Centre for Archaeological Fieldwork
School of Archaeology and Palaeoecology
Queen's University Belfast

Data Structure Report: No. 18.

Investigations at Grangemore, Co. Londonderry

AE/03/90

On behalf of

ENVIRONMENT AND HERITAGE SERVICE

Data Structure Report: Grangemore Dunes, Grange More, Co. Londonderry

Gill Plunkett

CAF DSR 018

SMR No: n/a

Grid Reference: Site 1: C80583519; Site 5: C80383517

Excavation Licence: AE/03/90

Contents **Page**

Page

List of Figures

List of Plates

List of Tables

1 Summary

1.1 A small-scale excavation was undertaken at Grangemore Dunes, Grange More, County Londonderry, during the period 11-14 August, 2003. Five areas of cultural activity had been identified by the Centre for Maritime Archaeology, University of Ulster, during the Centre's archaeological survey of the North Coast.

1.2 In view of the immediate threat posed to the sites by on-going cattle grazing on the dunes, a rapid investigation and recording of each site was warranted. Three of the sites, however (Sites 2, 3 and 4), fall within an ASSI and at the time of application for an excavation licence, consent to excavate in the area had not yet been obtained. The investigation therefore focussed on Sites 1 and 5.

1.3 The archaeological excavation was directed by Dr Gill Plunkett, School of Archaeology and Palaeoecology, Queen's University Belfast, on behalf of the Environment and Heritage Service: Built Heritage.

1.4 The primary objective of the excavation was to identify the nature and extent of the archaeological horizons identified by the Centre for Maritime Archaeology. It was envisaged that a record of the elevations of the sites would allow a comparative assessment of activity on the dunes in the past. In addition, the investigation offered the first opportunity to conduct scientific dating and palaeoenvironmental studies relating to sand dune archaeology in this area.

1.5 The investigations demonstrated prehistoric activity at Site 1, with possible evidence for flint working and/or domestic activity. Investigations at Site 5 failed to identify cultural layers and suggest that the site may already have been destroyed by erosion as a result of cattle grazing.

1.6 Recorded elevations on soil horizons at Sites 1, 2 and 5 indicate potentially contemporary activity. These findings warrant an urgent investigation of Site 2, which appears to be the most intact of the Grangemore sites, and a comparative study of the finds from the Grangemore sites.

2 Introduction

2.1 General

2.1.1 This report details the results of an archaeological investigation undertaken at Grangemore Dunes, Grange More, County Londonderry, during the period from 11-14 August, 2003. The work was conducted by the Centre for Archaeological Fieldwork, School of Archaeology and Palaeoecology, Queen's University Belfast, on behalf of the Environment and Heritage Service: Built Heritage.

2.2 Background

2.2.1 Five areas of archaeological activity (designated Sites 1 to 5) were identified in the Grangemore sand dune system, Co. Londonderry (Figure 1), by the Centre for Maritime Archaeology during its archaeological survey of the North Coast on behalf of the Environment and Heritage Service: Built Heritage. The horizons were exposed as a result of cattle grazing, and were directly threatened by this on-going activity.

2.2.2 Sites 1 and 5 are located to the south of the railway which transects the Grangemore Dunes (Figure 2). Site 1 consists of a stone setting, initially interpreted as a hearth, exposed in a section of a dune blow-out. Site 5 comprises a scatter of material (burnt stone, prehistoric pottery, flints and World War II bullets) at the base of a dune. The material at this site was *ex situ* and is presumed to derive from a higher location within the dune.

2.2.3 Sites 2, 3 and 4 are located to the north of the railway in an Area of Special Scientific Interest (Figure 2). Consent to investigate these sites had not yet been obtained from EHS: Natural Heritage at the time of application to excavate was being made to EHS: Built Heritage. As a result, examination of these three sites was limited to a survey and a record of their elevations. Site 2 represents a scatter of flints, burnt stone and pottery clearly deriving from a soil horizon exposed at ground level. At Sites 3 and 4, spreads of burnt stone, flint, prehistoric and Medieval pottery, and slag was recorded by the Centre for Maritime Archaeology. Surface finds at Site 3 were collected by Mr Malachy Conway, National Trust (Northern Ireland).

Figure 1 Location of Grangemore

Figure One: Grangemore location map

Figure 2 Location of sites

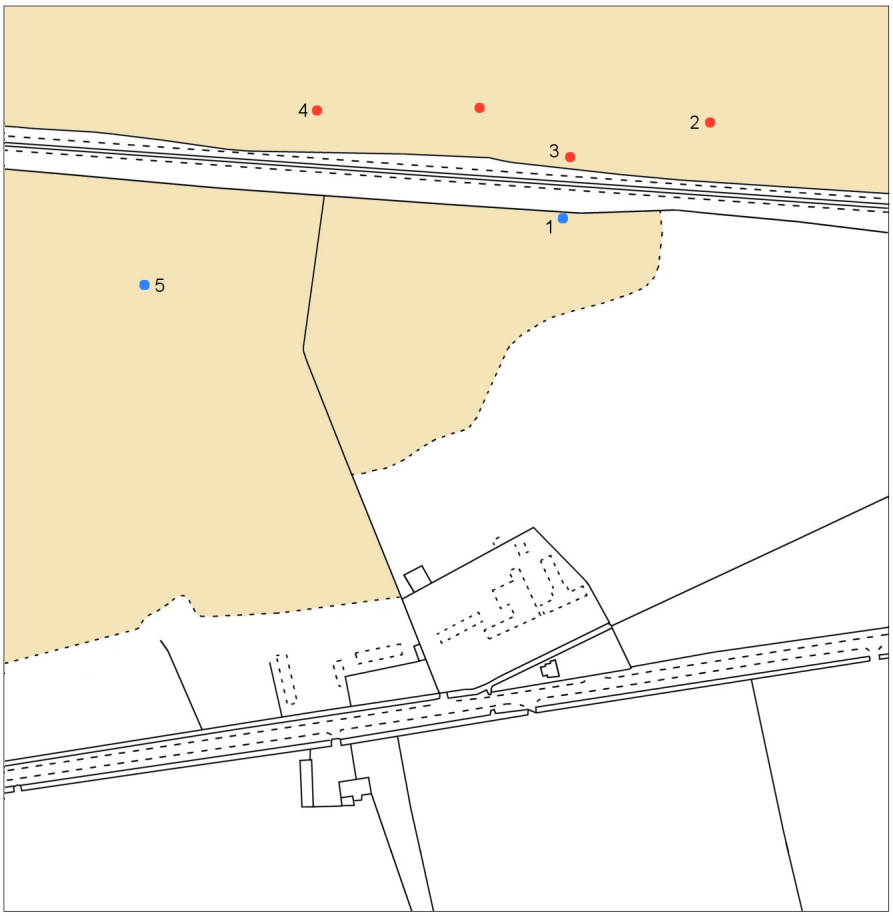

Figure Two: Grangemore location map (Scale - 1:2500)

2.3 Reason for Excavation and Research Objectives

2.3.1 A visit to the Grangemore sites by the Centre for Maritime Archaeology one month after their initial identification indicated that the sites were undergoing destruction as a result of cattle grazing in the area. A rapid investigation of the sites was therefore warranted before further damage was incurred.

