McDONALD INSTITUTE MONOGRAPHS

Temple landscapes

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By Charles French, Chris O. Hunt, Reuben Grima, Rowan McLaughlin, Simon Stoddart & Caroline Malone

Volume 1 of Fragility and Sustainability – Studies on Early Malta, the ERC-funded *FRAGSUS Project*

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With contributions by
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This project has received funding from the European Research Council (ERC) under the European Union's Seventh Framework Programme (FP7-2007-2013) (Grant agreement No. 323727).

Published by:
McDonald Institute for Archaeological Research
University of Cambridge
Downing Street
Cambridge, UK
CB2 3ER
(0)(1223) 339327
eaj31@cam.ac.uk
www.mcdonald.cam.ac.uk

ISBN: 978-1-902937-99-1

Cover design by Dora Kemp and Ben Plumridge.
Typesetting and layout by Ben Plumridge.

On the cover: *View towards Nadur lighthouse and Ghajnsielem church with the Gozo Channel to Malta beyond, from In-Nuffara (Caroline Malone).*

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Contents

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Figures

Tables

Preface and dedication

Caroline Malone

The *FRAGSUS Project* emerged as the direct result of an invitation to undertake new archaeological fieldwork in Malta in 1985. Anthony Bonanno of the University of Malta organized a conference on 'The Mother Goddess of the Mediterranean' in which Colin Renfrew was a participant. The discussions that resulted prompted an invitation that made its way to David Trump (Tutor in Continuing Education, Cambridge University), Caroline Malone (then Curator of the Avebury Keiller Museum) and Simon Stoddart (then a post-graduate researcher in Cambridge). We eagerly took up the invitation to devise a new collaborative, scientifically based programme of research on prehistoric Malta.

What resulted was the original Cambridge Gozo Project (1987–94) and the excavations of the Xagħra Brochtorff Circle and the Għajnsielem Road Neolithic house. Both those sites had been found by local antiquarian, Joseph Attard-Tabone, a long-established figure in the island for his work on conservation and site identification.

As this and the two other volumes in this series report, the original Cambridge Gozo Project was the germ of a rich and fruitful academic collaboration that has had international impact, and has influenced successive generations of young archaeologists in Malta and beyond.

As the Principal Investigator of the *FRAGSUS Project*, on behalf of the very extensive *FRAGSUS* team I want to dedicate this the first volume of the series to the enlightened scholars who set up this now 35 year-long collaboration of prehistoric inquiry with our heartfelt thanks for their role in our studies.

We dedicate this volume to:

Joseph Attard Tabone
Professor Anthony Bonanno
Professor Lord Colin Renfrew

and offer our profound thanks for their continuing role in promoting the prehistory of Malta.

Acknowledgements

This volume records research undertaken with funding from the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013)/ERC Grant Agreement n. 323727 (*FRAGSUS Project*: *Fragility and sustainability in small island environments: adaptation, cultural change and collapse in prehistory* – http://www.qub.ac.uk/sites/FRAGSUS/). All the authors of this volume are indebted to the ERC for its financial support, and to the Principal Investigator of the *FRAGSUS Project*, Prof. Caroline Malone (Queen's University, Belfast, UK), for her central role in devising the project and seeing this research through to publication.

For Chapter 2, we extend warm thanks to the staff of the ^{14}CHRONO centre at QUB, especially Stephen Hoper, Jim McDonald, Michelle Thompson and Ron Reimer, all of whom took a keen interest in the *FRAGSUS Project*. The success of the *FRAGSUS Project* in general and the radiocarbon dating exercise has depended on their work. We thank the Physical Geography Laboratory staff at the School of Geography, University College Dublin, for the use of their ITRAX XRF core scanner. In particular, we would like to thank Dr Steve McCarron, Department of Geography, National University of Ireland, Maynooth and Dr Jonathan Turner, Department of Geography, National University of Ireland, University College, Dublin. We thank Prof. Patrick Schembri for sourcing and collecting the *Acanthocardia* samples from the Natural Museum of Natural History. Sean Pyne O'Donnell thanks Dr Chris Hayward at the Tephrochronology Analytical Unit (TAU), University of Edinburgh, for help and advice during microprobe work. Dr Maxine Anastasi, Department of Classics and Archaeology, University of Malta, helped identify the pottery from the settlement cores. Dr Frank Carroll helped show us the way forward; but sadly is no longer with us. Chris Hunt, Rory Flood, Michell Farrell, Sean Pyne O'Donnell and Mevrick Spiteri were the coring team. They were helped by Vincent Van Walt, who provided technical assistance. Al Ruffell and John Meneely did geophysical evaluation and GRP location of the cores. During fieldwork, Tim Kinnaird and Charles French were assisted by Sean Taylor, Jeremy Bennett and Simon Stoddart. We are grateful to the Superintendence of Cultural Heritage, Malta and Heritage Malta for permission to undertake the analyses and much practical assistance.

For Chapter 5, we would like to thank all at Heritage Malta, the Ġgantija visitor's centre and the University of Malta for their friendly and useful assistance throughout. In particular, we would like to thank George Azzopardi, Daphne Caruana, Josef Caruana, Nathaniel Cutajar, Chris Gemmell, Reuben Grima, Joanne Mallia, Christian Mifsud, Anthony Pace, Ella Samut-Tagliaferro, Mevrick Spiteri, Katya Stroud, Sharon Sultana and Nick Vella. We also thank Tonko Rajkovača of the McBurney Laboratory, Department of Archaeology, University of Cambridge, for making the thin section slides, the Physical Geography Laboratory, Department of Geography, University of Cambridge, and the ALS Global laboratory in Seville, Spain, for processing the multi-element analyses.

For Chapter 6, Reuben Grima wrote the first draft of this contribution, receiving comments and additions from the other authors.

For Chapter 7, Simon Stoddart wrote the first draft of this contribution, receiving comments and additions from the other authors.

For Chapter 9, we thank Sharlo Camilleri for providing us with a copy of the GIS data produced by the MALSIS (MALtese Soil Information System) project. We are grateful to Prof. Saviour Formosa and Prof. Timmy Gambin, both of the University of Malta, who facilitated the donation of LiDAR data, together with computer facilities, as part of the European project ERDF156 *Developing National Environmental Monitoring Infrastructure and Capacity*, from the former Malta

Environment and Planning Authority. A number of individuals were happy to share their recollections of shepherding practices in Malta and Gozo over the last sixty or seventy years; others facilitated the encounters. We are grateful to all of them: Charles Gauci, Grezzju Meilaq, Joseph Micallef, Louis Muscat, Ċettina and Anġlu Vella, Ernest Vella and Renata Zerafa.

Simon Stoddart would like to thank Prof. Martin Jones and Rachel Ballantyne for their advice in constructing Figure 11.4. The editors would like to thank Emma Hannah for compiling the index.

Firstly, the FRAGSUS Project is the result of a very generous research grant from the European Research Council (Advanced Grant no' 323727), without which this and its two partner volumes and the research undertaken could not have taken place. We heartily thank the ERC for its award and the many administrators in Brussels who monitored our use of the grant. The research team also wants to record our indebtedness to the administrators of the grant within our own institutions, since this work required detailed and dedicated attention. In particular we thank Rory Jordan in the Research Support Office, Stephen Hoper and Jim McDonald – CHRONO lab, and Martin Stroud (Queen's University Belfast), Laura Cousens (Cambridge University), Glen Farrugia and Cora Magri (University of Malta), the Curatorial, Finance and Designs & Exhibitions Departments in Heritage Malta and Stephen Borg at the Superintendence of Cultural Heritage. Finally, we thank Fr. Joe Inguanez (Emeritus Head of Department, Department of Sociology, University of Malta) for offering us the *leitmotif* of this volume while a visiting scholar in Magdalene College, Cambridge: '*Mingħajr art u ħamrija, m'hemmx sinjorija*' translating as 'without land and soil, there is no wealth'.

Foreword

Anthony Pace

Sustainability, as applied in archaeological research and heritage management, provides a useful perspective for understanding the past as well as the modern conditions of archaeological sites themselves. As often happens in archaeological thought, the idea of sustainability was borrowed from other areas of concern, particularly from the modern construct of development and its bearing on the environment and resource exploitation. The term sustainability entered common usage as a result of the unstoppable surge in resource exploitation, economic development, demographic growth and the human impacts on the environment that has gripped the World since 1500. Irrespective of scale and technology, most human activity of an economic nature has not spared resources from impacts, transformations or loss irrespective of historical and geographic contexts. Theories of sustainability may provide new narratives on the archaeology of Malta and Gozo, but they are equally important and of central relevance to contemporary issues of cultural heritage conservation and care. Though the archaeological resources of the Maltese islands can throw light on the past, one has to recognize that such resources are limited, finite and non-renewable. The sense of urgency with which these resources have to be identified, listed, studied, archived and valued is akin to that same urgency with which objects of value and all fragile forms of natural and cultural resources require constant stewardship and protection. The idea of sustainability therefore, follows a common thread across millennia.

