<u>PS: WHITEHILL ROAD BARROW</u>

Area 3390 Zone 1 (ARC 330 98 and ARC WHR 99)

ASSESSMENT OF CHARRED PLANT REMAINS & CHARCOAL
Lisa Gray-Rees

Introduction

This assessment reports on 21 environmental samples taken during the works in Area 3390 Zone 1 (ARC 330 98 and ARC WHR 99). These were processed by flotation in a Siraf type flotation tank. Seventeen samples produced botanical remains. These are recorded in the table below and are the samples.

Methodology

Each sample was processed using a Siraf type flotation tank. Residues were collected in a 1mm mesh and flots were collected in a 250-micron mesh. Flots and residues were dried prior to scanning. Residues were scanned by eye. Environmental remains and artefacts (such as burnt flint, brick or tile fragments) were collected and transferred to the relevant specialists. Flots and plant remains recovered from the residues were examined in more detail using a low powered stereo microscope.

The modes of preservation, species diversity and abundance of organic remains in each sample were recorded on sheets then entered into the Oracle MoLAS/MoLSS database. Full sample details are given in the table below.

Quantifications

Full details of these samples are given in the table below.

The quantities of remains were estimated and recorded in the following manner:

For charred remains
+ = 1-10
++ = 11-50
+++ = 51-100
++++ = 101-1000
1000+ = >1000.

For waterlogged remains
+ = 0-5
++= 6-10
+++=11+

Provenance

Most of these samples were provisionally dated as either Bronze Age or Roman. Three samples came from pits (<28>, <271>, and <272>). The remaining sample came from ditch features. All samples were botanically poor in terms of diversity and abundance of remains. The richest sample was from a pit provisionally dated as Late Iron Age – Roman at Fawkham Junction. This sample contained a charred mallow (*Malva* sp.) seed and an uncharred elder (*Sambucus nigra* L) seed.

Conservation

None necessary. These samples can be discarded.

Comparative material

The contents of these samples were sparse and will not fulfil the research aims.

Potential for further work

Due to the paucity of the plant remains in the samples they are not recommended for further analysis.

Bibliography

None

Table 1: Assessment of Charred Plant Remains & Charcoal

Sample Details					*Flot Details*						Residue
Event Code	**Context & type**	**Period**	**Sample no.**	**Sample size (1)**	**Flot size (ml)**	**Grain**	**Chaff**	**Weeds Seeds charred/ uncharred**	**Charcoal**	**Comments**	**Size (ml) proportion checked**
ARC WHR 99	76/ pit	Bronze age/ Iron age	28	30	-	-	-	-	+		?
ARC WHR 99	52/ ditch	Bronze age/ Iron age	20	3	-	-	-	-	+		?
ARC WHR 99	69/ ditch	Bronze age/ Iron age	18	3	-	-	-	-	+		500ml
ARC WHR 99	23/ ditch	Bronze age/ Iron age	16	10	-	-	-	-	+		?
ARC 330 98	158/ ditch	Roman	27	25	-	-	-	-	+	-	1000ml
ARC 330 98	159 ditch	Roman	26	25	-	-	+	-	+	modern moss	800ml
ARC 330 98	316/ ditch	?	62	10	-	-	-	-	+	-	3000ml
ARC 330 98	318/ ditch	?	63	10	-	-	-	-	-	-	2000ml
ARC 330 98	512/ ditch	Late Iron Age or Roman	229	10	-	-	+	-	+	root/ rhizome frags	3000ml
ARC 330 98	782/ ditch	Late Iron Age or Roman	278	10	-	-	+	-	+	-	2000ml
ARC 330 98	800/ ditch	Roman	234	30	-	-	+	-	+	-	1600ml

