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Environment and Project Background

This report details the results of five seasons of archaeological work at Football Field, Worth Matravers, which took place between 2006 and 2011, in advance of a community housing project. Fig. 1 is the key for all archaeological sections.

Location

The site is located in south-east Dorset on high land overlooking the English Channel to the south, the Purbeck ridge to the north and the modern town of Swanage to the east (Fig. 2). The site, previously Quarry Field, is now known as Football Field (centred on SY 975778) and is located on the northern edge of the village of Worth Matravers, immediately south of Compact Farm (Figs 3 and 4). The field is on a slightly sloping spur of land between 138m and 142m above Ordnance Datum (OD) (Fig. 5). On the western side the land falls sharply towards a dry coombe. The site has clear views to the English Channel and westwards along the coast as far as Portland.

Landscape, Geology, Environment and Climate Change

Andrew Morgan and Robert Kenyon

Introduction

Football Field, Worth Matravers, is located in the southern part of the area known as the Isle of Purbeck and lies on the edge of the Purbeck Plateau, where the ground falls away gently towards the valley of Hill Bottom which leads to the natural harbour of Chapman's Pool.

Purbeck is a peninsula dominated by the sea and has a distinct geographical identity that separates it from the rest of Dorset. It is bordered by the English Channel to the south and east, by Poole Harbour and the River Frome to the north. Its western limit is defined by the Luckford Lake stream, a small tributary of the Frome which continues along a small valley that cuts through the chalk ridge into the bay at Arish Mell (Legg 1989, 1-2).

Topography

Purbeck can be divided into five topographical areas (Fig. 6), each clearly associated with the underlying geology. The limestone Purbeck Plateau forms the southern boundary of Purbeck, ending in dramatic cliffs along the coast. To the south west is the Vale of Kimmeridge, a coastal area affected by landslips and enclosed by the escarpment of the Purbeck Plateau. Here the coast is formed by steep cliffs that are cut by the bays of Kimmeridge and

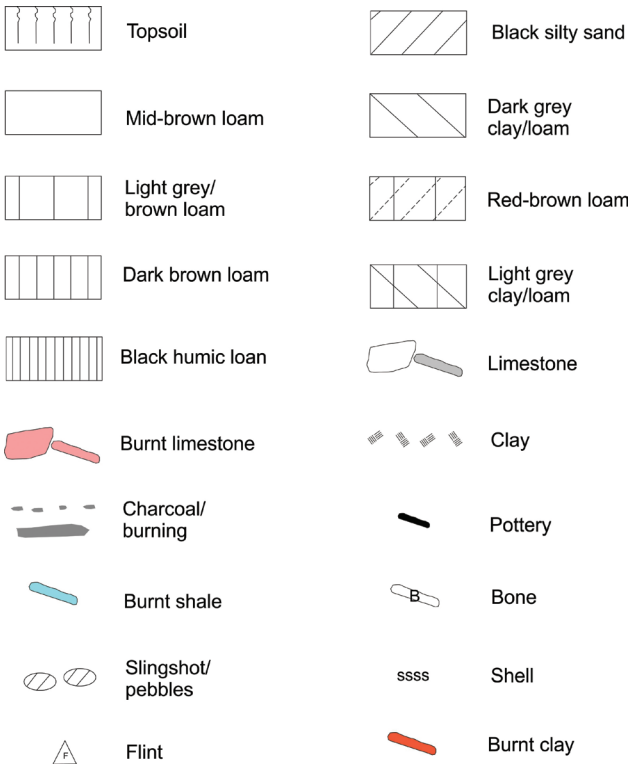

Figure 1 Key to section and plan drawings

Chapman's Pool. To the north, the land drops away along the edge of the plateau into the broad undulating Corfe Valley which stretches from Worbarrow Bay to Swanage Bay. This is bounded to the north by the Purbeck Hills, which form a chalk spine that extends across Purbeck from Arish Mell in the west to Handfast Point in the east. The Purbeck Hills reach a maximum height of 199m and form a natural barrier, accessed through openings at Corfe Gap and Ulwell Gap. Further north, the land falls away steeply through woodlands into the extensive low-lying landscape of the Purbeck Heathlands, which stretch from the Purbeck Hills to the fertile flood plain of the River Frome and the wetlands surrounding Poole Harbour.

Geology

The geology of the area comprises a succession of strata from the Late Jurassic period to the current Quaternary period, constituting part of the Jurassic Coast which has been designated a World Heritage Site and provides a wide range of natural resources that have been exploited for millennia.