2.3.2 Although cultural material has previously been recovered from Grangemore Dunes, this investigation marked the first opportunity to examine and record archaeological sites using a systematic and scientific approach.

2.3.3 The proposed excavation focused on Sites 1 and 5. The investigation aimed to identify the nature and extent of the archaeological material, with appropriate samples taken for dating and environmental analyses. In particular, it was envisaged that recorded elevations and environmental evidence could provide insights into the occupation and exploitation of the dunes in the past.

2.4 Previous work at Grangemore Dunes

2.4.1 Grangemore Dunes have been the focus of previous archaeological and palaeoenvironmental studies. The antiquarian W.J. Knowles published several accounts of finds from Grangemore (e.g. Knowles 1889; 1891; 1901), including a wide array of flint and stone objects, serpentine beads and a hearth. In addition, Hassé (1890) recorded a range of metal objects, pointing to later activity on the dunes, and remarked on the finds of a primitive slag possibly pointing to metal working, although refuted by Knowles (1901) as incidental to burning on iron-enriched deposits. May & Batty (1948) noted the recovery of Neolithic to Iron Age objects, including pottery, flints, bronze pins and beads, towards the north of the system (SMR no. LDY 003:040) associated with two occupation levels at elevations of 5.16 and 9.54 m OD (corrected to Belfast datum), respectively. To the south of the dunes, Mesolithic flints were recorded (SMR no. LDY 003:039) on a ridge at 6.74 m OD (May & Batty 1948).

2.4.2 Geomorphological research at Grangemore demonstrates that the dune system began to form some time before c. 4500-3800 cal. BC (5315±135 BP, UB-937), the earliest minimum age so far recorded for an Irish dune system (Hamilton & Carter 1983). This determination also provides a date for a phase of dune stabilisation, while at least two stratigraphically superior soil horizons indicate stabilisation at later dates. Archaeological evidence suggests that one such phase can be attributed to the Late Neolithic/Early Bronze Age (e.g. May & Batty 1948; see section 2.4.3). In addition, a date of 900-510 cal.

BC (2580±60 BP, Beta-62957, Wilson 1994) from an organic horizon in the vicinity of Sites 2, 3 and 4 of the present report points towards a similar phase in the Late Bronze Age, and is supported by further ^{14}C and thermoluminescence dates (P. Wilson, pers. comm.). Recorded elevations for this horizon imply a near horizontal ground surface at the time of soil formation (*ibid.*).

2.4.3 These studies place Grangemore Dunes firmly in the wider context of dune systems found in the region of the Bann Estuary. Immediately to the north, the Portstewart Dunes, of which the Grangemore system can be regarded as an extension (Wilson & McGourty 1999), have similarly revealed prehistoric occupation horizons (SMR nos LDY 003:001, LDY 003:043). To the west, Neolithic and Early Bronze Age finds have been recovered from the Castlerock Golf Course (SMR nos LDY 003:041, LDY 002:007).

2.5 Archiving

2.5.1 A copy of this report has been deposited with the Environment and Heritage Service: Built Heritage. All site records and finds are temporarily archived with the Centre for Archaeological Fieldwork within the School of Archaeology and Palaeoecology, Queen's University Belfast.

2.6 Credits and Acknowledgements

2.6.1 The excavation was directed by Dr Gill Plunkett.

2.6.2 Assistance and advice during the course of the excavation and in the preparation of this report was kindly provided by: Keith Adams (QUB), Thomas McErlean (UU), John Ó Néill (QUB), Peter Moore (QUB) and Colm Donnelly (QUB). Dr Peter Wilson (UU) provided valuable technical information on sand dune geomorphology and has kindly agreed to undertake environmental analyses on samples from the excavation. Thanks also to Cathy Dunne and Dermot Moore for their comments on the finds from Site 1.

2.6.3 The illustrations in this report were prepared by Keith Adams and Bronagh Murray of the Centre for Archaeological Fieldwork.

3 Excavation

3.1 Methodology

3.1.1 Excavation was undertaken from the 11-14 August, 2003. Mr Thomas McErlean, Centre for Maritime Archaeology, University of Ulster, provided an introduction to the sites on the ground, pointing out their locations and commenting on changes which had occurred since the sites were first identified in May, 2003.

3.1.2 Surface finds at Site 5 (see section 2.2.2) had been collected and recorded by Mr Danny Rhodes, an MSc student at the University of Ulster. The material was located *ex situ* at the base of a blow-out, however, and is assumed to have eroded from the edge of the adjacent dune. Excavation at Site 5, therefore, entailed an investigation of a buried soil horizon exposed in section on the west-facing slope of the dune (Plate 1). Two trenches were opened up across this layer to establish if archaeological activity could be detected.

3.1.3 Investigations at Site 1 comprised the excavation of sand horizons down to the level of the archaeological feature which was exposed in an eroded section of a sand dune. The extent of the archaeology was recorded, while a series of elevated sections enabled the site to be considered in context.

3.1.4 The excavations were undertaken by hand and a context record for each site was created using standard context recording methods. Individual features and deposits were photographed prior to and following their excavation and included in a series of overall sections and plans (Scale 1:10), prepared throughout the course of the excavation. Soil colours were recorded using a Munsell soil chart. For details of site photography, see Appendix Three, and for field illustrations, see Appendix Four. In addition to photography and illustration, the principal site records consisted of context sheets augmented by separate registers of small finds (Appendix Five) and samples (Appendix Six).

3.1.5 The locations and elevations of the sites, including Sites 2, 3 and 4, in the ASSI, were recorded by an EDM survey.

3.2 Account of the excavations

3.2.1 The following section provides an account of the excavations at Sites 1 and 5. It is recommended that the Harris Matrices for the sites (see Appendix Two) and Figures 3-9 are referred to while reading the following account of the stratigraphic sequences revealed at both sites.

3.3 Site 5

3.3.1 A trench measuring 1.5 m (N-S) x 1 m (E-W) was opened through an overlying, wind-blown sand (Context 101) which covered the western face of the sand dune. Immediately below this sand (approximately 0.7 m in depth but subject to variations), the upper layer of a buried soil horizon (Context 102) was evident. At this point, the total width of the trench (N-S) was reduced to 1 m to provide 'shelves' either side of the trench in order to prevent loose sand tumbling into the excavated area from the dune surface. The buried soil horizon, brown in colour and measuring 0.22 m in thickness, contained occasional charcoal flecks but no discernible archaeological material.

3.3.2 As excavation of the soil horizon progressed downwards, a change to a dark yellowish brown sand (Context 103) was observed. Similar in texture to Context 102, charcoal flecks were no longer apparent. On-site dry-sieving of a sample of this material indicated no inclusions > 3 mm. The context was approximately 80 mm in thickness. No archaeological material was evident.

3.3.3 Below Context 103, the soil horizon returned to a dark brown sand (Context 104), similar to Context 102 and again containing occasional charcoal flecks but devoid of archaeological remains. This layer was 0.24 m thick and constituted the base of the soil horizon. It rested on a yellowish brown sand (Context 105). The latter was at least 0.3 m in depth and was interpreted as a natural wind-blown sand accumulation. As further excavation was not deemed necessary, the back section of the trench was drawn (Scale 1:10; Figure 3) and photographed (Plate 2).