It is all the more reason why cultural resource management requires particular attention through research, valorization and protection. The *FRAGSUS Project* (Fragility and sustainability in small island environments: adaptation, cultural change and collapse in prehistory) was intended to further explore and enhance existing knowledge on the prehistory of Malta and Gozo. The objective of the project as designed by the participating institutional partners and scholars, was to explore untapped field resources and archived archaeological material from a number of sites and their landscape to answer questions that could be approached with new techniques and methods. The results of the *FRAGSUS Project* will serve to advance our knowledge of certain areas of Maltese prehistory and to better contextualize the archipelago's importance as a model for understanding island archaeology in the central Mediterranean. The work that has been invested in *FRAGSUS* lays the foundation for future research.

Malta and Gozo are among the Mediterranean islands whose prehistoric archaeology has been intensely studied over a number of decades. This factor is important, yet more needs to be done in the field of Maltese archaeology and its valorization. Research is not the preserve of academic specialists. It serves to enhance not only what we know about the Maltese islands, but more importantly, why the archipelago's cultural landscape and its contents deserve care and protection especially at a time of extensive construction development. Strict rules and guidelines established by the Superintendence of Cultural Heritage have meant that during the last two decades more archaeological sites and deposits have been protected in situ or rescue-excavated through a statutory watching regime. This supervision has been applied successfully in a wide range of sites located in urban areas, rural locations and the landscape, as well as at the World Heritage Sites of Valletta, Ġgantija, Ħaġar Qim and Mnajdra and Tarxien. This activity has been instrumental in understanding ancient and historical land use, and the making of the Maltese historic centres and landscape.

Though the cumulative effect of archaeological research is being felt more strongly, new areas of interest still need to be addressed. Most pressing are those areas of landscape studies which often become

peripheral to the attention that is garnered by prominent megalithic monuments. *FRAGSUS* has once again confirmed that there is a great deal of value in studying field systems, terraces and geological settings which, after all, were the material media in which modern Malta and Gozo ultimately developed. There is, therefore, an interplay in the use of the term sustainability, an interplay between what we can learn from the way ancient communities tested and used the very same island landscape which we occupy today, and the manner in which this landscape is treated in contested economic realities. If we are to seek factors of sustainability in the past, we must first protect its relics and study them using the best available methods in our times. On the other hand, the study of the past using the materiality of ancient peoples requires strong research agendas and thoughtful stewardship. The *FRAGSUS Project* has shown us how even small fragile deposits, nursed through protective legislation and guardianship, can yield significant information which the methods of pioneering scholars of Maltese archaeology would not have enabled access to. As already outlined by the Superintendence of Cultural Heritage, a national research agenda for cultural heritage and the humanities is a desideratum. Such a framework, reflected in the institutional partnership of the *FRAGSUS Project*, will bear valuable results that will only advance Malta's interests especially in today's world of instant e-knowledge that was not available on such a global scale a mere two decades ago.

FRAGSUS also underlines the relevance of studying the achievements and predicaments of past societies to understand certain, though not all, aspects of present environmental challenges. The twentieth century saw unprecedented environmental changes as a result of modern political-economic constructs. Admittedly, twentieth century developments cannot be equated with those of antiquity in terms of demography, technology, food production and consumption or the use of natural resources including the uptake of land. However, there are certain aspects, such as climate change, changing sea levels, significant environmental degradation, soil erosion, the exploitation and abandonment of land resources, the building and maintenance of field terraces, the rate and scale of human demographic growth, movement of peoples, access to scarce resources, which to a certain extent reflect impacts that seem to recur in time, irrespectively of scale and historic context.

Anthony Pace
Superintendent of Cultural Heritage (2003–18).

Appendix 6

The borehole and test excavation profile log descriptions

Charles French & Sean Taylor

Ġgantija and Ramla Valley

Transect A: Ġgantija to In-Nuffara across Ramla valley

BH 1 (N 36° 02.812/E 014° 16.100)
0–45 dark greyish brown silty clay loam with few fine stone fragments; Ap
45–55 dark brown silty clay loam with few charcoal fragments; B
55+cm weathered Coralline Limestone; C

BH2 (N 36° 02.807/E 014° 16.185)
0–55 dark greyish brown silty clay loam with few fine stone fragments; Ap
55–95 dark brown silty clay loam with few charcoal fragments; B
95+cm weathered Coralline Limestone; C

BH3 (N 36° 02.798/E 014° 16.189)
0–35 dark greyish brown silty clay loam with few fine stone fragments; Ap
35–45+cm weathered Coralline Limestone; C

BH4 (N 36° 02.798/E 014° 16.193)
0–35 dark greyish brown silty clay loam with few fine stone fragments; Ap
35–45+cm weathered Coralline Limestone; C

BH5 (N 36° 02.792/E 014° 16.193)
0–35 dark greyish brown silty clay loam with few fine stone fragments; Ap
35–40+cm weathered Coralline Limestone; C

BH6 (N 36° 02.777/E 014° 16.207)
0–40 grey silty clay; Ap
40+cm weathered, mottled grey/orange silty clay; B/C (change to Blue Clay geology)

BH7 (N 36° 02.770/E 014° 16.210)
0–40 grey silty clay; Ap
40+cm weathered, mottled grey/orange silty clay; B/C

BH8 (N 36° 02.764/E 014° 16.215)
0–40 grey silty clay loam; Ap
40+cm weathered, mottled grey/orange silty clay; B/C

BH9 (N 36° 02.760/E 014° 16.216)
0–40 grey silty clay loam; Ap
40+cm weathered, mottled grey/orange silty clay; B/C

BH10 (N 36° 02.753/E 014° 16.224)
0–40 grey silty clay loam; Ap
40+cm weathered, mottled grey/orange silty clay; B/C

BH11 (N 36° 02.745/E 014° 14.229)
0–40 grey silty clay loam; Ap
40+cm weathered, mottled grey/orange silty clay; B/C

BH12 (N 36° 02.734/E 014° 16.245)
0–40 grey silty clay loam; Ap
40+cm weathered, mottled grey/orange silty clay; B/C

BH13 (N 36° 02.723/E 014° 16.245)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; B/C

BH14 (N 36° 02.715/E 014° 16.251)
0–50 grey silty clay loam; Ap
50+cm weathered, mottled grey/orange silty clay; B/C

BH15 (N 36° 02.704/E 014° 16.266)
0–50 grey silty clay loam; Ap
50+cm weathered, mottled grey/orange silty clay; B/C

BH16 (N 36° 02.693/E 014° 16.280)
0–50 grey silty clay loam; Ap
50–70 yellowish/orangey brown gravelly silt; stream bed
70–80 weathered, mottled grey/orange silty clay and stones (<5 cm); B/C and stream bed
80+cm limestone pebbles and Blue Clay; C

BH17 (N 36° 02.696/E 014° 16.294)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; B/C (on Blue Clay geology)

BH18 (N 36° 02.677/E 014° 16.313)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; B/C

BH19 (N 36° 02.661/E 014° 16.332)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; Blue Clay B/C

BH20 (N 36° 02.642/E 014° 16.341)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; B/C

BH21 (N 36° 02.634/E 014° 16.339)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; B/C

BH22 (N 36° 02.624/E 014° 16.359)
0–70 grey silty clay loam; Ap
70+cm weathered, mottled grey/orange silty clay; B/C

BH23 (N 36° 02.610/E 014° 16.360)
0–70 grey/orangey brown silty clay loam with occasional quartz gravel (<1 cm); Ap
70+cm weathered, yellowish brown silt; B/C

BH24 (N 36° 02.603/E 014° 16.383)
0–60 brown/yellowish/orangey brown silty clay loam with mix of limestone gravel (<1 cm); Ap
60+cm weathered Coralline Limestone; B/C

BH25 (N 36° 02.592/E 014° 16.374)
0–85 orangey brown loam; Ap
85+cm stone boulders (<20 cm); C

BH26 (N 36° 02.540/E 014° 16.412)
0–30 brown sandy loam with even mix of limtestone pebbles (<1 cm); Ap
35+cm weathered Coralline Limestone of In-Nuffara plateau; C

Transect B: downstream along southern side of Ramla valley to the coast

BH27 (N 36° 02.769/E 014° 16.745)
0–35 reddish brown loam with few fragments of limestone rubble
35+cm grey silty clay; B/C

BH28 (N 36° 02.745/E 014° 16.726)
0–10 yellowish brown silt loam with mix of limestone fragments
10–30 grey clay
30+cm reddish brown sandy loam; ? made ground

BH 29 (N 36° 02.830/E 014° 16.809)
0–60 mix of greyish brown silty clay loam with common fine gravel (<3 cm)
60+cm mottled brown silty clay; B/C

BH 30 (N 36° 02.907/E 014° 16.905)
0–50 mix of greyish brown silty clay loam with common fine gravel (<3 cm)
50+cm mottled greyish brown clay; B/C

BH 600 (N 36° 02.921/E 014° 16.923
0–80 very pale brown, calcareous, very fine sandy/silt loam, becoming mottled from *c.* 50 cm
80+cm weathered Globigerina Limestone

BH 601 (N 36° 02.915/E 014° 16.961)
0–100 yellowish brown silty clay loam and limestone rubble
100+cm weathered Globigerina Limestone

Transect C: from Ramla Bay up-valley

4 sets of terraces visible up-valley from sea on low Globigerina/ Upper Coralline mesa-like spines

BH31 (N 36° 03.140/E 014° 17.097; 3rd terrace)
0–80 pale brown very fine sandy silt loam; loessic like Ap
80–100 orangey/pale brown fine sandy silt loam; loessic B
100+cm orangey brown fine sand; ? loessic B/C