In the west, the earliest rocks are the extensive Kimmeridge Clay Formation, exposed along the unstable cliffs from Brandy Bay to St Aldhelm's Head and comprise a series

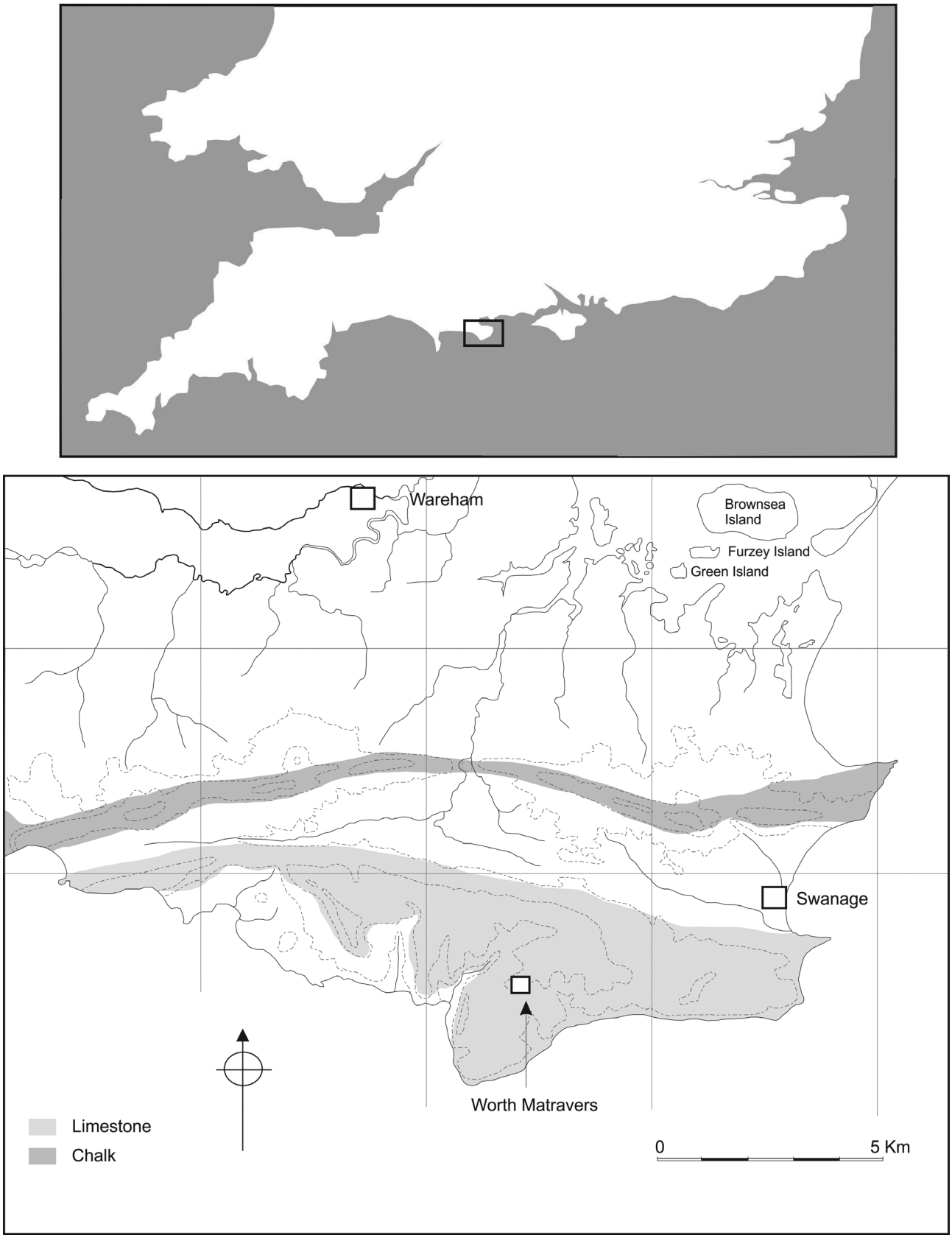

Figure 2 Worth Matravers, Dorset, site location and geology

of thin-bedded, organic-rich, grey-black shales and clays interlaced with layers of non-organic mudstone and limestone. An important stratum in this formation is the Blackstone, a bituminous oil-shale up to a metre thick, and is the source of Kimmeridge Shale which has been worked into objects since the Neolithic period. It can also be used as a fuel, but when burnt it gives off a pungent smell; it has been known to combust spontaneously.