3.3.4 Bulk samples were taken from each layer (Contexts 102, 103, 104) of the soil horizon. It is expected that careful sieving of the samples will provide material suitable for AMS ^{14}C dating. It is also hoped environmental analyses of the macroscopic remains may also shed light on any activity which took place at this location during the period of soil formation. Additional small samples (c. 0.5 kg) were collected for a range of more detailed environmental analyses (e.g. phosphate, organic, pollen contents).

3.3.5 A second trench (Trench 2) was opened 2.5 m to the north of Trench 1. The trench measured 0.75 m in width (N-S). A stratigraphy comparable to Trench 1 was observed, but differences in the depths of individual contexts were noted. Although the boundary between the two was obscure, Context 102, now measuring only c. 0.11 m in depth, rested on a significantly thicker (0.4 m) Context 103. Once again, no archaeological remains were evident. The back section of the trench was photographed.

Plate 1 Site 5 overview

Plate 2 Site 5, section 1

Plate 1 General view (from south) of buried soil horizon exposed in dune at Site 5

Plate 2 Site 5, Trench 1, Section 1 (from southwest)

Figure 3 Site 5 Section 1

Figure 4 Site 1 Section 1

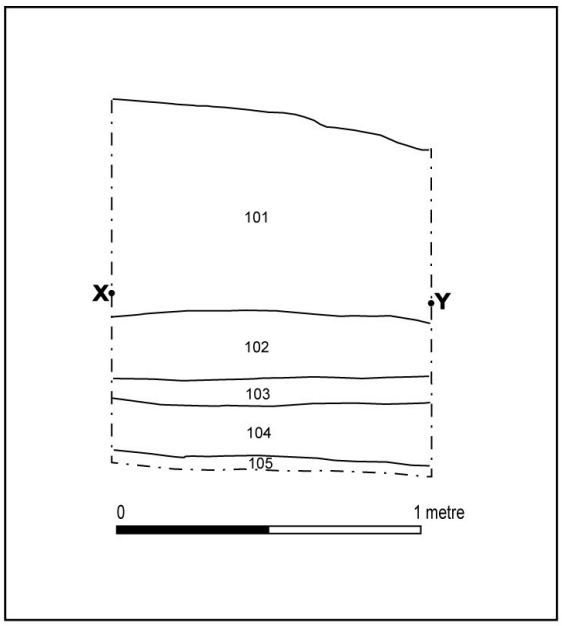

Figure 3 Site 5, Trench 1, SW-facing section.

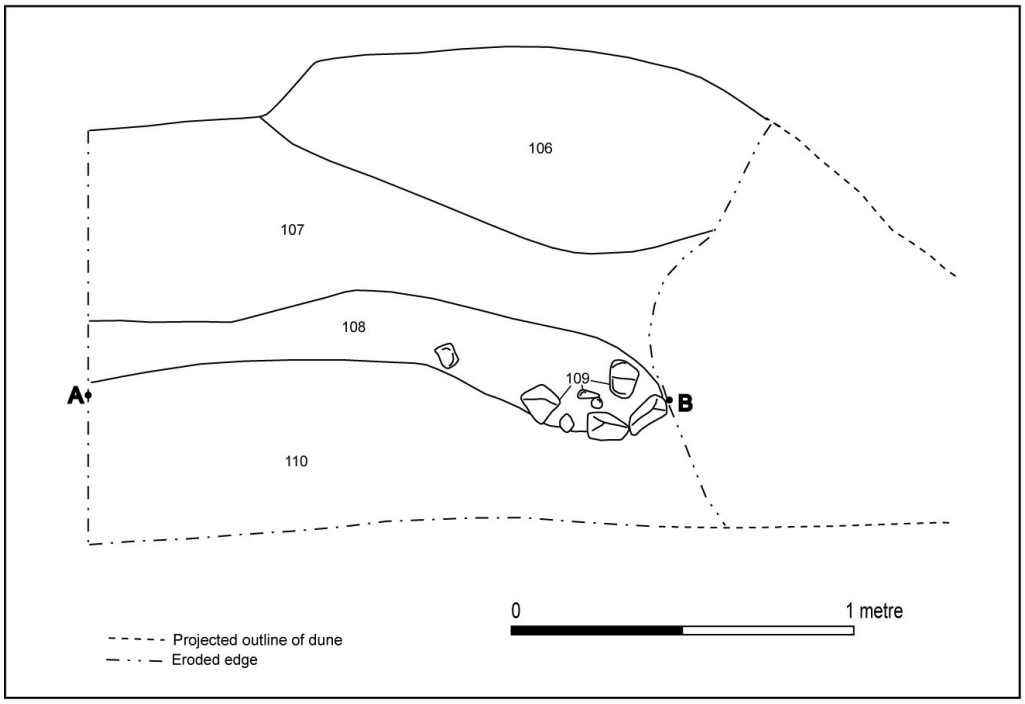

Figure 4 Site 1, section 1, SW-facing

3.3.6

The combined Contexts 102, 103 and 104 constitute a brown podzolic soil horizon, with the lighter-coloured Context 103 perhaps indicating a period of increased sand accumulation during a period of stability in dune formation. The soil horizon was traced in section to the north and south across a total length of 15 m. On the eastern slopes of the dune, 12 m to the northeast of Trench 1, a soil horizon was also noted. A spot height was taken on this layer for comparison with levels recorded in Trench 1 (see section 3.5).

3.4 Site 1

3.4.1 Site 1 was exposed in section at the edge of a blow-out of a sand dune. A number of stones (Context 109), some of which showed evidence of burning, were visible within a buried podzol layer (Context 108). At least three stones were found *ex situ* at the base of the section on arrival at the site.

3.4.2 A gorse bush growing on the dune above the site presented an obstacle to the investigation. In the interest of examining in full the extent of the archaeology, it was decided to remove the bush by systematically lopping the branches and root system, taking care not to disturb the archaeological remains below. This enabled an elevated section (Section 1) of the dune to be cleaned to the northwest of the stone setting (Context 109). Erosion of the sand dune prohibited a continuation of the section to the southeast. The section was drawn (Scale 1:10; Figure 4) and photographed (Plate 3).

3.4.3 Following approximately the eroded edge at the southeast of the stone feature (Context 109), a second elevated section (Section 2) was cut perpendicular to Section 1. This section enabled the feature to be viewed from a second angle, and was drawn (Scale 1:10; Figure 5) and photographed (Plate 4). As an effective extension to the Section 1 profile, a further section (Section 3) was cleaned perpendicular to Section 2, extending to the southeast. The section was drawn (Scale 1:10; Figure 6) and photographed (Plate 5).

3.4.4 Plate 6 shows an overview of the excavated area. The combined sections revealed a series of sand layers, including identifiable soil horizons. Beneath the gorse bush, a greyish brown sand (Context 106) formed a soil horizon associated with current sand dune vegetation. The soil was interlaced with modern plant roots and was up to 0.4 m thick. A rabbit burrow (Context 111) ran E-W through this layer from the eastern side of the gorse bush (see Plate 5), and partially cut through to the underlying brown sand (Context 107). The latter was 0.33 m thick, containing very occasional charcoal flecks and, in parts, heavily penetrated by modern plant root systems. The layer appeared to represent wind-blown sand, with no visible evidence for leaching from the overlying soil horizon (Context 106).