Sample Details					*Flot Details*						Residue
Event Code	**Context & type**	**Period**	**Sample no.**	**Sample size (1)**	**Flot size (ml)**	**Grain**	**Chaff**	**Weeds Seeds charred/ uncharred**	**Charcoal**	**Comments**	**Size (ml) proportion checked**
ARC 330 98	868/ ditch	Roman	261	30	-		+		+		4000ml
ARC 330 98	876/ ditch	Late Iron Age or Roman	264	30	-	-	-	-	+	-	3000ml
ARC 330 98	877/ ditch	Roman	265	20	10	-	-	-	+++	flecks of charred wood, moss fragments	4000ml
ARC 330 98	882/ ditch	Roman	268	30	-	-	-	-	+	-	5000ml
ARC 330 98	886/ pit	Late Iron Age or Roman	271	15	70	-	-	+/+	+++++	flecks of charred wood, moss fragments	1750ml
ARC 330 98	896/ pit	?	272	30	-	-	-	-	+	-	1500ml

APPENDIX 10: ASSESSMENT OF MOLLUSCS
Alan Pipe

Introduction

Mollusc shells were recovered during excavation works at the watching brief sites (ARC 330 98) and Whitehill Road Barrow (ARC WHR 99).

Mollusc shells were recovered by wet-sieving/flotation of bulk samples taken in the field. These were washed using a modified Siraf tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. These fractions were air-dried and visually sorted for mollusc remains, which were bagged and labelled as individual sample groups.

The material was assessed to determine any possible value to the Fieldwork Event Aim:

to establish a record of the changing palaeo-environment for all time periods present and the interaction with past economies.

Methodology

All samples containing mollusc remains were recorded onto a table template in terms of habitat preference and approximate quantification as specified in the CTRL project requirements. No sub-sampling of sample groups was carried out. Preliminary identifications of taxa were made using a binocular microscope and following Cameron & Kerney 1976; allocations of habitat preference followed Kerney 1999.

Quantifications

The material is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

A total of four small groups of mollusc shells, an approximate total of 65 shells, were assessed. This material derived entirely from terrestrial species; there were no marine or freshwater forms. The identified taxa recovered were *Cecilioides acicula*, *Retinella sp*., *Vallonia pulchella*, *Cepaea nemoralis*, *Hygromia sp*., *Pomatias elegans*, and *Discus rotundatus*.

The table below groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

The snail shells come from the complex of ditches at Fawkham Junction, dated c AD50 to AD100 and from the outer ditch fill of the Whitehill Road Barrow, dated c 2000 – 1600 BC.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure precise identification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample group in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

The mollusc assemblage should be retained for comparison with other sites of similar dates in Area 330.

Comparative material

Although the very small size of this assemblage does not justify detailed inter-site comparison with any other particular site, for completeness it should be included in any overall review of the CTRL Zonal molluscan groups.

Potential for further work

The assemblage has very little potential for further study in terms of quantification of species, or of ecological interpretation. Identification of all species present will allow some comment on the general nature of the local environment at ARC WHR 99 only. It will not be possible to specify spatial and temporal variation resulting from changes in landuse.

All species would be identified and counted in order to maximise data retrieval from this very small group.

Bibliography

Cameron, R A D, & Redfern, M, 1976 British land snails *Linnean Society synopses of the British fauna no.6* London

Kerney, M, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland,* Colchester

Table 2: Assessment of molluscs from Zone 1

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC WHR 99**
Column/Sectn				
Sample	62	63	104	17
Context	316	318	403	69
Date/ interpretation	/fill	/fill	/fill	/ditch
Depth				
Catholic species				
Open country species				
Shade-loving species	+++	+++	+	
Burrowing species				+
Aquatic species				
Approx totals	**35**	**25**	**2**	**5**

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

APPENDIX 11: ASSESSMENT OF GEO-ARCHAEOLOGY

Jane Corcoran

Introduction

Three monolith samples were recovered from three separate segments of the inner and outer ring ditches during excavation works.

For each section sampled, a monolith tin (500mm x 50mm x 500mm) was hammered into the cleaned section face. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith locations were marked on the section drawing and a level, related to Ordnance Datum was taken on the top of each tin. Each tin was wrapped in cling film and plastic bags, labelled and stored in a cold store prior to assessment.