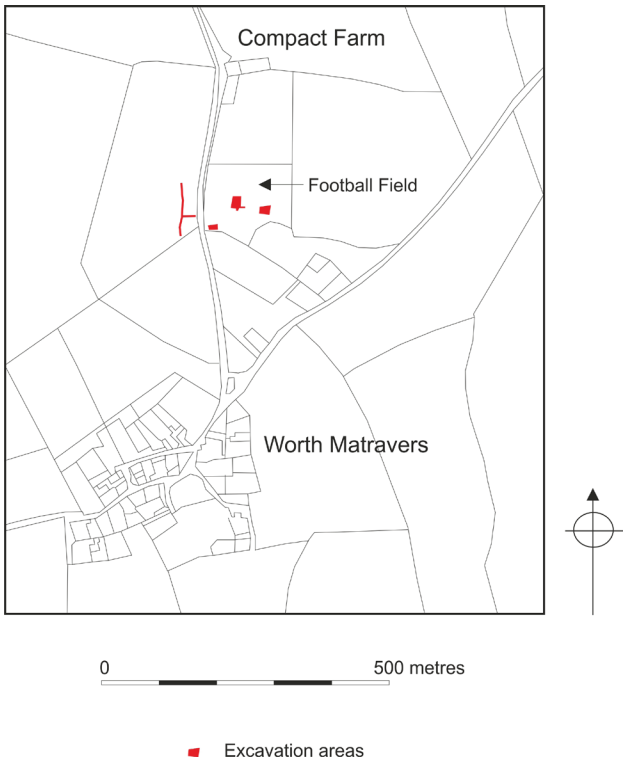

Figure 3 Location of Football Field and EDAS excavation areas in relation to Worth Matravers and Compact Farm

Limestone beds are prominent along the cliff tops and continue along the edge of the coast to Durlston Head and provide some of Dorset's most important building stone, which has been exploited for 2000 years. The thin-bedded limestone and shale rocks known as the Cinder Bed (Wood 2011, 72), and form the Purbeck Plateau, where Football Field is located, and yield materials that have been exploited for dry stone walls, roof tiles and paving slabs.

During the Holocene epoch (9700 BC to present), the sea level has risen substantially, the coast has been eroded and the rivers have laid down channels of rich alluvial deposits which are agriculturally important when compared with the surrounding poor-quality heathlands. During this period the chalk ridge that connected the Purbeck Hills to the Isle of Wight was breached, and Poole Harbour formed from a submerged valley. There are a number of small natural harbours along the coast, including Worbarrow Bay, Kimmeridge Bay, Chapman's Pool, Swanage Bay and Studland Bay.

Environmental change

Our understanding of the environmental history of the Isle of Purbeck is limited and no environmental studies have been undertaken on sites south of the Purbeck Ridge. Two projects have examined material from the clay and

Figure 4 Aerial view of Worth Matravers from the north. The excavation area and new housing development are within the red ellipse. The modern road is lower right and the Purbeck coast is visible at the top of the photo