Figure 5 Site 5 Section 2

Figure 6 Site 1 Section 3

Figure 7 Site1 Section 4

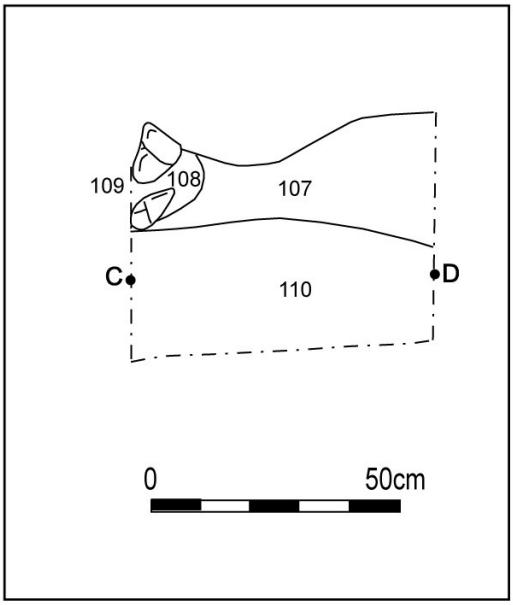

Figure 5 Site 1 Section 2, SE-facing

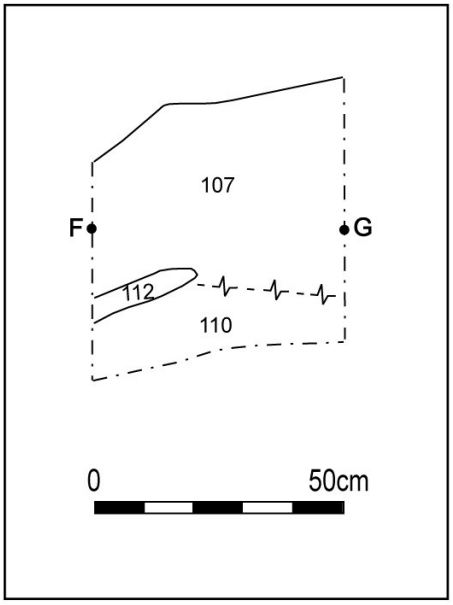

Figure 7 Site 1, Section 4, SE-facing

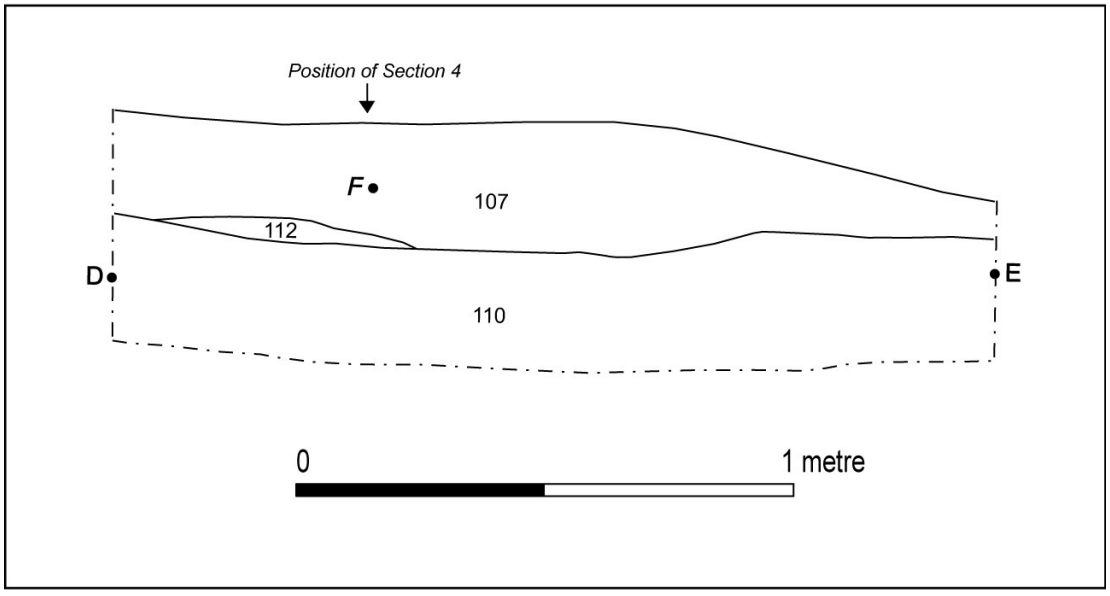

Figure 6 Site 1, Section 3, SW-facing

Plate 3: Site 1, section 1

Plate 4 Site 1 Section 2

Plate 3 Site 1, stone feature (Context 109) as seen in Section 1 after removal of much of the overlying gorse bush (viewed from southwest). Inset shows detail of stone feature

Plate 4 Site 1, Section 5, from southeast

Plate 5 Site 1, section 3

Plate 6 general overview

Plate 5 Site 1, Section 3, showing remnants of a former soil horizon (Context 112) (from southwest)

Plate 6 Site 1, overview of site during excavation (from southeast)

3.4.5 Beneath Context 107, a buried soil horizon (Context 108) was evident in Section 1, where it measured 0.26 m in depth. The soil abutted and partially covered the stone feature (Context 109). Section 2 demonstrated, however, that the soil horizon did not extend eastwards beyond the stone feature. An approximately L-Shaped area, extending to the northwest and east of the stone setting, was therefore excavated to the level of the soil horizon (Context 108) to trace its extent (Figure 8). The horizon was found to overlie and abut the stone feature (Context 109), but as Section 2 suggested, it petered out at the eastern edge of the stone setting. The layer was excavated by trowelling, leading to the recovery of several small finds of flint (SF 3-7, 11) dispersed throughout the context. Occasional charcoal inclusions were also noted. A small bulk sample of sand was collected from the area immediately above the stone setting for comparison with two further bulk samples from the context, collected for macrobotanical analyses. A further small sample was also collected for specific chemical and microscopic analyses.

3.4.6 As excavation of the soil horizon (Context 108) proceeded, further stones associated with the feature (Context 109) became apparent (Plates 7-8). The stones ranged from angular to sub-rounded, and from c. 30-130 mm in size. With the exception of an outlier 20 cm to the NW, the stones were generally concentrated in a small grouping, deposited up to 4 stones deep, with no discernible pattern of distribution. A number of stones showed indications of having been subject to heating, but evidence for *in situ* burning was absent.

3.4.7 Following planning (Scale 1:10; Figure 8) and photographing of the stone feature (Context 109), each stone was removed by hand, and a selection of stones were sampled. The intermingling of the soil horizon (Context 108) with the stones suggested that the two were at least partially contemporary. A small number of pot sherds were recovered (SF 2, 8-10) from within the setting. A flint flake (SF 1) also derived from the soil horizon (Context 108) which surrounded the upper stones of the feature. Removal of the upper stones revealed a concentration of a fine, black soil irregularly distributed amongst the stones. At a slightly lower level, a similar material but dark grey in colour was evident. Both soils were sampled in full for environmental examinations. The lowermost stones were found to sit directly on an underlying yellowish brown sand (Context 110).