BH32 (N 36° 03.135/E 014° 17.087; 2nd terrace)
0–90 pale brown very fine sandy silt loam; loessic like Ap
90+cm orangey brown fine sand; ? loessic B/C

BH33 (N 36° 03.110/E 014° 17.083; 2nd terrace)
0–70 pale brown very fine sandy silty clay loam; loessic like Ap
70+cm grey/orange mottled sandy/silty clay; Blue Clay B/C

BH34 (N 36° 03.034/E 014° 17.165; 1st terrace)
0–80 pale brown very fine sandy silt loam; loessic like Ap
80–100 orangey/pale brown fine sandy silt; loessic B
100+cm orangey brown fine sand; ? loessic B/C

Transect D: from platform infront of Ġgantija temple to west

BH35 (N 36° 02.810/E 014° 16.156)
0–45 brown silty clay loam with common small limestone pebbles (<2 cm); Ap
45+cm iron-rich weathered Coralline Limestone; C

BH36 (N 36° 02.800/E 014° 16.141)
0–15 brown silty clay loam with common small limestone pebbles (<2 cm); Ap
15+cm iron-rich weathered Coralline Limestone; C

BH37 (N 36° 02.79/E 014° 16.120)
0+cm weathered Coralline Limestone at surface; C

BH38 (N 36° 02.807/E 014° 16.124)
0–25 reddish brown silty clay loam; Ap
15+cm iron-rich weathered Coralline Limestone; C

BH39 (N 36° 02.806/E 014° 16.100)
0–10 reddish brown silty clay loam; Ap
10+cm iron-rich weathered Coralline Limestone; C

BH40 (N 36° 02.797/E 014° 16.090)
0–30 reddish brown silty clay loam with limestone pebbles (<2 cm); Ap
30+cm iron-rich weathered Coralline Limestone; C

BH41 (N 36° 02.789/E 014° 16.155)
0–70 dark reddish brown silty clay loam with even mix of limestone pebbles (<2 cm); Ap
70+cm iron-rich weathered Coralline Limestone; C

BH59 (N 36° 02.855/E 014° 16.199)
0–130 greyish brown/grey mottled silty clay loam; Ap and ? imported soil/made ground
130–135 dark reddish brown silty clay loam; ? buried B
135+cm weathered Coralline limestone; C

Transect E: to east and northeast of Ġgantija temple, east of Tr A

BH42 (N 36° 02.830/E 014° 16.198)
0–30 reddish brown silty clay loam with common stone rubble; Ap
30+cm Coralline Limestone bedrock; C

BH43 (N 36° 02.837/E 014° 16.211)
0–30 reddish brown silty clay loam with common stone rubble; Ap
30+cm Coralline Limestone bedrock; C

BH44 (N 36° 02.869/E 014° 16.173)
0–30 pale brown fine sandy silt loam; Ap
30–40 dark brown silt loam with few fine charcoal and pottery fragments; anthropogenic buried Ah
40+cm Coralline Limestone bedrock; C

BH45 (N 36° 02.872/E 014° 16.179)
0–55 pale greyish brown silt loam; Ap
55–75 reddish brown silty clay loam with fine pea-grit gravel
75+cm weathered Coralline Limestone; C

BH46 (N 36° 02.875/E 014° 16.182)
0–35 pale brown silt loam; Ap
35–120 pale brown to brown mixture of silt and silty clay with few fine charcoal fragments; imported soil ? (tenant farmer said soil imported in 1961 when olive grove planted) as a B mixed with anthropogenic buried soil ?
120+cm reddish brown silty clay loam with mollusc shell fragments; buried *terra rossa* B horizon ?

BH47 (N 36° 02.880/E 014° 16.186)
0–45 pale brown silt loam; Ap
45–120 mottled grey/orangey/yellowish brown, fine sandy/silty clay loam; imported soil ?
120–140 grey/yellow very fine sand and silt; B/C
140+cm weathered Coralline Limestone; C

BH48 (N 36° 02.886/E 014° 16.196)
0–45 pale brown silt loam; Ap
45–110 yellowish brown fine sandy/silty clay; imported soil ? as a B
110+cm reddish brown silty clay loam with fine limestone fragments; buried *terra rossa* B horizon ?

BH49 (N 36° 02.889/E 014° 16.207)
0–50 pale brown silt loam; Ap
50–65 brown silty clay with limestone fragments; imported soil ?
65–120 mottled yellow/grey silt loam; imported soil ?
120–130 yellow/grey silty clay; imported soil ?
130+cm pale yellow silt and very fine sand; B/C

BH50 (N 36° 02.895/E 014° 16.177)
0–110 reddish brown silty clay loam with pea-grit gravel and limestone pebbles (<5 cm); imported soil ?
110+ weathered Coralline limestone; C

BH51 (N 36° 02.908/E 014° 16.174)
0–110 reddish brown silty clay loam with pea-grit gravel and limestone pebbles (<5 cm); imported soil ?
110+ weathered Coralline Limestone; C
Samples taken: spot small bulk at 10–20 cm

BH52 (N 36° 02.913/E 014° 16.165)
0–10 brown silty clay loam with common limestone rubble; Ap
10+ cm weathered Coralline Limestone: C

BH53 (N 36° 02.904/E 014° 16.149)
0–60 brown to greyish brown silty clay loam; Ap
60+cm weathered Coralline Limestone; C

Transect F: parallel and to east of Tr E

BH54 (N 36° 02.863/E 014° 16.184)
0–70 greyish brown silt loam with even mix of small limestone fragments (<10 cm); Ap
70–115 dark brown silty clay loam with few pottery and charcoal fragments; anthropogenic buried Ah
115–130 brown silty clay loam with minor pottery/charcoal fragments; buried B horizon
130+cm weathered Coralline Limestone; C
Samples taken: spot micromorphology block at *c.* 80–85 cm; spot small bulks at 10–20 and 70–80 cm

BH55 (N 36° 02.870/E 014° 16.195)
0–35 greyish brown/grey mottled silt loam; Ap
35–50 dark reddish brown silty clay loam with fine pea-grit limestone
50+cm weathered Coralline Limestone; C

BH56 (N 36° 02.876/E 014° 16.200)
0–65 greyish brown/grey mottled silt loam; Ap
65–80 dark reddish brown silty clay loam with fine pea-grit limestone
80+cm weathered Coralline Limestone; C

BH57 (N 36° 02.894/E 014° 16.2111)
0–50 greyish brown/grey mottled silt loam; Ap
50–60 dark reddish brown silty clay loam with fine pea-grit limestone
60+cm weathered Coralline Limestone; C

BH58 (N 36° 02.907/E 014° 16.204)
0–100 greyish brown/grey mottled silt loam; Ap
100–110 dark reddish brown silty clay loam wit fine pea-grit limestone
110+cm weathered Coralline Limestone; C

Transect G: Ramla valley

BH60 (N 36° 03.318/E 014° 16.023)
0–150 yellowish brown very fine sand silt loam; Ap and hillwash
150+cm bedded Coralline Limestone; C

BH61 (N 36° 03.314/E 014° 16.039)
0–80 pale brown fine sandy silt loam with small irregular blocky structure; alluvial valley fill
80–140 grey clay and limestone blocks (<15 cm); C

BH62 (N 36° 03.313/E 014° 16.039)
0–200 pale brown very fine sand silt loam with common very fine gravel (<1 cm) with columnar blocky structure; colluvial valley fill
200+cm Coralline limestone bedrock; C

BH63 (N 36° 03.397/E 014° 16.975)

0–50	pale brown fine sandy/silty clay loam; Ap
50–80	mix of pale brown fine sandy/silty clay loam and limestone pebbles; colluvial valley fill
80–160	weathered, crumbly limestone; B/C
160+cm	Coralline Limestone bedrock; C

BH64 (N 36° 03.424/E 014° 17.047)

0–175	banded, grey to pale brown, calcareous fine sandy silts; episodes of eroded soil deposition
175–190	bedded rounded pebbles, <5 cm; riverbed/outwash
190–220	bedded brown silt; episodes of eroded soil deposition
220+cm	riverbed cobbles (<20 cm)

BH65 (N 36° 03.479/E 014° 17.058)

0–50	brown sandy silty clay loam; eroded soil deposition
50–125	brown sandy silty clay with even mix of pebbles; eroded colluvial soil/bedload
125–250	partly bedded river cobbles (<20 cm) and stones (5 cm); high velocity mixture of erosion and riverbed deposits

BH 66 (N 36° 03.522/E 014° 17.031)

0–150	bedded sand and sandy silts interrupted by few lenses of pebbles; episodes of eroded soil deposition
150–250	coarse bedded cobbles in a greyish brown silt loam soil matrix interrupted by lenses of sand/silt; episodic high/low velocity erosion; contains a few pieces of included Roman pottery
250–310	grey silty clay; eroded clay substrate from up-valley
310–350	reddish brown silt loam; eroded soil from up-valley
350–365	fine pebbles (<10 cm)
365+cm	bedded cobbles; riverbed

Profile 627 (N36° 03.442/E 014° 17.045): for OSL, micromorphology and small bulk sampling