Methodology

The sediments sampled in each tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

For each profile, every distinct unit was given a separate number and the nature of the contacts between each unit noted. Where several units appear to be part of the same depositional phase or event they have been grouped into a larger unit [indicated by a letter]. These units are related to the contexts identified on site in the profile description tables (Table 3, Table 4 and Table 5). Where possible in section 4 the profiles are discussed in terms of the context numbers as opposed to the units identified in the monolith tins.

Quantification

Sample <31>: section 3

This sample was taken from the north east part of the outer ditch, through contexts [10] and [39].

Table 3: Assessment of Geo-Archaeology: Sample <31> Section 3

Context	**Zone & unit**	**elevation of contact (m OD)**	**description and contacts**	**Related samples**
		47.80	Top of sequence sampled	
10	A1	[0.17m thick]	Dark yellowish brown 10YR4/6 slightly sandy clay silt. Moderately abundant, poorly sorted subangular flint inclusions of 10-50mm diameter. Manganese or charcoal speckles throughout. Hard and compact. Diffuse contact to:	<8>
10	A2		Dark yellowish brown 10YR4/4 slightly sandy clay silt. More clayey and darker than unit A1. Manganese or charcoal speckles throughout. Hard and compact.	<8>
		47.57	Sharp contact	
39	B		Yellowish brown 10YR5/8 sandy clay-silt. Very abundant angular to sub-rounded chalk clasts, commonly c. 10mm diameter. Very occasional large (>50mm) sub-angular and small rounded flint pebbles. In basal 0.06m of unit the matrix appears to contain chalk grit and there is a big increase in chalk grit and granules. Hard and compact.	<10>
		47.30	Base of profile sampled	

Sample <32> Section 4

This sample was taken from the eastern part of the inner ditch, through contexts [37] and [17]. The sequence sampled was only 0.25m long (the length of half a monolith tin).

Table 4: Assessment of Geo-Archaeology: Sample <32> Section 4

Context	**Zone & unit**	**elevation of contact (m OD)**	**description and contacts**	**Related samples**
		48.84	Top of sequence sampled	
37	A1	[0.09m thick]	Dark yellowish brown 10YR4/4 slightly sandy very clayey silt. Frequent angular to sub angular flint clasts, often burnt, especially towards base of unit. Moderately loose and crumbly. Diffuse contact to:	
17	A2	[0.16m thick]	Dark yellowish brown 10YR4/6 very slightly sandy clayey silt. Marked from unit above by fewer flints, more compact structure, paler more orange colour and very occasional chalk grit and speckles.	
		48.59	Base of profile sampled	

Sample <33>: section 7

This sample was taken from the eastern part of the outer ditch, through context [62].

Table 5: Assessment of Geo-Archaeology: Sample <33> section 7

Context	Zone & unit	elevation of contact (m OD)	description and contacts	Related samples
		49.17	Top of sequence sampled	
62	A1	[0.27m thick]	Dark yellowish brown 10YR4/4 slightly sandy clayey silt. Compact and hard. Occasional poorly sorted flint clasts increase with depth. Manganese speckles occur throughout.	
	A2	[0.16m thick]	Dark yellowish brown 10YR 4/6 slightly sandy clayey silt. Very occasional flint granules. More orange and less stoney than A1. Large root channel tapers towards base of unit. Possible slight increase in clay content and darkening of colour towards base.	
		48.74	Sharp irregular contact	
3	B	[0.07m thick]	White 10YR8/1 chalky silt. Abundant very poorly sorted chalk clasts.	
		48.67	Base of profile sampled	

Provenance

Monolith samples <31 and 33> are both from the outer ditch. In both samples the lowest fill was chalky with frequent chalk gravel and the overlying fill was decalcified.

The lowest contexts may reflect the initial weathering of the chalk ditch sides, probably quite soon after the construction of the ditch. In context [39] the matrix becomes more chalky towards the base of the ditch. Upwards in this context, the matrix becomes browner and chalk inclusions fewer.

This is likely to be a result of the stabilisation and plant / grass growth over the sides of the ditch, together with the weathering of the chalky primary fill. Such weathering, resulting from rainfall, plant growth and animal activities will have dissolved the chalky matrix and chalk rubble inclusions. In addition the accumulation of leaves, dust, eroded soil etc within the interstices of the chalk rubble will have led to a gradual accumulation of the decalcified matrix.