3.4.8 In contrast to the generally irregular positioning of stones, it was noted that a flat-surfaced stone sat centrally at the base of the feature, with two others adjacent at a slightly tilting angle (Plate 9). The arrangement hinted at a more ordered placement of stones. Removal of the stones revealed a regular circular depression (Context 113), approximately 0.28 m in diameter and 0.2 m in depth (Figure 9). The depression appeared to have been cut into the sand layer Context 110 and strengthened the impression that the feature was a deliberate construction. The cut was drawn (Scale 1:10) and photographed.

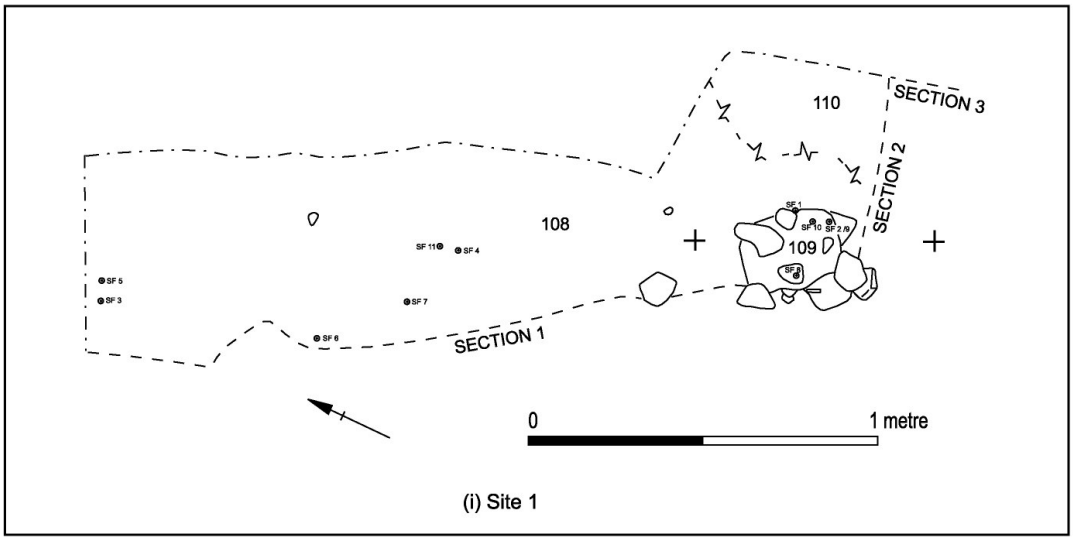

Figure 8 Site 1, plan of excavated area, showing stone setting (Context 108), extent of soil horizon (Context 109) and location of small finds. + indicates overlap with Figure 9.

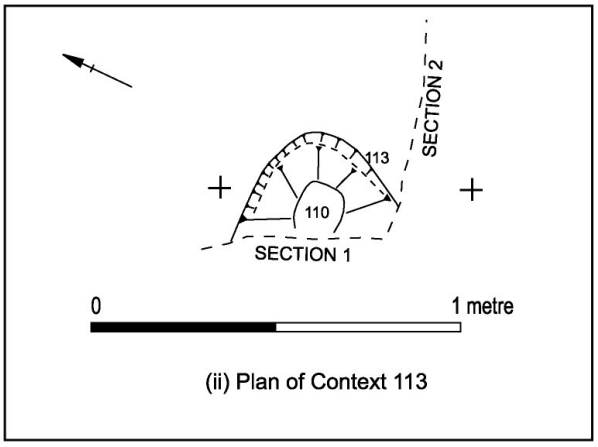

Figure 9 Plan of cut (Context 113) into which stone feature had been inserted. + indicates overlap with Figure 8

Plate 7 Stone setting (scan)

Plate 8 Basal stones (scan)

Plate 7 Detail of stone feature (Context 109) during excavation (from northwest)

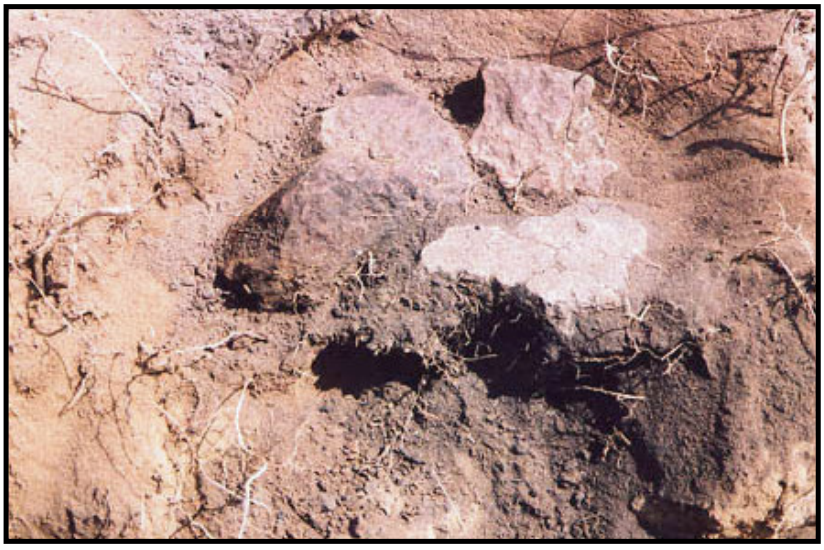

Plate 8 Detail of basal stones in feature (Context 109)

Following discussion with Dr Peter Wilson (UU), it was determined that the yellowish brown sand (Context 110) seen throughout the base of the dune represented a podzol layer into which iron had leached from the overlying soil horizon (Context 108). Its occurrence beyond the southern limits of Context 108 implied that the latter had been eroded in antiquity. In section 3, a lens of brown sand (30 mm thick, 0.43 m in length NW-SE) above Context 110 could therefore be equated with the soil horizon (Context 108) and was interpreted as a ferric podzol. Towards the south of the dune, Context 110 was darker in colour and showed a more cemented consistency *in situ*, representing a higher degree of podzolisation.

3.4.9 With the possibility that erosion of the soil horizon had occurred as a result of human activity associated with the stone feature (Context 109), it was decided to insert a test trench (0.5m NE-SW, 0.4 m NW-SE) at the southern limit of the soil horizon (Context 112) seen in Section 3. Excavation of the trench demonstrated the limited distribution of Context 112, which petered out gradually approximately 0.2 m back from Section 3. A single stone (unworked) was uncovered from the interface of Contexts 107 (the overlying sand layer), Context 112 and the ferric podzol (Context 110). Evidence for human activity associated with the erosion of the soil horizon (Context 108/112) was otherwise lacking. The southeast-facing section (Section 4) of the test trench was drawn (Scale 1:10; Figure 7) and photographed.

3.4.10 The removal of the upper layers of ferric podzol (Context 110) showed no indications of cultural remains, and the layer was not excavated further. A bulk sample of Context 110 was taken for a range of environmental analyses. In addition, two sequences of samples, each 2 cm deep, were extracted across the podzol horizons (Contexts 108, 110) at 5 cm intervals for palaeoenvironmental analyses.

3.5 Surveying

3.5.1 An EDM survey was carried out to tie the areas of investigation into the landscape and to record the elevations of the sites in relation to a Ordnance Survey benchmark at Pottagh House to the southwest of the dune system. Principal elevations recorded are presented in Table 1.

3.5.2 At Site 1, levels were taken on section points, and on selected areas of the investigated areas and the surrounding dune. The elevation of the soil horizon (Context 108, upper surface) was found to lie at an average height of 8.05 m OD (Belfast), and the stone feature was located between c. 7.6-7.9 m OD.