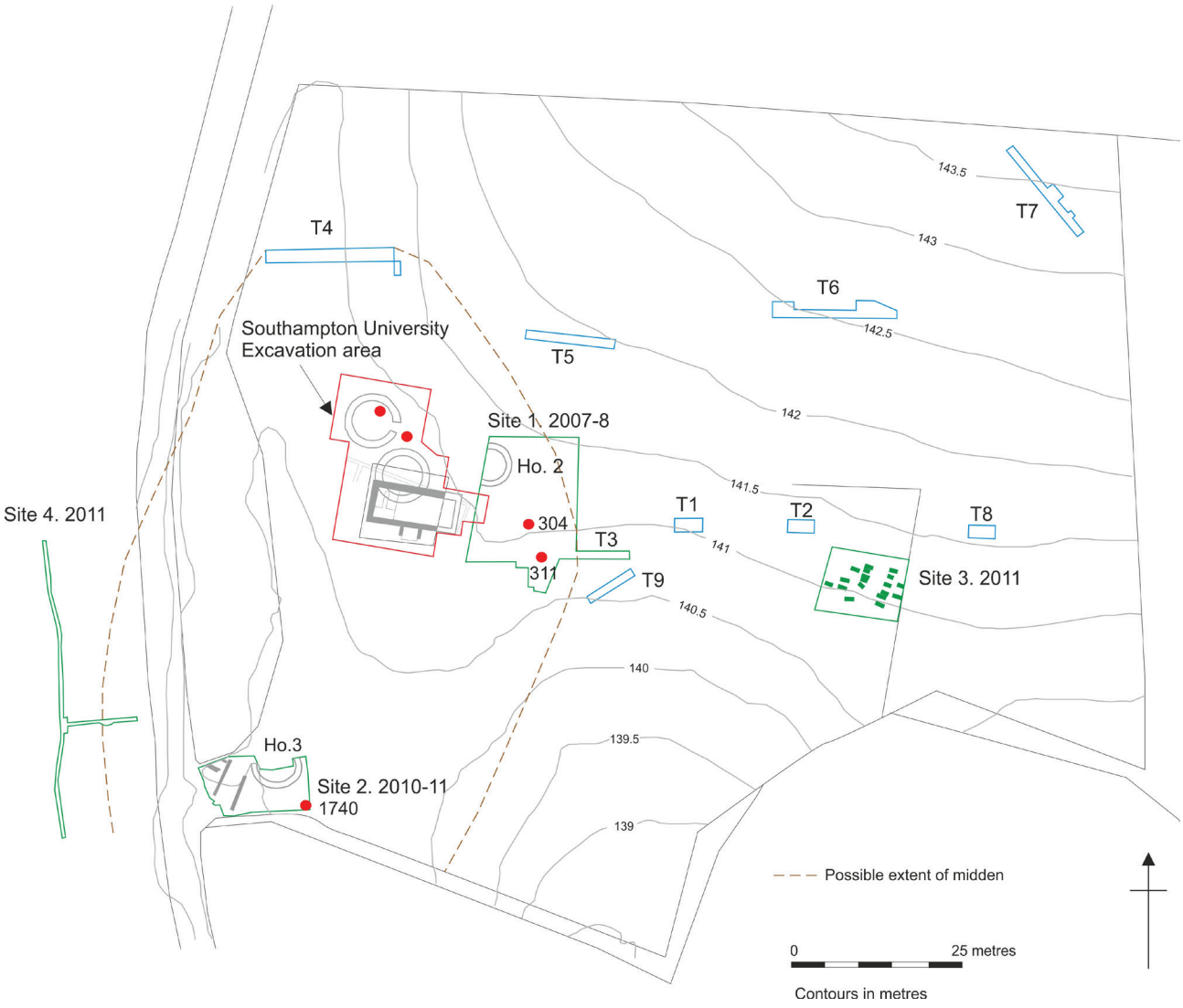

Figure 5 Contour survey and archaeological interventions 1991-2011

gravels of the southern fringes of Poole Harbour: Wytch Farm, (Allen and Scaife 1991) and Bestwall Quarry, Wareham (Scaife 2009) where a range of highly valuable data for understanding the environmental development of the western harbour basin was recorded. The area is very different from South Purbeck in underlying geology, topography and hydrology. However, the results provide a useful backdrop against which to consider the situation to the south of the Purbeck Ridge, with respect to the type and degree of woodland cover, access to resources, the likelihood and date of episodes of clearance and the possible arable and animal economy of the site at Football Field.

Climate change

Earth's climate has changed continuously over time, driven mainly by natural events but has also been affected by human activities. Minor changes can have a significant impact by affecting the land available for cultivation, the length of the growing season and crop yield and the productivity of livestock. Changes determine the variety and abundance of natural resources and the opportunities for human settlement and population levels. Table 1 summarises the broad climatic phases which affected the environment and influenced human settlement in Purbeck in the Neolithic to Post-Roman periods.

Project Background

Planning background

Football Field was bought by Signpost Housing Association Limited in 2002 and was the subject of two planning applications for housing development in 2003. Due to potential high archaeological costs, no development took place and the field was bought by Mr Robert Kenyon in 2007. In the same year, Performance Management Services International (PMSI) bought 7 ½ acres on the south side of the field; of this, one acre was earmarked for community housing. The remaining 6½ acres, in which there were known and excavated archaeological remains, were retained by Mr Kenyon. The extreme south west corner of the field was acquired by the Worth Community Property Trust with the intention of building five low-cost