+100	modern made ground and water pipes
0–4	(= top of modern stone wall adjacent); pinkish-grey (5YR7/3) fine gravel and coarse sand; waterborne/ colluvial coarse material
4–13	pale grey (5YR7/1), calcareous silt loam; fine alluvium with drying and secondary calcification
13–15	fine rounded pebbles (<1 cm); colluvial wash
15–26	pale grey (5YR7/1), calcareous silt loam; fine alluvium with secondary calcification
26–28	fine rounded pebbles (<1 cm); colluvial wash
28–46	pale grey (5YR7/1), calcareous silt loam; fine alluvium with secondary calcification
46–60	pale grey (5YR7/1) calcareous silt loam; fine alluvium
90–100	greyish brown (10YR5/2) silt loam with abundant horizontally bedded fine to medium pebbles (<5 cm); mixed soil/limestone rubble erosion as possible small alluvial outwash fans
100–140	greyish brown (10YR5/2) fine and silt; becoming more a loamy sand with depth; fine alluvium
140+cm	Globigerina Limestone; bedrock

Samples taken: Micromorphology blocks and small bulk samples at 4–14, 75–85 and 103–110 cm; OSL profiling samples at 7.5, 15, 27.5, 45, 60, 75, 82.5, 105, 115, 125 and 140 cm; OSL dating tubes at 15–20, 62–66 and 103–106 cm

Transect H: Ta Marziena

BH67 (N 36° 02.005/E 014° 14.400; inside temple)

0–10	brown silt loam with occasional fine limestone pebbles (<5 mm); Ah
10+cm	Coralline Limestone bedrock; C

BH68 (N 36° 01.978/E 014° 14.407)

0–50	grey silty clay loam with common calcium carbonate aggregates and few limestone fragments (<1 cm)
50+cm	grey/yellowish grey mottled clay loam; B/C

BH69 (N 36° 01.983/E 014° 14.382)

0–45	brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
45+cm	Coralline Limestone bedrock; C

BH70 (N 36° 01.964/E 014° 14.391)

0–50	brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
50–75	pale grey/yellowish grey silty clay loam; B
75+cm	grey/yellowish grey mottled clay loam; B/C

BH71 (N 36° 01.926/E 014° 14.400)

0–50	brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
50–75	pale grey/yellowish grey silty clay loam; B
75+cm	grey/yellowish grey mottled clay loam; B/C

BH72 (N 36° 01.891/E 014° 14.391)

0–50	brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
50–75	pale grey/yellowish grey silty clay loam; B
75+cm	grey/yellowish grey mottled clay loam; B/C

BH73 (N 36° 01.827/E 014° 14.391)

0–80	brown silty clay loam with common fine limestone pebbles (<5 mm); Ap
80–90	pale reddish/yellowish brown silty clay loam with common fine limestone fragments (<5 mm); buried B of palaeosol
90–120	dark reddish brown silty clay loam with common fine limestone fragments (<5 mm); probably buried clay-enriched Bt of palaeosol
120+cm	weathered Coralline Limestone bedrock; C

BH74 (N 36° 01.792/E 014° 14.331)

0–50	reddish brown silty clay loam with common fine limestone pebbles (<5 mm); Ap
50–80	pale reddish brown silty clay loam with common fine limestone pebbles and fragments (<5 cm); B
80+cm	weathered Coralline Limestone bedrock; C

BH75 (N 36°01.744/E 014° 14.299)

0–50	pale reddish brown silt loam with common fine limestone pebbles (<2 cm); Ap
50+cm	weathered Coralline Limestone bedrock; C

BH 602 (N 36° 01.987/E 014° 14.387)

0–50	brown sandy/silt loam with even mix of limestone
50+cm	weathered Coralline Limestone

BH 603 (N 36° 01.979/E 014° 14.380)

0–40	brown sandy/silt loam with even mix of limestone
40+cm	weathered Coralline Limestone

BH 604 (N 36° 01.972/E 014° 14.382)
0–30 greyish brown silty clay loam
30–100 mottled greyish/yellowish brown silty clay with calcium carbonate aggregates
100+cm grey clay B/C

BH 605 (N 36° 01.969/E 014° 14.385)
0–30 yellowish brown silty clay loam
30–100 mottled greyish/yellowish brown silty clay with calcium carbonate aggregates
100+cm grey clay B/C

Transect I: southwest side of Ramla valley, starting between Tal Hamrija and It Tafilija)

BH76 (N 36° 03.428/E 014° 16.532)
0–45 yellowish brown fine to coarse sandy silt loam; Ap
45–60 yellow sand/silt; B
60+cm weathered Coralline Limestone; C

BH77 (N 36° 03.425/E 014° 16.545)
0–50 aggregated pale yellowish brown silty clay loam with few limestone pebbles; Ap
50+cm grey/yellowish brown silty clay with limestone fragments; B/C

BH78 (N 36° 03.425/E 014° 16.557)
0–60 yellowish brown to pale reddish brown coarse-fine sandy/silt loam with few limestone pebbles; Ap
60–70 orangey brown silty clay loam
70+cm grey/yellow silt; B/C

BH79 (N 36° 03.429/E 014° 16.567)
0–35 grey silty clay loam; Ap
35–60+cm pale grey/yellow silt with orange mottles; B/C

BH80 (N 36° 03.430/E 014° 16.570)
0–35 greyish brown silty clay loam; Ap
35–70+cm pale grey/yellow silt with orange mottles; B/C

BH81 (N 36° 03.430/E 014° 16.570)
0–30 greyish brown silty clay loam; Ap
30+cm Coralline Limestone pebbles; C

BH82 (N 36° 03.419/E 014° 16.620)
0–50 grey silty clay loam; Ap
50+cm grey silty clay; B/C

BH83 (N 36° 03.487/E 014° 16.694)
0–60 pale brown silt loam; Ap
60+cm grey silty clay; B/C

BH84 (N 36° 03.479/E 014° 16.761)
0–50 greyish brown silty clay loam; Ap
50+cm grey silty clay; B/C

BH85 (N 36° 03.473/E 014° 16.797)
0–30 greyish brown silty clay loam with few limestone pebbles
30+cm Coralline Limestone pebbles; C

BH86 (N 36° 03.487/E 014° 16.890)
0–50 pale greyish brown fine sandy clay loam; Ap
50+cm laminar pale grey Globigerina Limestone; C

Transect J: from southern end of In-Nuffara downslope to east

BH87 (N 36° 02.401/E 014° 16.430)
0–5 pale brown fine sandy silt loam; Ah
5+cm Coralline Limestone bedrock; C

BH88 (N 36° 02.410/E 014° 16.446)
0–50 greyish yellow silt loam; Ap
50+cm Coralline Limestone bedrock; C

BH89 (N 36° 02.406/E 014° 16.523)
0–60 greyish yellow silt loam; Ap
60+cm Coralline Limestone bedrock; C

BH90 (N 36° 02.406/E 014° 16.523)
0–60 greyish yellow silt loam; Ap
60+cm Coralline Limestone bedrock; C

BH91 (N 36° 02.395/E 014° 15.545)
0–60 grey silty clay loam; Ap
60+cm Coralline Limestone bedrock; C

BH92 (N 36° 02.389/E 014° 16.590)
0–60 grey silty clay loam; Ap
60+cm Coralline Limestone bedrock; C
Samples taken: spot small bulk sample at 10–20 cm

BH93 (N 36° 02.377/E 014° 16.646)
0–50 yellowish brown to grey silt loam; Ap
50+cm Coralline Limestone bedrock; C

BH94 (N 36° 02.392/E 014° 16.646)
0–60 greyish brown fine sandy/silt loam with even mix of limestone pebbles; Ap
60+cm Globigerina Limestone bedrock; C

BH95 (N 36° 02.358/E 014° 16.659)
0–60 greyish brown fine sandy/silt loam with even mix of limestone pebbles; Ap
60+cm Globigerina Limestone bedrock; C

Transect M: from Tar-Rumiena round-about southwards to Xewkija

BH104 (N 36° 02.860/E 014° 16.200)
0–50 pal brown fine sandy silt loam; Ap
50–110+cm pale yellowish/greyish brown silt loam; gleyed B/C

BH105 (N 36° 02.287/E 014° 15.864)
0–50 pal brown fine sandy silt loam; Ap
50–90+cm pale yellowish/greyish brown silt loam with small weathered limestone fragments (<1 cm); gleyed B/C

BH106 (N 36° 02.266/E 014° 15.052)
0–50 pal brown fine sandy silt loam; Ap
50–70+cm yellowish/greyish brown fine sandy silt loam with small weathered limestone fragments (<1 cm); gleyed B/C

BH107 (N 36° 02.235/E 014° 15.854)
0–40 brown fine sandy silt loam; Ap
40+cm weathered Coralline Limestone bedrock; C

BH108 (N 36° 02.222/E 014° 15.846)
0–50 orangey brown fine sandy silt loam; Ap
50+cm weathered Coralline limestone bedrock; C

BH109 (N 36° 02.214/E 014° 15.839)
0–20 orangey brown fine sandy silt loam; Ap
20+cm weathered Coralline Limestone bedrock; C

Transect K: from north end of In-Nuffara to east-north-east

BH96 (N 36° 02.350/E 014° 16.658)
0–30 grey silt loam with fine limestone pebbles (<5 cm); Ap
30–60 grey/orange mottled silt; B
60+cm Coralline Limestone bedrock; C

