storage and custody laboratory	Lab receipt form

Table 1. Recording activity pathway for Malapa excavations. Forms relate to archival and field forms below.

Total Station 3D mapping, and photographic recording of the excavation is critical, augmented by the use of high-resolution three-dimensional surface scanning in order to document the location, orientation (axial and surface) of every bone, artefact, breccia block (both in and ex-situ). We use an Artec Eva 3D white light scanner (this has the capacity for surface colour and texture capture, with surface resolution of 0.5mm and 3D point accuracy of 0.1mm) in order to record and analyze spatial position and orientation within stratigraphical units. The post-scan process is managed in Artec Studio 9.

Signature	Characters or Taphonomic Traces for Recording
Preservational	<ul style="list-style-type: none"> • General state of remains (excellent, good, fair, or poor) • Cortical erosion/exposure of cancellous bone • Cortical exfoliation (bone loss in thin, spalling layers) • Postmortem breakage • Perimortem breakage/fragmentation or trauma • Rounding (erosion/tumbling in an abrasive environment) • Decalcified • Postmortem cracking of desiccated tooth enamel • Incidental surface striations/scratches
Soil Surface Exposure	<ul style="list-style-type: none"> • Surface cracking/longitudinal splitting from drying of waterlogged bone • Weathering (bleaching and cracking; sensu Behrensmeyer)
Mineral Deposition	<ul style="list-style-type: none"> • Copper (green), iron (red), calcium (white), manganese (black), or other mineral oxide staining • Vivianite formation • Concretion <p>Water staining (presence of a water line from mineral deposits, colour differential line)</p>
Mechanical	<ul style="list-style-type: none"> • Excavation damage • Micro-abrasion
Soil/Burial Substrate	<ul style="list-style-type: none"> • General soil staining • Warping/flattening of elements (especially the cranial vault) • Crushing/compaction from overburden • Adhering/infiltrating sediments
Artefactual	<ul style="list-style-type: none"> • Cut marks • Pounding marks • Artefactual fractures
Faunal	<ul style="list-style-type: none"> • Adhering fauna • Carnivore puncture and gnawing • Gastric corrosion, winnowing, or windowing of bone • Rodent gnawing • Termite or other insect damage

Table 2. Taphonomic recording criteria for fossil material (characters and traces after Pokines ²).

References

- 1 MOLAS. *Archaeological Site Manual*. (Museum of London Archaeological Services (MOLAS), 1994).
- 2 Pokines, J. T. & Symes, S. A. *Manual of Forensic Taphonomy*. (CRC Press, 2013).

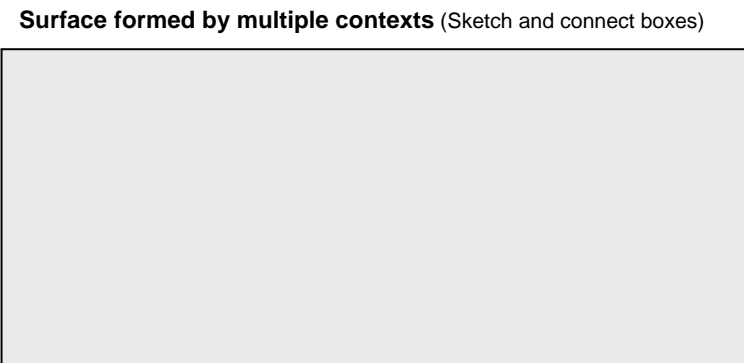
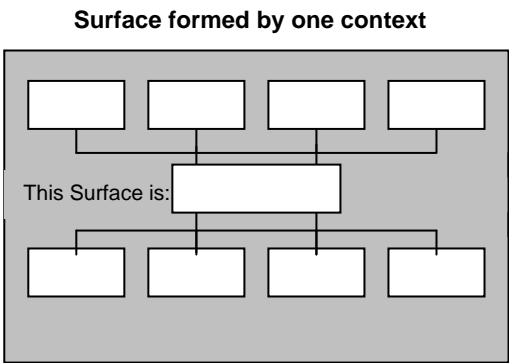
Location/ Grid Square(s)	Area/Section	Context type SURFACE
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SURFACE 1. Shape in plan 2. Corners/ edges 3. Dimensions 4. Inclination of surface 5. Truncated (if known) 6. Other comments 7. Method and conditions	

Draw plan/ profile overleaf

Context numbers forming this surface (See separate context sheets for descriptions of constituents of this surface)

Stratigraphic matrices: (Note: These are not matrices of physical relationships)



Interpretation:	Internal	External	Structural	Other (specify)
Discussion:				
Context same as:				PTO