3.5.3 At Site 5, levels were recorded for the section points at Trench 1, as well as on the soil horizon to the north and south of the investigated areas. The results indicate that the upper level of the soil horizon ranges from 8.8 m OD at the north of the eroding dune sloping down to 7.9 m OD at the south. In addition, the soil horizon seen in section on the eastern face of the dune was recorded at an elevation of 10.7 m. It is not clear if this indicates a significant undulation in a single soil horizon, or if more than one such feature is represented within the dune. It is notable, however, that no soil horizon was observed above the level of the investigated podzol on the western slope of the dune.

Table 1 Elevations (m OD Belfast) recorded at Grangmore Dunes

Site	Location	Height
Site 5	Section line X-Y	8.57
	Surface of podzol at N	8.77
	Surface of podzol at S	7.91
	Surface of podzol at E	10.75
Site 1	Section line A-B	8.04
	Section line C-D	7.69
	Section line D-E	7.69
	Section line F-G	7.84
	Top of stone feature (C. 109)	7.86
Site 2	Top of soil horizon	8.53
Site 3	Position of *ex situ* finds	5.66
Site 4	Position of *ex situ* finds	4.35
Other	Spot height 1	7.00
	Spot height 2	5.65

3.5.4 Elevations were also recorded at Site 2 (8.53 m OD), Site 3 (5.66 m OD) and Site 4 (4.35 m OD) north of the railway. The lower elevations at Sites 3 and 4 strongly suggest that the *ex situ* artefacts are derived from an upper level in the adjacent dunes.

3.5.5 A spot height (Spot height 1) was taken at a location which corresponds to the site from which Wilson (1994) obtained ^{14}C dates from the podzol. A height of 6.997 m OD was recorded and can be compared to that obtained by Wilson (7.72 m). The difference in height between the two may be explained either by localised undulations in the ground surface, or by subsequent erosion of the upper levels of the podzol since Wilson's study.

3.5.6 A spot height (Spot height 2) was also taken on the field surface to the southeast of the dune system (5.65 m OD).

4 Discussion

4.1 Introduction

4.1.1 Investigations at Sites 1 and 5 in Grangemore Dunes reflect localised activity in the prehistoric period. Elevations obtained for all sites identified by the Centre for Maritime Archaeology provide information which allows inferences about contemporaneity of activity in different areas to be put forward.

4.2 Discussion

4.2.1 The finds discovered *ex situ* at Site 5 include pottery, burnt stone and flints, representative of prehistoric activity. World War II bullets suggest that the dune was possibly used as a practice range in the recent past (T. McErlean, pers. comm.). Investigations of the buried soil horizon at a higher level in the sand dune failed to reveal any firm evidence of archaeological activity, although charcoal remains were present in the upper levels of the soil horizon. No other soil horizons were evident in the slope of the dune, although it is conceivable that wind-blown sand could have obscured such features. The elevation of the investigated horizon, however, can be compared to the archaeological levels at Sites 1 and 2, and strongly suggests that the *ex situ* material derived from this level. It is possible that a small occupation area has by now been entirely destroyed by cattle grazing and sand erosion. A detailed examination of the finds from this area could potentially reveal the likely date of activity, and its relationship to other sites at Grangemore.

4.2.2 At Site 1, investigations revealed no evidence of *in situ* burning associated with the stone setting. In contrast to preliminary interpretations, therefore, it seems unlikely that the feature represents a hearth. Nevertheless, the stones appear to have been placed in a small depression, arguably too regular to have formed naturally or simply as a result of the weight of stones above. The basal stones within the feature also hint at a deliberate positioning, and as such, the setting may have been intended to provide a stable or partially protected surface for activities. An analysis of the small soil deposits found within the stone setting is necessary to elucidate the origin of this material, but the irregular distribution of stones in the upper part of the feature suggest that the site may have been used as a dumping area prior to abandonment. Although no further archaeological features were noted during the excavation, stones within the feature and a large proportion of the flints show indications of burning, and suggest that a hearth at least may have been locally present. The site may, therefore, have been part of a wider area of activity, evidence for which might remain concealed within the sand dune, if not already lost by substantial erosion.

4.2.3 Plain pot sherds were recovered from the stone setting. The fabric is finely-made and well-fired, and shows characteristics of Late Neolithic/Early Bronze Age pottery, although a later ware cannot be ruled out (C. Dunne, pers. comm.). A worked flint was also recovered from the feature, while several pieces were found within the apparently contemporary soil horizon (Context 108). The larger flints are Neolithic in nature, and the flint chips suggest localised flint working (D. Moore, pers. comm.).

4.2.4 The limited artefactual evidence, therefore, hints at a Late Neolithic/Early Bronze date for Site 1. Interestingly, finds of this date have been recovered in the neighbouring Portstewart and Ballywoolen dunes (LDY 003:001, LDY 003:043, LDY 002:007), albeit at a lower level of 5-6 m OD at the former location (May & Batty 1948). A Late Neolithic/Early Bronze Age date is surprising, however, in view of the Late Bronze Age dates obtained by Wilson (1994) for a soil horizon at a comparable elevation c. 150 m to the northeast (see section 2.4.3). It is not implausible, however, that the flints at Site 1 were re-used from earlier deposits, and dating of the pottery is not as yet conclusive. It is also possible, on the other hand, that soil formation at these sites is asynchronous. A detailed analysis of the pottery and an independent AMS ^{14}C date from the soil horizon at Site 1 is required to clarify this issue.

4.2.5 Archaeological activity at Sites 1 and 2, located less than 100 m apart, occur at 7.8-8.5 m OD, respectively, and conceivably date to approximately the same period. Future investigations at Site 2, which for the moment appears to be largely intact, may very well yield greater information about the nature of activity on the sand dunes at this time. Comparative studies of finds from all five sites could establish if the *ex situ* artefacts at Sites 3, 4 and 5 are likely to have derived from a similar level.

4.2.6 Elevations on the podzols at Sites 1, 2 and 5 range from 7.9-8.8 m OD, and support Wilson's (1994) suggestion of a near-horizontal land surface. On the other hand, a height of 10.7 m OD is recorded for one horizon near Site 5 and may indicate a slightly more pronounced dune topography.

4.3 Conclusions

4.3.1 Although of limited scale and duration, the excavation programme at Grangemore Dunes represents the first systematic examination of sand dune occupation in the prehistoric period in this area. Environmental samples have been collected and can potentially shed further information on the nature of activity at the sites, as well as on the development of the sand dune system in general. Importantly, samples obtained from Site 1 provide an

opportunity to obtain for the first time independent dates for the occupation and use of these dunes.

4.3.2 Site 1 at Grangemore Dunes comprises a stone setting perhaps associated with wider activity involving flint working and/or domestic activity. The site had been subject to erosion prior to investigation, however, and the surviving remains were limited in extent. The comparable elevation of the nearby Site 2 suggests that the two sites may have been broadly contemporary. In this respect, investigations at Site 2 have the potential to reveal further important evidence about the nature of activity on the sand dunes.