BH97 (N 36° 02.559/E 014° 16.496)
0–30 grey silty clay loam with fine limestone pebbles (<5 cm); Ap
30–60 grey/orange mottled silt; B
60+cm Coralline Limestone bedrock; C

BH98 (N 36° 02.562/E 014° 16.496)
0–30 grey silty clay loam with fine limestone pebbles (<5 cm); Ap
30–60 grey/orange mottled silt; B
60+cm Coralline Limestone bedrock; C

BH99 (N 36° 02.545/E 014° 16.510)
0–20 grey silty clay loam with fine limestone pebbles (<5 cm); Ap
20+cm grey/yellow silty clay; B/C

BH100 (N 36° 02.550/E 014° 16.526)
0–80 grey silty clay loam with fine limestone pebbles (<5 cm); Ap
80+cm grey/yellow silt; B/C

BH101 (N 36° 02.554/E 014° 16.598)
0–30 grey silt loam with fine limestone pebbles (<5 cm); Ap
30+cm grey/orange silty clay; B/C

BH102 (N 36° 02.521/E 014° 16.619
0–70 grey silty clay loam with fine limestone pebbles (<5 cm); Ap
70+cm grey/yellow silty clay; B/C

Transect N: in small walled field between TP1 and west side of Ġgantija temple platform

BH124 (N 36° 02.813/E 014° 16.141)
0–60 brown to reddish brown silt loam with even mix of limestone; Ap on terrace
60+cm limestone, not necessarily bedrock
BH125 (N 36° 02.817/E 014° 16.137)
0–70 brown to reddish brown silt loam with even mix of limestone; Ap on terrace
70+cm limestone, not necessarily bedrock

BH126 (N 36° 02.814/E 014° 16.139)
0–70 brown to reddish brown silt loam with even mix of limestone; Ap on terrace
70–80 reddish brown silt with abundant limestone fragments; remnant of buried B ?
70+cm limestone, not necessarily bedrock

BH127 (N 36° 02.815/E 014° 16.135)
0–20 brown to reddish brown silt loam with even mix of limestone; Ap
20–30 reddish brown silt with abundant limestone fragments; remnant of buried B ?
30+cm limestone, not necessarily bedrock

Transect P (2015): southeast side of Ramla valley across abandoned terraces

BH500 (grid)
0–10 grey silty clay loam; Ap
10–70 grey with orange mottles silty clay loam; B
70–100 yellowish grey silty clay with common limestone fragments
100+cm grey silt; B/C

BH501 (grid)
0–10 grey silty clay) loam; Ap
10–65 grey silty clay loam; B
65–100 grey silty clay with few limestone fragments and some orange mottles; gleyed B
100–150 grey silty clay with few limestone fragments; gleyed B
150–200 grey silt, limestone fragments and calcium carbonate mottles; Bgk
200–230 yellowish grey silty clay with calcium carbonate mottles; Bgk2
230+cm grey silt; B/C
Samples taken: Small bulk samples at 0–10, 50–60, 90–100, 160–170 and 230–240 cm

BH502 (grid)
0–10 grey silty clay loam; Ap
10–40 grey silty clay with calcium carbonate mottling; Bgk1
40–90 grey silty clay; Bg1
90–127 grey silty clay with calcium carbonate mottling; Bgk2
127–140 grey silty clay loam; Bg2
140–150+cm grey/greyish brown clay; C of Blue Clay

BH503 (grid)
0–10 grey silty clay loam; Ap
10–40 grey silty clay; B
40–95 grey/orange mottled silty clay; Bg
95–134 grey silty clay with calcium carbonate mottling; Bgk
134+cm grey silty clay; C of Blue Clay

BH504 (grid)
0–10 grey silty clay loam; Ap
10–30 greyish brown silty clay; B
30–65 greyish brown silty clay with few stone fragments (<1 cm); Bg with colluvial input
65–170 greyish brown silt clay; Bg
170–200 grey silty clay with calcium carbonate mottling; Bgk
200+cm greyish blue silty clay; C of Blue Clay

BH505 (grid)
0–10 grey silty clay loam; Ap
10–50 greyish brown silty clay with few stone fragments (<1 cm); B with colluvial input
50–220 greyish brown silty clay; Bg
220–285 greyish brown silty clay with orange mottles and abundant calcium carbonate nodules and gypsum concretions; Bgk
285–310 grey/yellowish brown silty clay; B/C
310+cm grey silty clay; C of Blue Clay

BH506 (grid)
0–10 grey silty clay loam; Ap
10–160 greyish brown silty clay; Bg
160–300+cm greyish brown silty clay with orange mottles and abundant calcium carbonate nodules; Bgk

BH507 (grid)
0–10 grey silty clay loam; Ap
10–150 pale greyish brown with orange mottles silty clay and occasional limestone pebbles (<1 cm); Bg
150–215 greyish brown silty clay with orange mottles and abundant calcium carbonate nodules; Bgk
215+cm grey silty clay; C of Blue Clay

BH508 (grid)
0–10 grey silty clay loam; Ap
10–300 pale greyish brown with orange mottles silty clay and occasional limestone pebbles (<1 cm); with more very fine sand and silt with depth; Bg
300+cm grey fine sandy/silty clay with weathered limestone; B/C

BH509 (grid)
0–10 grey silty clay loam; Ap
10–230 pale greyish brown fine sandy silty clay with occasional limestone pebbles; Bg
230+cm bluish green silty clay; C of Blue Clay

Transect R: northwest side of Ramla valley across terraces

BH510 (grid)
0–30 pale greyish brown silt loam; Ap
30–160 pale greyish/yellowish brown mottled silt loam; Bg
160–195 pale greyish/yellowish brown mottled silt loam with calcium carbonate nodules; Bgk
195+cm bluish grey silty clay; C of Blue Clay

BH511 (grid)
0–35 pale greyish brown silt loam; Ap
30–115 yellowish brown silty clay with few limestone pebbles (<2 cm); Bw
115–210 pale grey silty clay with calcium carbonate nodules and gypsum concretions; Bgk
210+cm grey/orangey brown mottled silty clay; C of Blue Clay

BH512 (grid)
0–42 pale greyish brown silty clay loam; Ap
42–115 yellowish brown silt loam with few gravel pebbles (<2 cm); Bg1
115–132 greyish brown fine sandy silt loam with minor clay; Bg2
132+cm grey/orangey brown mottled silty clay; C of Blue Clay

BH513 (grid)
0–35 pale greyish brown silty clay loam; Ap
35–98 yellowish brown silt loam with few limestone pebbles (<2 cm); Bg1
98–100 lens of brown fine sandy silt loam; hillwash epsisode
100–118 greyish brown fine sandy silt loam with minor clay with calcium carbonate nodules and gypsum concretions; Bg2
210+cm grey/yellowish brown mottled silty clay; C of Blue Clay

BH514 (grid)
0–30 pale greyish brown silty clay loam; Ap
30–90 greyish brown silty clay loam with few limestone pebbles (<2 cm); Bw
90–130 greyish brown silty clay loam; Bg
130–190 greyish brown silty clay loam with calcium carbonate nodules and gypsum concretions; Bg
190+cm greyish blue silty clay; C of Blue Clay

BH515 (grid)
0–30 pale greyish brown silty clay loam; Ap
30–45 yellowish brown silt loam with few limestone pebbles (<2 cm); Bg1
45–120 pale greyish brown silt; Bg
120–130 pale greyish brown silt with weathered limestone fragments; colluvial input
130–220 greyish brown silt loam with occasional weathered limestone fragments; Bg with colluvial input
220–260 grey/yellow/blue silt with Globigerina fragments; B/C
260+cm Globigerina Limestone bedrock; C

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BH 606 (N 36° 01.259/E 014° 16.133)
0+cm beach pebbles

BH 607 (N 36° 01.303/E 014° 16.097)
0–60 reddish brown sandy loam with fine limestone pebbles
60–100+cm limestone pebbles

BH 608 (N 36° 01.536/E 014° 15.737)
0–50 greyish brown silt loam
50–128 pale greyish/yellowish brown silty clay loam
128–180 pale greyish white calcareous silt with 25% coarse-fine gravel content
180+cm limestone gravel

Transect S: Xagħra to Rabat

BH 609 (N 36° 02.718/E 014° 15.330)
0–30 yellowish brown fine sandy/silt loam with limestone pebbles
30–60 greyish brown fine sandy/silty clay loam with fine limestone pebbles nodules
60–110 greenish-grey silt loam with limestone pebbles and iron nodules
110+cm pale greyish/reddish brown silty clay; B/C

BH 610 (N 36° 02.684/E 014° 15.296)
0–40 yellowish brown fine sandy/silt loam
40+cm greyish brown fine sandy/silty clay loam with fine limestone pebbles and calcium carbonate nodules

BH 611 (N 36° 02.638/E 014° 15.257)
0–55 greyish brown silty clay loam
55+cm Globigerina limestone

BH 612 (N 36° 02.615/E 014° 15.205)
0–55 greyish brown silty clay loam
55+cm Globigerina Limestone

BH 613 (N 36° 02.615/E 014° 15.205)
0–55 greyish brown silty clay loam
55+cm Globigerina Limestone