Plan numbers:	Artefacts/ Evidence on surface (evidence numbers & type)
Other drawings: Sections / Sketches	
Film photographs <input type="checkbox"/> (Film & frame numbers):	
Digital photographs <input type="checkbox"/> Video <input type="checkbox"/>	
Levels on reverse	
Tick when reduced and transferred to plans <input type="checkbox"/>	
Highest: <input type="text"/> Lowest: <input type="text"/>	
Survey point references:	
Site note book references:	
Metal detecting in situ <input type="checkbox"/> on site <input type="checkbox"/> off site <input type="checkbox"/> (List artefacts across page):	

Site Code <input type="text"/>	Context No <input type="text"/>	Date <input type="text"/>
		Recorded by <input type="text"/>
		Signature <input type="text"/>

SURFACE RECORDING FORM

adapted from Molas, 1994

Levels:

1 st TBM	TMB	IH
	BS	Numbers

3 rd TBM	TMB	IH
	BS	Numbers

2 nd TBM	TMB	IH
	BS	Numbers

4 th TBM	TMB	IH
	BS	Numbers

No	FS	Reduced
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

No	FS	Reduced
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

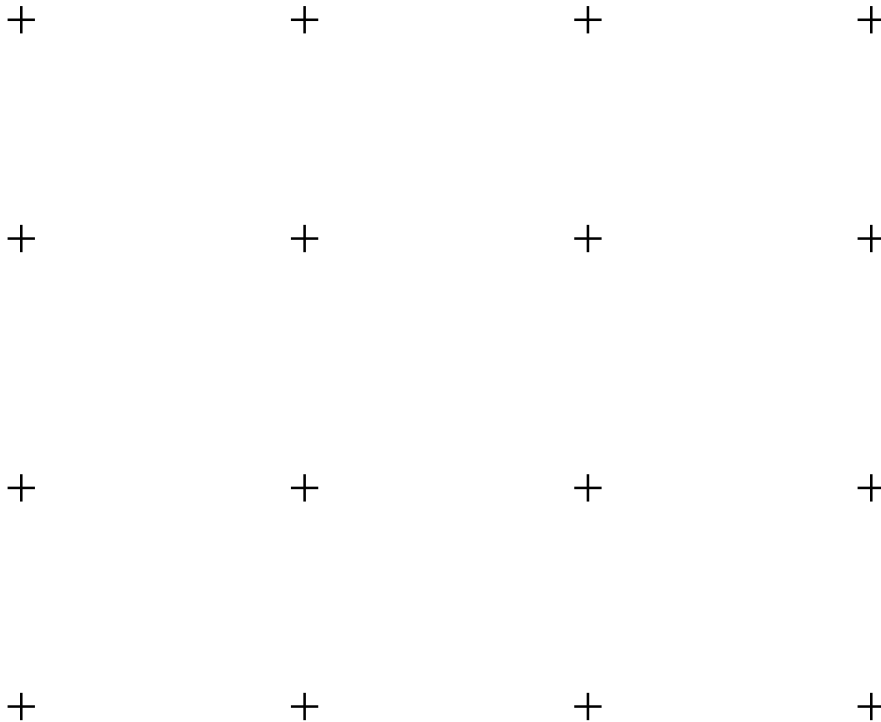
No	FS	Reduced
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		

Now transfer to plan/ sketches

Continue levels as necessary

Draw sketch profile/plan

(show: scale, cardinal points/ north point, co-ordinates & dimensions)



Date		Site Code	
Recorded by		Context No	
Signature		Page 2	

Area/ Location/Grid Square(s)	Context type
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Follow conventions of the Museum of London Archaeological Service *Archaeological Site Manual* (1994) for descriptions (including deposits and cuts). Circle and list properties.

DEPOSIT	ARBITRARY LAYER -describe as deposits- CLEANING LAYER	CUT
1. Compaction		1. Shape in plan
2. Colour		2. Corners
3. Composition / particle size (over 10%)		3. Dimension /depth (L/B/D)
4. Inclusions (under 10%)		4. Break of slope top
5. Thickness & extent (Length/ Breadth/ Depth)		5. Sides
6. Other comments		6. Break of slope base
7. Method and conditions		7. Base
		8. Orientation
		9. Inclination of axis
		10. Truncated (if known)
		11. Fill numbers
		12. Other comments
Draw plan/ profile overleaf		

Stratigraphic matrix (Note: this is not a matrix of physical relationships)

This context is:											

Interpretation:	Internal	External	Structural	Other (specify)
Discussion:				
Context same as:				PTO