4.3.3 Evidence for *in situ* occupation at Site 5 was not forthcoming, although the elevations recorded for the investigated soil horizon suggests that it may be broadly contemporary with activity at Site 1. With comparable elevations also recorded at Site 2, the combined evidence hints at the widespread exploitation of the sand dunes in the past. The date of this activity has yet to be established but an analysis of the finds collected from all sites could undoubtedly shed much light on this hypothesis.

5. Recommendations for further work

5.1 Surface finds collected from the Grangemore sites prior to the current excavation have not been subject to any formal examination. Detailed studies of these finds will allow an assessment of the relationship of the sites, in terms of function and contemporaneity, to be undertaken, and the assemblages can now be examined in the light of finds recovered *in situ* from Site 1. It is therefore recommended that full, specialist studies of the flints and pottery from all five sites be undertaken.

5.2 Bulk soil samples have been obtained from Sites 1 and 5 for the purpose of both dating and environmental analyses. Samples from Site 1 may reveal important evidence relating to the nature of activity at the site. Although no structural remains were found at Site 5, an examination of the bulk soil samples from the soil horizon could shed light on any occupation which took place in the vicinity and can be compared to those from Site 1.

5.3 Charcoal and possibly plant macrofossil remains from Site 1 offer the possibility of obtaining an AMS ^{14}C date for occupation of the sand dunes. Importantly, such a date will be the first independent determination for occupation of the sand dune systems in the Bann Estuary area, and will provide a firm basis for comparative studies of sand dune archaeology both in the immediate area and in a national context.

5.4 Chemical analyses are currently being undertaken on selected samples from Site 1 by Dr Peter Wilson, University of Ulster, and Dr Gill Plunkett. It is hoped that this research will contribute to the current understanding of sand dune formation, and will provide rare information about the environment in which prehistoric activity in these areas took place. A study of the parallel, pollen samples from the site will greatly compliment these analyses.

5.5 Up to three further areas of archaeological activity are known within the ASSI at Grangemore Dunes. At least one of these sites (Site 2) remains *in situ* but is in immediate danger of erosion as a result of cattle grazing. Further archaeological investigations are urgently required to record these sites before further damage and loss of evidence is sustained. A prompt investigation of the site could enable the results of the excavation to be combined with those of the current project.

5.6 In view of the presence of burnt stone and possibly pottery at these sites, it is strongly recommended that future research designs for sand dune excavations consider the application of thermoluminescence dating in advance of investigation. This method can compliment standard ^{14}C dating, and offers the potential to overcome difficulties presented by the calibration of ^{14}C dates.

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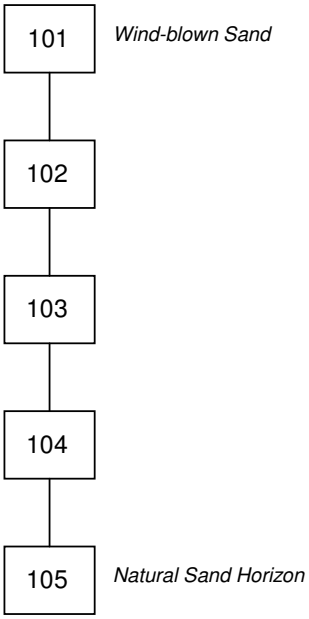
Appendix One: Context list

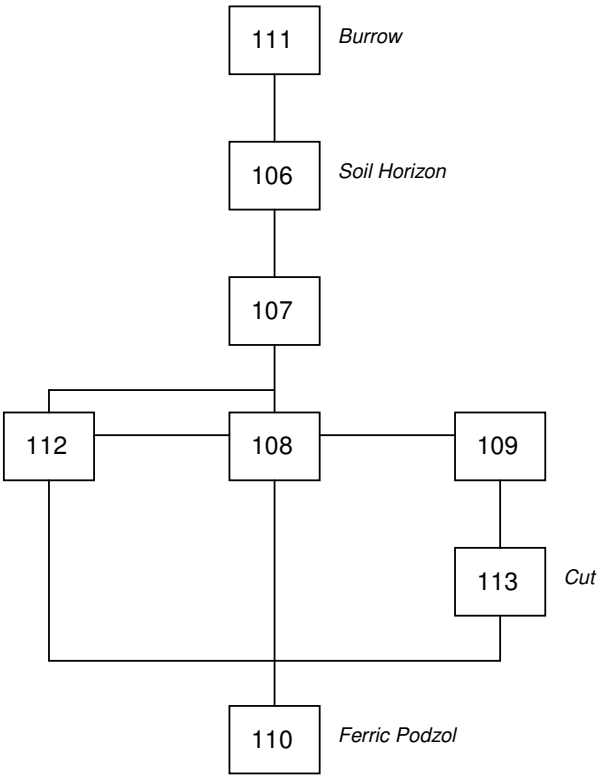
Context No.	*Site*	*Trench No.*	*Description (Munsell soil colour)*
101	5	1 and 2	Sand layer, yellowish brown (10YR 5/4)
102	5	1 and 2	Buried soil horizon, sand, mid-brown (10YR 4/3)
103	5	1 and 2	Buried soil horizon, sand, dark yellowish brown (10YR 4/4)
104	5	1 and 2	Buried soil horizon, sand, dark brown (10YR 3/3)
105	5	1 and 2	Sand layer, yellowish brown (10YR 5/6)
106	1		Soil horizon, sand, greyish brown (10YR 5/2)
107	1		Sand layer, sand, brown (10YR 5/3)
108	1		Buried soil horizon (= context 112), sand, very dark greyish brown (2.5YR 3/2)
109	1		Stone setting
110	1		Buried soil horizon, sand, yellowish brown-dark yellowish brown (10YR 5/8-7.5YR 4/6)
111	1		Rabbit burrow (recent)
112	1		Buried soil horizon (= context 108), sand, brown (10YR 4/3)
113	1		Cut associated with context 109