BH 614 (N 36° 02.571/E 014° 15.152)
0–50 pale greyish brown fine sandy clay loam
50–90 greyish brown fine sandy clay loam with fine Globigerina pebbles
90–120 yellow fine sandy/silty/clay weathered bedrock; B/C
120+cm Globigerina Limestone rubble and pale greyish brown silt loam; B/C

BH 615 (N 36° 02.554/E 014° 15.121)
0–70 greyish brown fine sandy/silt loam
70–120 pale yellowish brown sandy/silt loam with 5% calcium carbonate aggregates; hillwash
120–150+cm yellowish brown fine sandy/silt with fine limestone mix; weathered B/C

Dweija Valley

BH 616 (N 36° 02.572/E 014° 11.526)
0–100 pale greyish white calcitic silt with fine limestone pebbles
100–120 stone terrace wall
120–220 pale greyish white calcitic silt with large limestone fragments
220–250 brown calcitic loam with large irregular blocky structure; buried soil
250+cm Globigerina Limestone bedrock; C
Samples taken: spot micromorphology and small bulk sample from 225–235 cm

BH 617 (N 36° 02.549/E 014° 11.793)
0–80 pale greyish brown calcitic silt loam; terrace make-up
80+cm weathered Globigerina Limestone bedrock; C

Transect T: Skorba environs

BH 618 (N 35° 55.254/E 014° 22.606)
0–55 mid-brown fine sandy/silt loam with common fine gravel size limestone pebbles
55+cm Coralline Limestone bedrock; C

BH 619 (N 35° 55.239/E 014° 22.629)
0–60 brown silty clay loam with common fine gravel size limestone pebbles
60+cm Coralline Limestone bedrock; C

BH 620 (N 35° 55.233/E 014° 22.660)
0–50 brown silty clay loam with common fine gravel size limestone pebbles
50+cm Coralline Limestone bedrock; C
Samples taken: small bulks from 0–10, 35–40 and 40–50 cm

BH 621 (N 35° 55.220/E 014° 22.695)
0–55 brown fine sandy/silty clay loam with common fine gravel size limestone pebbles
55+cm Coralline limestone bedrock; C

BH 622 (N 35° 55.220/E 014° 22.670)
0–40 brown fine sandy/silty clay loam with common fine gravel size limestone pebbles
40+cm Coralline Limestone bedrock; C

BH 623 (N 35° 55.203/E 014° 22.671)
0–45 dark brown silty clay loam with common fine gravel size limestone pebbles
45+cm Coralline Limestone bedrock; C

BH 624 (N 35° 55.187/E 014° 22.677)
0–48 dark brown silty clay loam with common fine gravel size limestone pebbles
48+cm Coralline Limestone bedrock; C

BH 625 (N 35° 55.172/E 014° 22.660)
0–40 dark brown silty clay loam with common fine gravel size limestone pebbles
40+cm Coralline limestone bedrock; C

Ġgantija Test Pits

Test Pit 1 (2014 and 2015): composite section

Southwest facing section
0–152 Modern stone retaining wall of the visitor's platform; contains two vertical megaliths, one of *c*. 100 cm and the other of *c*. 142 cm in height

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Northeast facing section (N 36° 02.818/E 014° 16.149)

Modern ground surface outside platform
0–80 greyish brown silt loam with common limestone fragments (<5 cm); Ap and terrace soil
80–90 brown silt loam with abundant Neolithic artefacts (pot, bone, lithics); *in situ* Ah of palaeosol
90–120 mid-brown silt loam with abundant Neolithic artefacts (pot, bone, lithics); buried lower A
120–130 reddish brown fine sandy silt loam; buried Bw
130+cm undulating Upper Coralline Limestone bedrock; C
Samples taken: Micromorphology blocks at 40–47, 50–60, 60–77, 87–100, 100–111 and 111–125 cm; small bulk samples at 10–20, 70–80, 80–90, 90–100, 100–110, 110–120 and 120–130 cm; pollen spots at 5 cm intervals from 80–130 cm; 2 large bulk samples for wet sieving/macro-botanical remains at 40–70 and 90–120 cm

Test Pits for moving palm trees on east side of platform (2014):

Test Pit 2 (N 36° 02.818/E 014° 16.149)
0–70 grey silty clay loam with even mix of limestone fragments; Ap; imported soil from 1982
70–130 pale grey/yellowish brown silty clay with even mix of limestone fragments; imported soil from 1961; anthropogenic B
130–137 dark grey silty clay loam; buried Ah
137–142 pale grey silt; ? introduced/truncation zone?
142–148 reddish brown fine sandy silt loam; buried B
148+cm Coralline Limestone bedrock; C
Samples taken: Spot small bulk sample at 142–148 cm

Test Pit 3 (N 36° 02.873/E 014° 16.188)
0–50 grey silty clay loam with even mix of limestone fragments; Ap; imported soil from 1982
50–105 pale grey/yellowish brown silty clay with even mix of limestone fragments; imported soil from 1961; anthropogenic B
105–112 limestone rubble
112–135 reddish brown fine sandy silt loam
135+cm Coralline Limestone bedrock; C
Samples taken: Spot small bulk sample at 120–130 cm

Test Pit 4 (N 36° 02.854/E 014° 16.201)
0–50 grey silty clay loam with even mix of limestone fragments; Ap; imported soil from 1982
50–150 pale grey/yellowish brown silty clay with even mix of limestone fragments; imported soil from 1961; anthropogenic B
150–160 reddish brown fine sandy silt loam; buried upper B
160–180 brown sandy silt loam with fine limestone pebbles; buried lower B-B/C
180+cm Coralline Limestone bedrock; C
Samples taken: Spot small bulk samples at 150–160 and 165–175 cm

Test Pit 5 (N 36° 02.861/E 014° 16.201)
0–54 grey silty clay loam with even mix of limestone fragments; Ap; imported soil from 1982
54–75 pale grey silty clay with even mix of limestone fragments; imported soil from 1961; anthropogenic B
75–98 reddish brown fine sandy silt loam; buried upper B
98+cm Coralline limestone bedrock; C
Samples taken: Spot micromorphology block sample at 78–88 cm; spot small bulk sample at 80–90 cm

Ġgantija WC Trench (2015)

South section 2015:
c. 0–110 greyish brown silt loam and limestone rubble; made ground for 1970s toilet block
April excavations starting surface
0–35/40 large limestone blocks
35/40–60 dark brown silt loam with abundant pottery and bone, and the occasional fragment of calcitic plaster; 10YR4/3; context 1015; midden and soil accumulation
60–80 dark brown silt loam with abundant pottery and bone, and the occasional fragment of fired clay; 10YR5/2; context 1016; midden and soil accumulation
80–83 discontinuous lens of black humic and very fine charcoal 'soot'; context 1040; hearth dumped material
80–82 discontinuous, slightly undulating lens of pale yellowish brown pea-grit gravel; context 1041; ground surface
82/83–90 greyish brown silt loam with abundant pottery and bone; 10YR4/2; context 1004; buried Ah of palaeosol with abundant anthropogenic inclusions
90–105/125 reddish brown silty clay loam with common pottery and bone; 5YR3/3; context 1019; buried B of palaeosol with common anthropogenic inclusions
110/125+cm weathered Upper Coralline Limestone bedrock; C; rising in height northwards
Samples taken: Micromorphology blocks at *c*. 60, 68–86, 84–94 and *c*. 78–83 cm, and a further four samples taken continuously through the buried soil from the same sequence (as at *c*. 85–105 cm), but at *c*. 50 cm in/to north of section described above; and a further two spot micromorphology blocks from contexts 1015 and 1016; 13 small bulk samples taken to match each of these micromorphology samples

Xagħra town/plateau construction site profiles

House construction site 1 (N 36° 03.058/E 014° 16.601):

Profile 1: back wall
0–20 stone rubble wall
20–60 reddish brown silty clay loam; buried B of *terra rossa* palaeosol
60+cm fissured Upper Coralline limestone bedrock; C

Profile 2: near front gate
0–15 brown silt loam with tree rooting; modern topsoil
15–25 red silt loam; redeposited soil ?
25–80 pale reddish brown calcareous silt loam with common limestone pebbles; terrace soil
80–85 pockets of reddish brown silt loam; buried Bw of palaeosol
85+cm undulating Upper Coralline limestone bedrock; C

House construction site 2 (N 36° 03.004/E 014° 16.549):
0–15 modern concrete yard surface
15–35 pockets of reddish brown silt loam; buried Bw of palaeosol
35+cm undulating Upper Coralline limestone bedrock; C
Samples taken: Micromorphology blocks at 15–25 and 25–35 cm; small bulk samples at 15–25 and 25–35 cm

House construction site 3 (N 36° 03.536/E 014° 16.221):
0–50/80 dark brown silt loam with even mix of limestone fragments (<3 cm)
50/80–100/160 red silt loam; buried Bw of palaeosol
100/160+cm undulating Upper Coralline limestone bedrock; C
Samples taken: Micromorphology blocks at 50–60 and 60–70 cm; small bulk samples at 50–60 and 60–70 cm

Ta Marziena temple site and environs

Transect H:

BH67 (N 36° 02.005/E 014° 14.400; inside temple)
0–10 brown silt loam with occasional fine limestone pebbles (<5 mm); Ah
10+cm Coralline Limestone bedrock; C

BH68 (N 36° 01.978/E 014° 14.407)
0–50 grey silty clay loam with common calcium carbonate aggregates and few limestone fragments (<1 cm)
50+cm grey/yellowish grey mottled clay loam; B/C