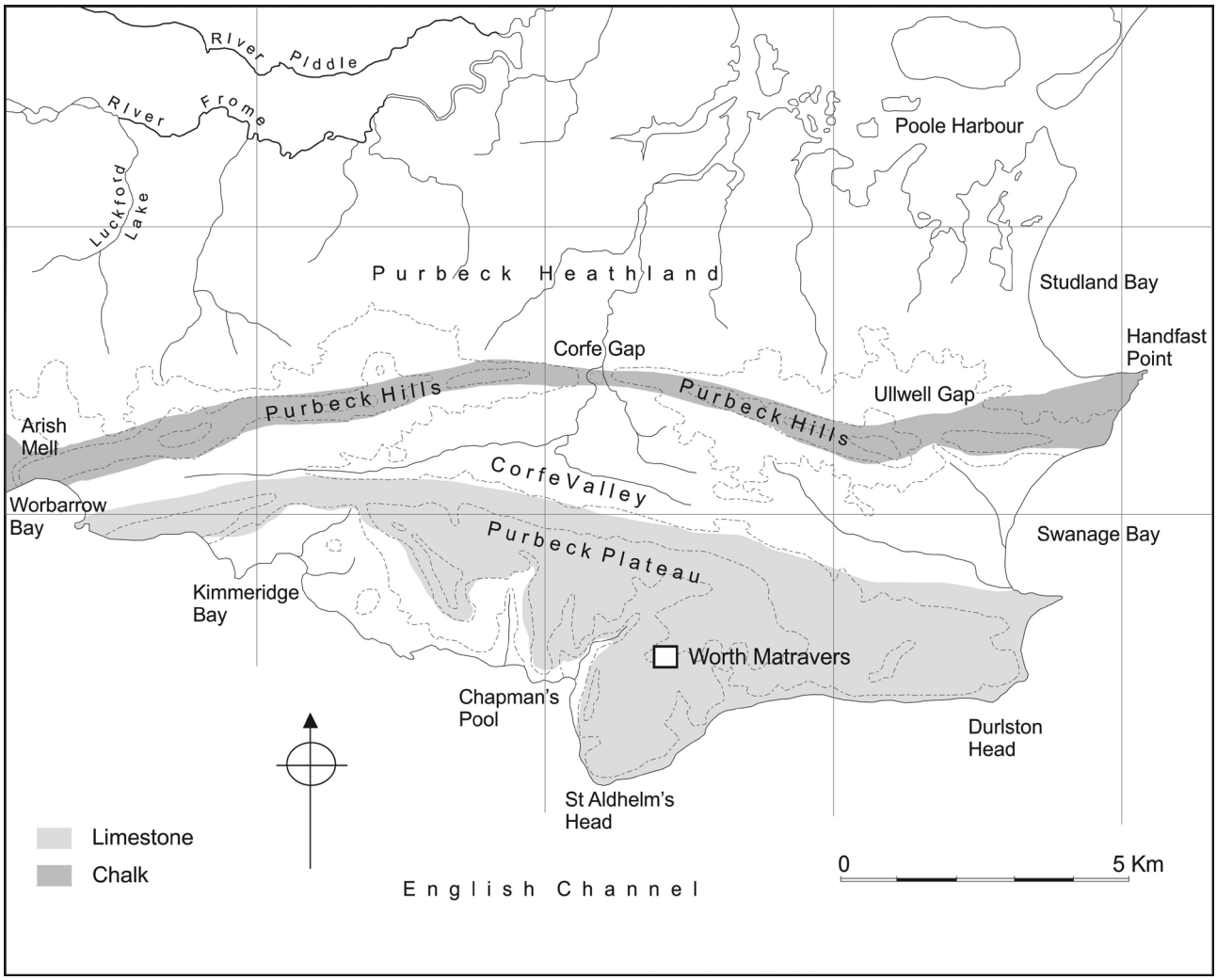

Figure 6 Main topographical features in the Isle of Purbeck

houses: this development was the subject of two further planning applications in 2008 and 2010. Planning consent was given in 2011 with relevant archaeological conditions under Planning and Policy Guidelines (PPG15). Building work began in July 2011 and was completed by April 2012.

Site evaluation and previous work

The archaeological potential of the site was first recognised by the Royal Commission on Historical Monuments (England) during their survey work of south-east Dorset in the 1960s and 1970s (RCHM 1970, 621).

Southampton University undertook fieldwork from 1990 to 1993 opening up an area approximately 16m by 25m in the south west sector of the field (Fig. 5). This produced settlement evidence in the form of structures and finds from at least the Early Iron Age up to the very latest Roman period. In addition, a 5m by 5m test pit and twenty four 1m^2 square pits were dug at 20m intervals (Graham *et al* 2002, fig. 1.2). Rubble surfaces with potential archaeology were encountered in eight of these pits which were sited immediately to north, south and east of the main excavation.

A desk-based assessment for a proposed housing development was followed by an archaeological evaluation prior to any determination of a planning application (Oakley 2003). This work comprised eight 10m by 1.9m trenches, excavated by Wessex Archaeology in 2003 and revealed '*substantial high-quality archaeological deposits*' in six of the eight trenches (Wessex Archaeology 2003a).

In 2006, East Dorset Antiquarian Society (EDAS) carried out further evaluation of the proposed housing development footprint by magnetometer survey and a single evaluation trench, the results of which implied that there were no significant underlying archaeological remains (Roberts 2009, 211). This work was followed in 2007 by a magnetometer survey of much of the remainder of the field, targeting specifically two of the proposed garden plots. On the basis of geophysical anomalies, five 10m by 2m trenches were machine-stripped and in the garden areas, a further two 3m by 2m trenches were hand-dug (Fig. 5). One of the trenches, which had been sited close to the Southampton University excavation, revealed a substantial Late Iron Age storage pit with a nearby inhumation (Roberts 2009, 212).

Table 1 Climatic phases of Southern England (based on Allen 2000; Allen and Scaife 2007)

Approx. date calibrated BC	Archaeological period	Climatic zone	Pollen Zone	Climate and vegetation
1050 BC-Present	Early medieval Roman Period Late Iron Age Middle Iron Age Late Bronze Age	Sub-Atlantic	VIII	Deterioration Cold and wet, general deterioration. High rainfall. Decline of lime. Increase of ash, birch and beech.
3200-1050 BC	Middle Bronze Age Early Bronze Age Late Neolithic	Sub-Boreal	VIIb	Stable Warm and dry, low rainfall, wind-blown deposits. Woodland regeneration in Southern England.
4000-3200 BC	Middle Neolithic Early Neolithic			Declining warmth. First agriculture. Gradual woodland clearance. Loss of elm.
6300-4000 BC	Later Mesolithic	Atlantic	Vlla	Optimum Holocene Climatic Optimum, warm and wet. Increase of 2°C, poly-climax forest. Increase in elder. Some clearances.
8900-6300 BC	Mesolithic	Boreal	VI V	Ameliorating Continental climate. Warm and dry. Asynchronous expansions of mixed oak forest with hazel and succession from pine.
10,000-8900 BC	Early Mesolithic	Pre-Boreal	lV	Rapid amelioration Sharp increase in warmth at 8,000BC. Birch, juniper and pine woodland.
Pre 10,000 BC	Upper Palaeolithic	Arctic	III	Tundra