Plan numbers:	Other drawings: sections/ sketches	
Digital photographs <input type="checkbox"/> (Frame numbers):	Site note book references:	Survey point references:
Scanned <input type="checkbox"/>	Artefacts/ Evidence (evidence numbers and type):	
Environmental samples (evidence numbers & type):		
Sieving	Metal detecting in situ <input type="checkbox"/> on site <input type="checkbox"/> off site <input type="checkbox"/>	
Dry Sieving: on site <input type="checkbox"/> off site <input type="checkbox"/> volume (L) _____	Artefacts (evidence numbers & type):	
Wet Sieving: on site <input type="checkbox"/> off site <input type="checkbox"/> (fill in flotation sheet)		

Site Code	<input style="width: 90%;" type="text"/>	Context No	<input style="width: 90%;" type="text"/>	Date	<input style="width: 95%;" type="text"/>
				Recorded by	<input style="width: 95%;" type="text"/>
				Signature	<input style="width: 95%;" type="text"/>

CONTEXT RECORDING FORM

adapted from Molas, 1994

Levels:

1 st TBM	BM	IH
	BS	No's

3 rd TBM	BM	IH
	BS	No's

2 nd TBM	BM	IH
	BS	No's

4 th TBM	BM	IH
	BS	No's

No	FS	Reduced
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

No	FS	Reduced
11		
12		
13		
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19		
20		

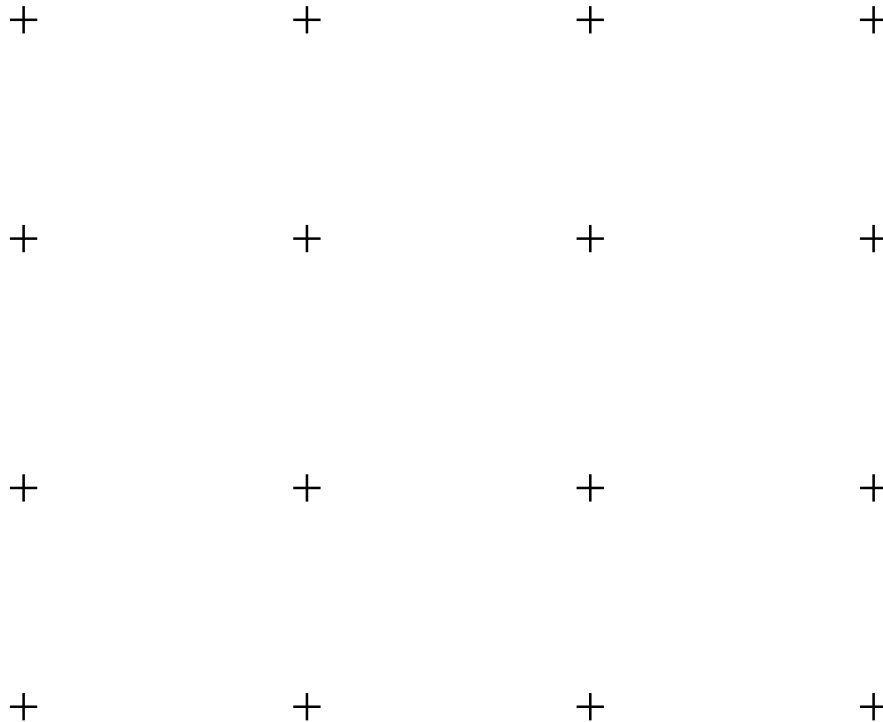
No	FS	Reduced
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

Transfer from/ to scale plan

Continue levels as necessary

Draw sketch profile/ plan, with relevant associated contexts where appropriate

(show: scale; if sketch is not to scale state 'not to scale', cardinal points/ north point, grid co-ordinates, section levels and dimensions)



Date	<input type="text"/>	Site Code	<input type="text"/>	Context No	<input type="text"/>
Recorded by	<input type="text"/>				
Signature	<input type="text"/>				

FIELD NOTES FORM

(provide relevant codes/evidence numbers/references for note descriptions)

Site Code	<input type="text"/>	Page	<input type="text"/>	Date Recorded by Signature	<input type="text"/> <input type="text"/> <input type="text"/>
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Context Number	Description/ location/ coordinates	Plan	Section	Sample	Initial/ date

SITE DIGITAL IMAGE LOG

Camera Number:	
Number of frames taken:	
Photographer:	
Pages:	

Master Flash Card Number:
Working Copy Flash Card Number:
Additional copies made: <input type="checkbox"/> Y <input type="checkbox"/> N (if yes, provide details)
Storage location:

Frame Number	Evidence Number	Description <small>Include evidence type, associated evidence numbers.</small>	Taken for: (initial/time)

Site Code		Page		Date	
				Recorded by	
				Signature	

SITE DIGITAL IMAGE LOG

Frame Number	Evidence Number	Description Include evidence type, associated evidence numbers.	Taken for: (initial/time)

Date	<input type="text"/>	Recorded by	<input type="text"/>	Signature	<input type="text"/>	Page	<input type="text"/>	Site Code	<input type="text"/>
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SITE DIGITAL IMAGE LOG