Appendix Two: Harris Matrices

Site 5



Site 1



Appendix Three: Photographic Record

Digital Images

DSCN0897	Site 5: General view of buried soil horizon prior to investigation. Viewed from W.
DSCN0898	Site 5: General view of buried soil horizon prior to investigation. Viewed from W.
DSCN0899	Site 5: General view of buried soil horizon prior to investigation. Viewed from SW.
DSCN0900	Site 5: General view of buried soil horizon prior to investigation. Viewed from SW.
DSCN0901	Site 5: General view of buried soil horizon prior to investigation. Viewed from S.
DSCN0902	Site 5: Detail of buried soil horizon. Viewed from SW.
DSCN0903	Site 5: Detail of buried soil horizon. Viewed from SW.
DSCN0904	Site 5: Buried soil horizon (Context 102) exposed in Trench 1. Viewed from above.
DSCN0905	Site 5: Buried soil horizon (Context 102) exposed in Trench 1. Viewed from above.
DSCN0906	Site 5: Buried soil horizon (Context 102) exposed in Trench 1. Viewed from above.
DSCN0907	Site 5: Trench 2, showing Contexts 101-105. Viewed from SW.
DSCN0908	Site 5: Trench 2, showing Contexts 101-105. Viewed from SW.
DSCN0909	Site 5: View of Trench 1, showing Contexts 101-105. Viewed from SW.
DSCN0910	Site 5: Trench 2, showing Contexts 101-105. Viewed from SW.
DSCN0911	Site 5: Trench 2, showing Contexts 101-105. Viewed from SW.
DSCN0912	Site 1: Stone setting (Context 109) in section prior to excavation. Adjacent section has been cleaned and overlying gorse bush pruned. Viewed from SW.
DSCN0913	Site 1: Stone setting (Context 109) in section prior to excavation. Adjacent section has been cleaned and overlying gorse bush pruned. Viewed from SW.
DSCN0914	Site 1: Stone setting (Context 109) in section prior to excavation. Adjacent section has been cleaned and overlying gorse bush pruned. Viewed from SW.
DSCN0915	Site 1: Focus on stone setting (Context 109) in section prior to excavation. Viewed from SW.
DSCN0916	Site 1: Stone setting (Context 109) in section. Viewed from SW.
DSCN0917	Site 1: Stone setting (Context 109) in section. Viewed from SW.
DSCN0918	Site 1: Focus on stone setting (Context 109) in section. Viewed from SW.
DSCN0919	Site 1: View of stone setting (Context 109) in section. Viewed from S.
DSCN0920	Site 1: View of site after removal of gorse bush and cleaning of Section 1. Viewed from S.
DSCN0921	Site 1: Section 2, showing contexts 107, 109, 110. Viewed from SE.
DSCN0922	Site 1: Section 2, showing contexts 107, 109, 110. Viewed from SE.
DSCN0923	Site 1: Section 3, showing Contexts 107, 112, 110. Viewed from SW.
DSCN0924	Site 1: Section 3, showing Contexts 107, 112, 110. Viewed from SW.
DSCN0925	Site 1: Section 3, with focus on soil horizon (Context 112). Viewed from SW.
DSCN0926	Site 1: Section 3, showing Contexts 107, 112, 110, with view of stone setting (Context 109) in Section 1 to the north. Viewed from SW.

DSCN0927 Site 1: overview of site during excavation, with Keith Adams in view. Viewed from SSW.

DSCN0928 Site 1: overview of site during excavation, with Keith Adams in view. Viewed from SSW.

DSCN0929 Site 1: overview of site during excavation, with Keith Adams in view. Viewed from SSW.

DSCN0930 Site 1: overview of site during excavation, with Keith Adams in view. Viewed from SSW.

DSCN0931 Site 1: overview of site during excavation. Viewed from SSW.

DSCN0932 Site 1: overview of site during excavation. Viewed from SSW.

DSCN0933 Site 1: General view of excavated area, showing positions of Sections 1, 2 and 3. Viewed from SE.

DSCN0934 Site 1: General view of excavated area, showing positions of Sections 1, 2 and 3. Viewed from SW.

DSCN0935 Site 1: General view of excavated area, showing positions of Sections 1, 2 and 3. Viewed from SE.

DSCN0936 Site 1: Detail of stone setting (Context 109) during excavation, showing basal stones *in situ*. Viewed from SW.

DSCN0937 Site 1: Detail of stone setting (Context 109) during excavation, showing basal stones *in situ*. Viewed from SW.

DSCN0938 Site 1: Detail of stone setting (Context 109) during excavation, showing basal stones *in situ*. Viewed from above.

DSCN0939 N/A

DSCN0940 Site 1: Oblique view of Section 4, showing contexts 107, 112, 110. Viewed from SE.

DSCN0941 N/A

DSCN0942 Site 1: Rabbit burrow (Context 111) cutting through modern soil horizon (Context 106) in section. Viewed from SE.

DSCN0943 Site 1: Rabbit burrow (Context 111) cutting through modern soil horizon (Context 106) in section. Viewed from SE.

Colour Print

1	Site 1: Oblique view of stone feature (Context 109) from SE
2	Site 1: Oblique view of stone feature (Context 109) from NW
3	Site 1: Vertical detail of basal stones in stone feature (Context 109)
4	Site 1: Oblique detail of basal stones in stone feature (Context 109) from NW
5	Site 1: Oblique view of cut (Context 113) associated with stone setting (Context 109) from NW
6	Site 1: View of principal stones removed from stone feature (Context 109)
7	Site 1: View of principal stones removed from stone feature (Context 109)
8	Site 1: View of Section 4, showing limited extent of buried soil horizon (Context 112)

Appendix Four: Field Drawing Register

Drawing Nos.	***Scale***	***Type***	***Date***	***Description***
1	1:10	Section	12.08.03	SW-facing section of Trench 1, Site 5 showing contexts 101, 102, 103, 104, 105
2	1:10	Elevation	12.08.03	SW-facing section (Section 1), Site 1, showing profiles of contexts 106, 107, 108, 109, 110
3	1:10	Elevation	13.08.03	SE-facing section (Section 2), Site 1, showing profiles of contexts 107, 108, 109, 110
4	1:10	Elevation	13.08.03	SW-facing section (Section 3), Site 1, showing profiles of contexts 107, 110, 112. Position of Section 4 indicated.
5	1:10	Plan	13.08.03	Plan of excavated area at Site 1, showing contexts 108, 109, 110, and locations of small finds associated with contexts 108, 109. Positions of sections 1, 2 and 3 indicated.
6	1:10	Plan	13.08.03	Plan of context 113, following removal of context 109
7	1:10	Elevation	13.08.03	SE-facing section (Section 4), showing profiles of contexts 107, 110, 112

Appendix Five: Small Finds Register

Small Find No.	***Description***	***Site No.***	***Context No.***
1	Flint, burnt?	1	108/109
2	Pot, body sherd	1	108/109
3	Flint	1	108
4	Flint chip	1	108
5	Flint chip	1	108
6	Flint chip, burnt	1	108
7	Flint chip, burnt	1	108
8	Pot, body sherd	1	109
9	Pot, body sherd	1	109
10	Pot, body sherd	1	109
11	Flint chip, burnt	1	108
12	*Ex situ* flint collected from surface	2	n/a

Appendix Six: Samples Record

Sample No.	***Site No.***	***Context No.***	***Comment***
1	5	103	Fresh insect (fly) material collected for reference purposes
2	5	104	Fresh insect (fly) material collected for reference purposes
3	5	102	Bulk sample for charcoal, plant and insect extraction
4	5	102	Bulk sample for charcoal, plant and insect extraction
5	5	102	Small sample for chemical and microbotanical analyses
6	5	103	Bulk sample for charcoal, plant and insect extraction
7	5	103	Bulk sample for charcoal, plant and insect extraction
8	5	103	Small sample for environmental analyses
9	5	104	Bulk sample for charcoal, plant and insect extraction
10	5	104	Small sample for environmental analyses
11	1	108	Small sample extracted immediately above context 109, for environmental analyses
12	1	108	Bulk sample for charcoal, plant and insect extraction
13	1	108	Bulk sample for charcoal, plant and insect extraction
14	1	108	Small sample for environmental analyses
15	1	109	Black humic soil (100% sampled) for environmental analyses
16	1	109	Selection of stones from feature
17	1	109	Grey humic soil (100% sampled) for environmental analyses
18	4	n/a	*Ex situ* mammal bones collected from surface for reference
19	1	108/110	Sequence of samples (N=10) through podzol layers for chemical analyses
20	1	108/110	Sequence of samples (N=10) through podzol layers for pollen analyses
21	1	110	Single sample from top of context 110 towards its southern extent, for comparison with sample 19
22	1	109	Selection of stones from feature
23	1	110	Bulk sample for charcoal, plant and insect extraction