BH69 (N 36° 01.983/E 014° 14.382)
0–45 brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
45+cm Coralline Limestone bedrock; C

BH70 (N 36° 01.964/E 014° 14.391)
0–50 brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
50–75 pale grey/yellowish grey silty clay loam; B
75+cm grey/yellowish grey mottled clay loam; B/C

BH71 (N 36° 01.926/E 014° 14.400)
0–50 brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
50–75 pale grey/yellowish grey silty clay loam; B
75+cm grey/yellowish grey mottled clay loam; B/C

BH72 (N 36° 01.891/E 014° 14.391)
0–50 brown fine sandy silt loam with few fine limestone pebbles (<5 mm); Ap
50–75 pale grey/yellowish grey silty clay loam; B
75+cm grey/yellowish grey mottled clay loam; B/C

BH73 (N 36° 01.827/E 014° 14.391)
0–80 brown silty clay loam with common fine limestone pebbles (<5 mm); Ap
80–90 pale reddish/yellowish brown silty clay loam with common fine limestone fragments (<5 mm); buried B of palaeosol
90–120 dark reddish brown silty clay loam with common fine limestone fragments (<5 mm); probably buried clay-enriched Bt of palaeosol
120+cm weathered Coralline Limestone bedrock; C

BH74 (N 36° 01.792/E 014° 14.331)
0–50 reddish brown silty clay loam with common fine limestone pebbles (<5 mm); Ap
50–80 pale reddish brown silty clay loam with common fine limestone pebbles and fragments (<5 cm); B
80+cm weathered Coralline Limestone bedrock; C

BH75 (N 36° 01.744/E 014° 14.299)
0–50 pale reddish brown silt loam with common fine limestone pebbles (<2 cm); Ap
50+cm weathered Coralline Limestone bedrock; C

Ortine land-fill site

Area of possible prehistoric, small rectilinear stone demarcated fields, mainly of bedrock at or near surface; very denuded

Marsalforn Valley

BH110 (N 36° 03.485/E 014° 14.946)
0–150 pale yellowish grey silty clay loam; hillwash
150–180 pale yellowish brown silty clay loam with columnar blocky ped structure; buried old land surface in colluvium
180–220 rounded stone pebbles (<5 cm); stream bed
220–340 greyish brown fine-medium sand and silt
340–350 rounded stone pebbles (<10 cm); stream bed
350+cm modern road surface, with Globigerina Limestone bedrock beneath

Profile 626 (N 36° 03.485/E 014° 14.946): OSL, micromorphology and small bulk sampling profile
0–10 turf/topsoil; modern ploughsoil and land surface
10–175 pale yellowish grey silty clay loam with weakly developed blocky ped structure; hillwash
175–210 pale yellowish brown silty clay loam with well developed columnar blocky ped structure; incipient soil in stabilized hillwash
210–270 rounded stone pebbles (<5 cm) in grey silty clay loam; hillwash
270–310 very pale brown (10YR7/4) very fine sandy/silt loam with even mix of fine limestone pebbles (<2 cm); mix of colluvial soil and pebbles
310–370 grey (10YR5/1) silty clay loam with <10% fine to coarse stone pebbles (<10 cm); coarser mix of colluvial soil and pebbles
370–400 grey clay; weathered B/C
400+cm Globigerina Limestone; bedrock
Samples taken: Micromorphology blocks and small bulks at 175–185, 200–210 and 275–285 cm; OSL profiling samples at 180, 195, 205, 215, 225, 270, 290, 300, 310 and 320 cm; OSL dating tubes at 175–180, 265–270 and 320–325 cm

Ta' Kulijat

Messa plateau above Marsalforn valley:
0–25/35 brown coarse sandy loam; Ap
25/35+cm weathered Coralline Limestone bedrock; C; sometimes exposed at surface

Ghajn Abdul and Wied il-Kibr valley, northwest of Xlendi

Terraces on limestone ridges:
0–25/35 brown coarse fine sandy silt loam; Ap, with common prehistoric pottery
25/35+cm weathered Coralline Limestone bedrock; C, sometimes exposed at surface
Sample taken: spot small bulk sample at 0–10 cm

Santa Verna and environs

Transect L:

BH111 (N 36° 02.743/E 014° 15.520)
0–20 pale brown fine sandy silt loam; Ap
20+cm Coralline Limestone bedrock; C

BH112 (N 36° 02.755/E 014° 15.527)
0–45 brown to reddish brown fine sandy silt loam with few fine limestone fragments (<2 cm) and rare pottery fragments; Ap
45+cm weathered Coralline Limestone bedrock; C

BH113 (N 36° 02.762/E 014° 15.530)
0–60 brown to reddish brown fine sandy silt loam with few fine limestone fragments; Ap
60–65 reddish brown silt loam with few fine limestone fragments (<1 cm); B
65+cm weathered Coralline Limestone bedrock; C

BH114 (N 36° 02.775/E 014° 15.544)
0–60 brown fine sandy silt loam with few fine limestone fragments; Ap
60+cm weathered Coralline Limestone bedrock; C
Sample taken: spot small bulk sample at 0–10 cm

BH115 (N 36° 02.784/E 014° 15.565)
0–30 dark brown fine sandy silt loam with few fine limestone fragments; Ap
30–50 reddish brown fine sandy clay loam with few fine limestone fragments; B
50+cm weathered Coralline Limestone bedrock; C
Samples taken: Spot micromorphology blocks at 20–30 and 30–40 cm

BH116 (N 36° 02.789/E 014° 15.587)
0–60 brown silt loam with few fine limestone fragments; Ap
60+cm weathered Coralline Limestone bedrock; C

BH117 (N 36° 02.797/E 014° 15.591)
0–50 brown silt loam; Ap
50–90 brown with orange mottles silt loam with few fine limestone fragments; B
90+cm weathered Coralline Limestone bedrock; C

BH118 (N 36° 02.807/E 014° 15.614)
0–30 brown silt loam; Ap
30–40 orangey brown silty clay loam; B
40+cm weathered Coralline Limestone bedrock; C

BH119 (N 36° 02.845/E 014° 15.634)
0–25 brown silty clay loam with few fine limestone fragments (<2 cm); Ap
25–35 orangey brown silty clay loam with few fine limestone fragments; B
35+cm weathered Coralline Limestone bedrock; C

BH120 (N 36° 02.838/E 014° 15.650)
0–45 reddish brown silty clay loam; Ap
45–80 yellowish brown coarse sandy loam with few fine limestone fragments; B
80+cm weathered Coralline Limestone bedrock; C

BH121 (N 36 02.717/E 014 15.566)
0–10 grey silt loam; Ap
10+cm weathered Coralline Limestone bedrock; C

BH122 (N 36° 02.743/E 014° 15.499)
0–45 brown silty clay loam with abundant limestone pebbles (<2 cm); Ap
45+cm weathered Coralline Limestone bedrock; C

BH123 (N 36° 02.743/E 014° 15.499)
0–20 grey silt loam with common limestone pebbles (<2 cm); Ap
20+cm weathered Coralline Limestone bedrock; C
Note: remainder of plateau to northwest is very denuded with limestone bedrock near or at the surface

Santa Verna Excavations (2015)

Off-site trench, Profile SV15/1:
0–40 greyish brown fine sandy silt loam with few fine gravel pebbles (<1 cm); Ap
40–58 brown silt loam; buried Ah of palaeosol
58–90 reddish brown silt loam; buried Bw of *terra rossa* palaeosol
90+cm weathered Upper Coralline Limestone bedrock; C
Samples taken: Micromorphology blocks at 42–52, 53–66, 66–73 and 74–88 cm; small bulk samples at 10–20, 50–58, 60–70, 80–90 and 90–95 cm

Profile SV15/2: Ashby sondage
0–20 modern topsoil and limestone rubble
20–22 compacted brown silt; torba floor
22–65 limestone rubble
65–70 compacted brown silt; torba floor
70–80 limestone rubble
80–95 brown silt loam; buried Ah of palaeosol
95–115 reddish brown silt loam; buried Bw1 of *terra rossa* palaeosol
115–125 dark reddish brown silt loam; buried Bw2 of *terra rossa* palaeosol
125+cm weathered Upper Coralline Limestone bedrock; C
Samples taken: Micromorphology blocks at 95–105, 105–115 and 115–125 cm; micromorphology spot samples of torba floor contexts 28 and 78; small bulks at 95–105, 105–115 and 115–125 cm

Profile SV15/3: Trump Sondage, Cut 55 (contexts 28/29/30/51):
0–10 greyish brown silt loam; Ah topsoil
10–100 limestone rubble
100–120 dark brown silt loam; buried Ah of palaeosol; (note: adjacent feature cut defines from *c*. 110 cm down-profile)
120–165 reddish brown silt loam; buried Bw of palaeosol
165+cm weathered Upper Coralline Limestone bedrock; C
Samples taken: Micromorphology blocks at 100–120 and 120–140 cm from buried soil, and 110–130 and 130–160 cm from feature fill; small bulk samples at 100–110 and 130–140 cm, from buried soil, and 110–120 and 140–150 cm from feature fill