Frame Number	Evidence Number	Description Include evidence type, associated evidence numbers.	Taken for: (initial/time)

SITE DIGITAL SCAN LOG

Scanner:		Master Data Folder Number:
Scans taken:		Working Copy Data Folder Number:
Operator:		Additional copies made: <input type="checkbox"/> Y <input type="checkbox"/> N (if yes, provide details)
		Where Stored:

Scan Number	Evidence Numbers	Description <small>Include evidence type, associated evidence numbers.</small>	Taken: <small>(initial/time)</small>

FOSSIL SPECIMEN LOG

Specimen Number	Context Number	Photograph Number	Description or ID	Coordinates		
				E	N	H

Site Code		Page		Date	
				Recorded by	
				Signature	

ARTEFACT FIND LOG

Find Number	Context Number	Photograph Number(s)	Description	Coordinates		
				E	N	H

BRECCIA BLOCK LOG

Block Number	Context Number	Photograph Number(s)	Description and number of blocks	Coordinates		
				E	N	H

Site Code <input style="width: 100px; height: 20px;" type="text"/>	Page <input style="width: 60px; height: 20px;" type="text"/>	Date <input style="width: 100%; height: 20px;" type="text"/> Recorded by <input style="width: 100%; height: 20px;" type="text"/> Signature <input style="width: 100%; height: 20px;" type="text"/>
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FIELD BULK SEDIMENT SAMPLE LOG

Sample Number	Context Number	Photograph Number(s)	Description (including coordinates)	(initials / date)		Storage location
				Taken for	Taken by	

Site Code		Page		Date	
				Recorded by	
				Signature	

SITE EVIDENCE LOG (SPECIMENS, FINDS & BLOCKS)

Evidence Number (F, S or B)	Type	Remarks, associated evidence numbers and ID details	Description	Context	Location or Provenance	Found by (initials)	Stored at	Date

Site Code

Page

Date
 Recorded by
 Signature

Plan Number	Sheets used	Description & associated context(s)	Location	Name	Date (initials)

Site Code
 Page
 Date
 Recorded by
 Signature

Section Number	Sheets used	Description & associated context(s)	Location	Scale	Direction	Name & date

Site Code
Page
Date

Recorded by
Signature

SIEVING LOG

Evidence Type	Evidence Number	Associated Evidence Numbers	Artefacts sent to position/initials	Number of Bags	Sieved by initials/ date

Date

Recorded by

Signature

FIELD HAND OVER FORM

Site Name:

Site Code:

Pages:

Chain of Custody

Received from:		Time/ Date/ Seal Number	Handed to:	
Name	Signature		Signature	Name
I (the signatory below) hereby declare that I am handing over all items listed in 'Items Transferred'.			I (the signatory below) hereby declare that I have received all items listed in 'Items Transferred'.	

Reason for Transfer

Transfer Method

Comments

FIELD HAND OVER FORM

Items Transferred

No	Evidence No	Item Description	Reference from	Reference to

FIELD HAND OVER FORM

No	Evidence No	Item Description	Reference from	Reference to

Site Code	<input type="text"/>	Page	<input type="text"/>	Date	<input type="text"/>
				Recorded by	<input type="text"/>
				Signature	<input type="text"/>

FIELD HAND OVER FORM

No	Evidence No	Item Description	Reference from	Reference to

Date
Recorded by
Signature

Page

Site Code

LABORATORY RECEIPT FORM

Site Name:

Site Code:

Pages:

Chain of Custody

Received from:		Time/ Date/ Seal Number	Handed to:	
Name	Signature		Signature	Name

Reason for Transfer

Transfer Method

Comments

Site
Code

Page

Date
Recorded by
Signature

LABORATORY RECEIPT FORM

Items Transferred

No	Evidence No	Item Description	Reference from	Reference to

Date	<input type="text"/>	Page <input type="text"/>	Site Code <input type="text"/>
Recorded by	<input type="text"/>		
Signature	<input type="text"/>		

LABORATORY RECEIPT FORM

No	Evidence No	Item Description	Reference from	Reference to

Site Code	<input type="text"/>	Page	<input type="text"/>	Date	<input type="text"/>
				Recorded by	<input type="text"/>
				Signature	<input type="text"/>

LABORATORY RECEIPT FORM

No	Evidence No	Item Description	Reference from	Reference to

Date _____
Recorded by _____
Signature _____

Page

Site Code

PT #	TS location	Description or ID	Coordinates		
			E	N	H

Site Code	<input type="text"/>	Page	<input type="text"/>	Date	<input type="text"/>
				Recorded by	<input type="text"/>
				Signature	<input type="text"/>