Archaeological organisation

The most recent fieldwork (2008-2011) was also conducted by the East Dorset Antiquarian Society (EDAS), the site being evaluated and excavated by society members. The 2006-8 work was directed by Phil Roberts and subsequently by Lilian Ladle (Ladle 2012b). Mark Corney has advised on fieldwork and post-excavation processes since 2010. An £8000 grant from Comma, the Community Aggregates Fund, secured initial post-excavation specialist input for the pre-2010 finds and the Worth Community Housing Trust allocated £21,000 for specialist work associated with the housing development. The Dorset Archaeological Committee gave a grant of £7722 for radiocarbon dating of selected contexts.

The work of the project was submitted for the 2011 Dorset Archaeology Award and received a runner-up certificate. Since 2010, the results of the fieldwork have been widely disseminated through lectures to archaeology groups, amenity societies and conferences. In addition there have been articles in magazines and Interim reports in the *Proceedings of the Dorset Natural History and Archaeological Society* and in the CBA (Council for British Archaeology) newsletter. Three well-attended open days were organised during the excavations and a full-colour brochure was produced for the general public detailing key aspects of the site's development. A video film was also created to promote the site to a wider audience via the internet.

Archaeological background

In the late 1950s and early 1960s during fieldwalking exercises, J.P. Calkin and A.P. Brown discovered a potential Iron Age site south of Compact Farm (Brown, 1955, 77; Calkin 1960, 86). Five years later, R.A.H Farrar noted further material of Late Iron Age and Roman date in the same area (Farrar, 1965, 118). The site was located and recorded by the Royal Commission on Historical Monuments (England) in the 1960s (RCHME 1970, 621).

Between 1990 and 1993, Southampton University undertook fieldwalking and excavation after a Roman grain dryer was located during ploughing. Excavation confirmed a period of occupation from at least the Early Iron Age to the latter part of the 4th century if not into the early part of the 5th century AD. The results were published in a University of Southampton monograph *Purbeck Papers* (Graham *et al* 2002).

Evaluation by Wessex Archaeology in 2003 confirmed the presence of stratified archaeological deposits within some of the proposed building plots on the western half of the site and within the easement of the access road. Archaeological material recovered from this work suggested Early Iron Age activity with little Late Iron Age or Roman material.

In 2006, East Dorset Antiquarian Society (EDAS) were approached to conduct further evaluation of the site

and following a magnetometer survey of the proposed housing area, a single trench was opened; this proved to be archaeologically sterile (East Dorset Antiquarian Society 2007). The landowner requested further work to be undertaken within the proposed gardens of two of the dwellings as well as outside the development area. An additional magnetometer survey was conducted over most of the field and this produced anomalies indicating potential archaeological features. As a result, five 10m by 2m trenches were opened over the field and two trenches (3m by 2m) were opened in the proposed garden areas of the houses. Four of the test trenches produced archaeological sequences and one in particular (Trench 3), which was located directly east of the Southampton University excavation, yielded significant Late Iron Age features and finds including a deep storage pit and a human inhumation.

The following year, Trench 3 was extended to determine any potential relationships between the storage pit and burial and those features recorded by Southampton University.

An area measuring approximately 18m by 13.5m was subsequently excavated and revealed archaeological features dating from the Early Iron Age to the end of the Roman period (Roberts 2009, 211-213).

Additional archaeological observation and recording took place in December 2010 when four geological test pits (all approximately 2m by 0.75m and 2m deep) were dug in the housing development area. No archaeological features were recorded, but evidence of quarry infilling with material from nearby Weston Farm was noted (RCHME 1970, 621).

Prior to building work commencinging, EDAS were invited back in 2010 and 2011 to conduct work on the development access road, next to the field gateway. A rectangular area immediately inside the field entrance was investigated between May and October 2010. A further extension comprising an L-shaped area next to the main road was investigated between February and May 2011. When building work started in July 2011, unexpected archaeological deposits in the form of human skeletal remains were encountered at the extreme eastern end of the development area. In addition, an opportunity arose during 2011 to record archaeological sequences in a water trench in land immediately west of the site. In summary, the various interventions have exposed complex stratigraphic sequences dating from the Early Neolithic to the Post-Roman period.

Archaeological methodology

Football Field has been the subject of three major excavations (located on Fig. 5), discussed above; each was organised in a different way and with different objectives. The initial single EDAS test trench was dug by hand as were a further eight test trenches; one of these (Trench 3) was extended when archaeological features were encountered. As this trench was in close proximity to the Southampton excavations, a decision was taken to examine the area in more detail in an attempt to clarify the relationship between the two sites. An area measuring approximately 14m by 18m was investigated. This work was undertaken as an EDAS training exercise.