Profile SV15/4: Trench E, A section:
0–10 greyish brown silt loam; Ah topsoil
10–40 limestone rubble
40–43 compacted brown silt; torba floor
43–71 limestone rubble
71–75 compacted brown silt; torba floor
75–83 limestone rubble
83–100/105 dark brown silt loam; buried Ah of palaeosol
100/105+cm weathered Upper Coralline Limestone bedrock; C
Samples taken: Micromorphology blocks at 40–44, 68–75, 83–93 and *c*. 65–70 cm; small bulks at 40–43, 66–74, 83–93 and *c*. 65–70 cm

Taċ-Ċawla (TCC/14) Neolithic settlement site excavations (2014)

Section 1:

0–50	made ground and Horton 1985 excavation trench backfill
50–54	brown silt loam; remnant of post-site B horizon ?
54–57	compacted brown silt with fine charcoal; possible floor surface
57–63	brown silt loam; soil aggradation ?
63–72	compacted mixture of brown silt, fine charcoal and pale grey calcitic ash; possible floor surface accumulation
72–74	reddish brown silt loam; possible upper surface of buried Bw of palaeosol

Samples taken: Micromorphology blocks at 50–59 and 59–73 cm; small bulk samples at 54–57, 57–63, 63–72 and 72–74 cm

Section 2:

Excavated surface

0–28	greyish brown fine sandy silt loam; trench backfill or old terrace soil
28–29	lens of fine charcoal and humic matter; anthropogenic accumulation
29–32	laminar pale grey silt or calcitic ash with fine limestone fragments (<1 cm); possible floor deposits
32–41	greyish brown fine sandy silt loam; soil aggradation
41+cm	excavation surface of Horton 1985

Samples taken: Micromorphology blocks at 16–31, 22–37 and 26–42 cm; small bulks at 20–25, 28–32 and 32–40 cm

Deep valley cores: sample depths of small bulk and micromorphology samples

Xemxija 1 valley core

Sample depth (cm)	Description	Micromorphology block sample at cm	Small bulk sample at cm
47–70	yellowish brown silty clay; 5Y6/4		
70–85	yellowish brown calcitic silt with fine stone; 5Y8/3		
85–112	calcitic silt with orange mottles; 5Y8/3		
112–122	reddish brown silty clay; 10YR5/6		
122–151	light reddish brown silt; 5YR6/4		
165–206	yellowish brown silt; 10YR5/4	199-201	205
206–250	pale grey silt; 10YR5/1 to 6/1	220-3	
250–265	pale grey fine sand; 2.5YR6/2	250-3	255
265–295	grey/orange sine sandy/silt loam; 10YR6/4	273-5	275
295–317	mid-grey silt; 5Y4/1	302-4	300
317–319	dark grey silt with fine sand; 5Y3/1		
319–335	black silt with fine sand; 5Y2/1		330
335–355	grey silt; 7.5Y1	335-9	
355–405	grey silt with common humified organic matter; 7.5Y4/1	403-5	365
405–425	black organic silt mud; 10YR2/1		405
425–450	grey silt with common humified organic matter; 7.5Y4/1		435
460–528	black organic silt mud; 10YR2/1; C-14 date of 2198–1985 cal. BC at 460 cm	495-7	490, 513
528–543	greyish black silt; 10YR4/1		535
543–565	dark grey silt with common humic/organic fragments; 10YR4/1	545-7	555
565–600	dark grey silt; 10YR4/1; C-14 date of 4326–4053 cal BC at 570 cm	578-80	570
600–630	black organic silt; 10YR2/1	610-2	600
630–635	mottled grey/black organic silt; 10YR4/1 and 2/1		630
635–655	dark grey silt; 5Y4/1	645-7	638
670–685	brown to dark brown silt loam with few fine stones, manganese flecks, few plant remains fragments; 10YR4/3		680
685–815	brown silt loam with orange oxidation mottling; 10YR4/4	685-7, 725-7, 772-5, 785-7	710, 740, 775, 787, 800
815–832	brown to dark brown silt loam with few fine stones, manganese flecks, few plant remains fragments; 10YR4/3	823-5	818
832–855	brown to dark brown silt loam with few fine stones; 10YR4/3	833-5	835
855–870	brown silt loam with orange oxidation mottling; 7.5YR4/2	868-70	865
870–890	brown silt loam with orange oxidation mottling and limestone fragments; 7.5YR4/2		875
890–910	dark greyish brown organic silt; 7.5YR2/2		890
910–922	brown organic silt with limestone fragments; 7.5YR4/4	913-5	913
922–943	dark brown silt loam; 7.5YR3/2	025-7	922
943–960	pale brown fine sandy/silt loam with abundant limestone pebbles; 10YR6/3	945-7	945
960–990	dark yellowish brown fine sandy/silty clay loam with abundant limestone pebbles; 10YR64/4; C-14 date of 7000 cal BC at 990 cm	965-7, 975-7	970
990+	Limestone bedrock		

Wied Żembaq 1 valley core

Sample depth (cm)	Description	Micromorphology block sample	Small bulk sample
0–119	dark brown silt loam; 10YR4/3	7-9, 45-7, 80-2	9, 47, 82
119–161	yellowish brown coarse sandy silt loam with occasional limestone pebbles; 10YR4/2		
161–213	dark greyish brown sandy silt loam with occasional limestone pebbles and common organic fragments; 10YR4/2		
215–217	yellowish brown silt loam; 10YR5/4	215-7	217
217–315	weathered limestone pebbles		
250–260	greyish brown silt loam; 10YR5/2	253-5	255
260–350	dark brown silt loam; 10YR4/3	300-02	302
350–362	limestone pebbles		
362–380	dark greyish brown silt loam; 10YR4/2	365-7	367
380–400	dark grey silt loam; 10YR4/1	396-8	398
400–420	very dark grey organic silt mud; 10YR3/1	410-12	412
420–450	dark grey organic silt mud with occasional humified plant remains and iron mottling; 10YR4/1	433-5	435
450–480	dark yellowish brown silt loam with orange oxidation mottling; 10YR4/4	460-2	461
480–518	dark grey organic silt mud with orange oxidation mottling; 10YR4/1	496-8	498
518–558	very dark grey organic silt mud with pebbles at base; 10YR3/1	528-30	530

Marsaxlokk valley core

Sample depth (cm)	Description	Micromorphology block sample	Small bulk sample
0–40	pale brown fine sandy/silt loam with fine limestone fragments; 10YR6/3	5-7	6
40–76	light yellowish brown silt loam; 10YR6/4	62-66	66
86–155	light grey, calcitic, very fine sandy/silt; possibly micro-laminated; 10YR7/1	110-112	112
155–165	brownish yellow fine gravel and coarse sand; 10YR6/6		
165–170	very dark grey organic silt mud; 10YR3/1		
170–185	light brownish grey very fine sandy/silt; possibly micro-laminated; 10YR6/2	170-2	172
186–192	pale brown fine gravel and coarse sand; 10YR6/3		
192–245	yellowish red silty (clay) loam with occasional fine limestone pebbles; 5YR4/4	215-7	217
245–286	dark yellowish brown silty clay loam with frequent fine limestone pebbles; 10YR4/4	255-7	257
286–292	light yellowish brown fine gravel and coarse sand with marine shell fragments; 10YR6/4		
292–332	brown to reddish brown silty clay loam; 5YR4/4	296-9, 320-2	299, 322
332–353	pinkish brown, calcitic silty clay loam with common weathered limestone; 10YR7/4		
353–386	pale pinkish brown calcitic silt; 10YR8/4	365-7	367

Temple landscapes

The ERC-funded *FRAGSUS Project* (*Fragility and sustainability in small island environments: adaptation, cultural change and collapse in prehistory, 2013–18*), led by Caroline Malone (Queens University Belfast) has explored issues of environmental fragility and Neolithic social resilience and sustainability during the Holocene period in the Maltese Islands. This, the first volume of three, presents the palaeo-environmental story of early Maltese landscapes.

The project employed a programme of high-resolution chronological and stratigraphic investigations of the valley systems on Malta and Gozo. Buried deposits extracted through coring and geoarchaeological study yielded rich and chronologically controlled data that allow an important new understanding of environmental change in the islands. The study combined AMS radiocarbon and OSL chronologies with detailed palynological, molluscan and geoarchaeological analyses. These enable environmental reconstruction of prehistoric landscapes and the changing resources exploited by the islanders between the seventh and second millennia BC. The interdisciplinary studies combined with excavated economic and environmental materials from archaeological sites allows Temple landscapes to examine the dramatic and damaging impacts made by the first farming communities on the islands' soil and resources. The project reveals the remarkable resilience of the soil-vegetational system of the island landscapes, as well as the adaptations made by Neolithic communities to harness their productivity, in the face of climatic change and inexorable soil erosion. Neolithic people evidently understood how to maintain soil fertility and cope with the inherently unstable changing landscapes of Malta. In contrast, second millennium BC Bronze Age societies failed to adapt effectively to the long-term aridifying trend so clearly highlighted in the soil and vegetation record. This failure led to severe and irreversible erosion and very different and short-lived socio-economic systems across the Maltese islands.

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Published by the McDonald Institute for Archaeological Research,
University of Cambridge, Downing Street, Cambridge, CB2 3ER, UK.

Cover design by Dora Kemp and Ben Plumridge.

ISBN: 978-1-902937-99-1

UNIVERSITY OF CAMBRIDGE