Between May and October 2010, in response to potential destruction of archaeological deposits by construction of the proposed site access road, an area approximately 7m by 10m was opened inside the field gateway. In order to access the archaeological levels, between 0.2m to 0.4m of overburden was removed by a small back-acting mechanical excavator with a flat bucket, under archaeological supervision. The exposed subsoil was set out into forty eight individually numbered slots measuring approximately 1m by 2m (Fig. 24). These were hand-cleaned; a very difficult task due to the presence of very large amounts of limestone rubble. These slots were then taken down in 0.1m and 0.05m spits until a compacted surface of small limestone pieces was encountered. From February until May 2011, work took place on an extension of the site comprising a further 3m west to the edge of the current highway and 2m north (to investigate features encountered in 2010). As this was a much smaller area, only two subdivisions were made, the westernmost being termed the Access Road (AR) and the northernmost, the Stone Alignment (SA). Once again, the exposed levels were all cleared by hand and taken down in 0.1m to 0.2m spits.

Building work commenced in July 2011 with observation and recording of all groundworks. In addition, the complete footprint and part of the garden of one of the houses was excavated; the area under investigation measuring 16m by 16m. Further monitoring of groundworks took place in February and March 2012. The insertion of a water pipe in the field opposite the site was recorded in November 2011. The EDAS interventions have been divided into four sub-sites for this report (Fig. 5).

- Site 1 – 2006-7 evaluation trenches and 2008 excavation area
- Site 2 – 2010/2011 excavations on the access road
- Site 3 – excavation associated with the house footprint
- Site 4 – monitoring of a water pipe in the field to the west of the development

A total of 235 discrete features dating from the Early Neolithic to the Post-Roman period were excavated. All features were hand excavated and the majority were 100% sampled; however, a number of features on Site 1 were 50% sampled and some not sampled at all. There were few linear features, most comprising shallow gullies which were 100% sampled. The large Neolithic ditch was initially sampled by evaluation pits in 2010 and excavated by sectioning in 2011. It is probable that some features were missed in the 2006 excavation due to the fact that the much of the rubble cover on the site was not cleared.

A unique series of context numbers was allocated and relationships between contexts were noted together with relevant stratigraphic information. Features were recorded by section at a scale of 1:10. Longitudinal sections of the excavated sides of Site 2 were produced at 1:20. Site plans were produced at scales of 1:25, 1:50 and 1:100. Features were recorded and planned using standardised recording forms derived from the AC Archaeology recording system. A comprehensive photographic record of digital images was maintained. Finds were washed (where appropriate), marked and catalogued by material type. An appraisal of material from each year involved the identification, cataloguing and spot dating of all finds. Unfortunately a comprehensive environmental strategy was only achieved for the 2010/11 work when in order to gain maximum information, a number of features were specifically targeted which were likely to produce material that would give information on the contemporary environment and also for potential radiocarbon dating. Both bulk and hand-retrieved samples were taken.

Themes and aims

When the first EDAS project was initially undertaken, there was neither a project design nor arrangements for post-excavation analysis and publication. This author undertook responsibility for the project in 2009 and developed an excavation strategy and an outline proposal for post-excavation work and ultimate publication with major themes addressing the following criteria:

Chronology

Place the sequence of structures, features and finds within the known framework of activities around Purbeck, Poole Harbour and Dorset as well as within Southern England.

Calibrate the sequence through absolute radiocarbon dating where possible.

Settlement

Examine changes in the settlement status and function through time.

Society

Examine cultural associations, social units, human remains and evidence for non-domestic activities.

Environment and economy

Examine evidence for environmental change, agricultural production, food processing and storage, craft activities and trade and exchange.

Summary of Phasing

(Site 2 was the only area where there were intercutting features and where site stratigraphy could be plotted. This is illustrated on Fig. 215)

Neolithic/Early Bronze Age (c. 3500-1500 BC)

A probable Early Neolithic enclosure ditch was located on the western side of the site on Site 2 and is dated by pottery and flintwork from its infilling which took place over several millennia. A radiocarbon date of 2023-1828 cal BC was obtained for an infill layer. The cultural material represents activity in a landscape which was increasingly being opened up for agriculture and husbandry. A miniature stone alignment was undated and may belong to the Early Bronze Age. Pottery and flint scatters imply nearby activity.

Middle Bronze Age (c. 1550-950 BC)

Settlement evidence is lacking but the period is represented by remnants of a probable pottery clamp and an associated pottery scatter on Site 3 together with a general spread of flintwork over all areas examined.

Latest Bronze Age and Late Bronze Age/Early Iron Age (c. 950/800-400 BC)

A single pit on Site 4 produced Late Bronze Age pottery in the plainware tradition.

A post-built roundhouse was located on the edge of Site 1 and pre-dated a deliberately laid surface of limestone rubble which covered much of the site. A further post-built roundhouse was probably constructed soon after the rubble was laid down. Over a period of time this surface was covered with a midden deposit of sticky loam which incorporated very large amounts of cultural material comprising pottery, animal and human bone, shale and metalwork. Pits and scoops were dug into the accumulating debris, many penetrating the rubble surface. A single pit produced evidence for *in-situ* pottery making. Mixed agriculture was practised nearby.

Middle Iron Age (c. 400-150 BC)

A single large pit was located on Site 2; two brooches, pottery, animal bone and charred grain hint at specific intentional depositional infilling events.

Late Iron Age (c. 150 BC- AD 50)

Stone-footed roundhouses and associated pits were located on Sites 1 and 2. A single crouched female inhumation was recorded on Site 1. Two coins and a range of metalwork together with locally-produced and continental pottery were recorded on Sites 1 and 2.

Roman (c. AD 50-410)

A rectangular stone-built barn was constructed on Site 2 around the early 300s AD and was predominantly associated with shale working. A minimum of 20 infants were interred within the confines of the building. The presence of coins, brooches, tweezers, glass and pottery

confirms rural status with access to some high-value objects.

Post-Roman (c. AD 410-650)

A cemetery was set out on Site 3 where 26 east-west orientated burials were located. In addition to the single burials there were three double and one triple inhumation. The only grave good was a copper alloy buckle; a stone anchor was part of the grave furniture of a double grave. A number of graves utilised Roman stone roofing tiles. A single burial was located on Site 1.

Radiocarbon Dating

Introduction

In total, 17 radiocarbon samples from Football Field were processed and dated at the Scottish Universities Environmental Research Centre at East Kilbride. The samples comprised two carbonised plant macrofossils, seven of animal bone and eight of human bone.

The dating process is expensive: with limited financial resources, the project had to be realistic in choosing material for submission. A grant from the Dorset Archaeological Committee for the complete set of dates is gratefully acknowledged.

Objectives of the dating programme

The scientific dating programme was designed to address the following objectives:

- Date the infill of a potential Early Neolithic ditch
- Date a post-built roundhouse underlying the Late Bronze Age/Early Iron Age cobble layer.
- Date the accumulation of midden material on top of the cobble layer.
- Date pits cut into the midden and cobble layer.
- Refine the dating of a single Middle Iron Age pit together with a Late Iron Age pit which cut into it.
- Define the dating of a large Late Iron Age pit containing significant artefactual deposits.
- Date the stone-founded Roman barn.
- Date an isolated adult human burial on Site 1.
- Date Post-Roman cemetery activity on Site 3.

Sampling strategy

A range of material was available for radiocarbon dating but financial constraints meant that a limited number of samples could be submitted. These included charcoal, a charred grain and animal and human bone. Typically, the samples most suitable to provide the most reliable dates did not necessarily coincide with the stratigraphical units or finds which required dating. Consequently, a degree of pragmatism had to be exercised in the selection of materials for dating. Samples were selected on availability, suitability and condition. Single samples were selected from the infill of the Neolithic ditch, the Middle Iron Age pit, two Late Iron Age pits, the Roman barn and the isolated human burial.

Five samples associated with the Late Bronze Age/Early Iron Age midden deposit were selected with the objective of dating the duration of activity associated with this feature. These included a sample from a posthole from a post-built roundhouse which pre-dated and underlay the construction of the limestone rubble hard standing which made up the base of the midden deposit. Two samples related to the accumulation of the midden deposit itself and two samples were selected from pits which cut into the midden. One of the pits contained a fragment of continental glass and the other illustrated a complex infill sequence containing a range of ceramic material.

Six samples were selected from the Post-Roman cemetery in order to date the time frame of the burials and to attempt to define the spatial development of the site. Samples were chosen to reflect the linearity of the cemetery layout, the type of grave in which the individuals were buried and in two cases to date objects within the graves (a copper alloy buckle and a stone anchor). The human bones from the cemetery site were in poor condition, probably due to post-depositional soil conditions, which had to be taken into account in the selection of samples.

Results and calibration

The results are tabulated in Table 2 and are conventional radiocarbon ages (Stuiver and Polach 1977) which are cited according to Trondheim convention standards (Stuiver and Kra 1986). The ^{14}C ages are quoted in conventional years BP (before 1950 AD). The error which is expressed at the one sigma level of confidence includes components from the counting statistics on the samples, modern reference standard and blank and then random machine error. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration programme (OxCal4). The calibration plots were calculated using methods derived from Bronk Ramsey *et al* (2013) and Riemer *et al* (2013). All certificates and calibration curves are held in archive. Bayesian modelling was undertaken for the Post-Roman material and is discussed by Krus in Chapter 12.