The upper contexts [10] in monolith <31> and [62] in monolith <33> were subdivided into an upper and lower unit. In monolith <31> the lowest part of context [10] was more humic, darker and slightly more clayey than the upper part. Whereas in monolith <33> the lower part of context [62] was possibly lighter and less stoney than the upper part of the context. In addition in this sample a concentration of flint gravel occurred between A1 and A2 (the upper and lower parts of context [62]).

It is possible that these characteristics represent an initial period when soil from the banks and ditch surroundings gradually accumulated in the ditch and a later period when more severe erosion was taking place either on the ditch sides or surrounding landsurface.

It is possible that this might indicate that initial landuse around the barrow was slight or possibly consisted of animal grazing and that subsequent local activities may have involved ploughing or re-use of parts of the barrow, which dislodged coarser gravel material.

As the later fills were decalcified it suggests that considerable weathering of the chalk had probably already taken place by this time. This might imply that the outer ditch infilled very slowly.

Manganese speckles within the ditch fills indicate that the environment within the ditch was likely to have been damp.

The nature and significance of the processes leading to the infilling of the ditch are likely to be better understood if soil micromorphological analysis is undertaken on the samples.

Pollen is likely to be preserved in the upper decalcified ditch fills. Pollen analysis may provide useful information on the changing landscape and landuse around the barrow for the period after its construction. Such information should provide a better understanding of the setting, visibility and context of the monument both to the people who constructed it and to following occupants of the area.

Monolith sample <32> was taken through the inner ditch. In this location there was no chalky primary fill and the ditch and fills were shallow and decalcified.

This is likely to be the result of weathering of the shallower inner ditch, which has left only a few chalk grit fragments in the lower fill [17].

The upper fill [37] was reddened with shattered burnt flints and may be the result of an *in situ* burning event, which scorched and transformed the pre-existing fill.

Soil micromorphological analysis might enable microscopic components of the materials burnt within the ditch to be identified.

Conservation

If thin sections are made of the monolith blocks they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths the samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. In addition thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monoliths will be easier to store and less likely to deteriorate than the original soil material.

Long term storage as monolith samples is likely to be costly and is not an efficient use of space or archive material.

Comparative material

The evidence from further analysis of the monoliths should be compared to other evidence for the changing environment during the Bronze Age and Romano-British periods in the North Downs area and further afield. This will enable a better understanding of the exploitation and modification of the landscape by Bronze Age and later societies to be gained.

The snail sequence and pollen from the monolith samples from the Bronze Age ring-ditch on Cobham Golf Course (ARC CGC 98) should provide good comparative material relating to the infilling of a similar feature and timeframe. Comparative material will also include the colluvial sequences sampled during CTRL investigations in many of the North Downs sites.

Also published or otherwise available accounts of soil, pollen and snail evidence from buried soils and valley sediments in other parts of south-east England (eg: Godwin 1962; Thomas, 1989; Allen 1995; Preece & Bridglend 1998; Waller 1998; Waller and Hamilton 1998).

Potential for further work

The data from the monolith samples has potential to address the following landscape Zone and fieldwork aims:

To study the natural landscape, its geomorphology, vegetation and climate, as the context within which the archaeological evidence can be interpreted.

Farming communities (2000 BC-100 BC): to consider environmental change resulting from landscape organisation and re-organisation.

These aims may be achieved by pollen and soil micromorphological analysis of the ditch fills.

Pollen analysis should enable the nature of the changing landscape during and after the construction of the barrow (in the period of c 2000 to 1600 BC) to be reconstructed and soil micromorphology should enable the sequence of events that led to the infilling of the ditch to be unravelled.

Recommendations for further work on the monolith samples

task	requirement
Preparation and analysis of 16 pollen samples (*): 5 at c. 0.40mm intervals through units A1 and A2 in <31> 11 at c.40mm intervals through units A1 and A2 in <33>	Pollen specialist
Impregnation of the 3 monolith samples and manufacture of 6 thin sections of c.110 x 70mm from across contacts A1/A2 + A2/B in monolith <31> from A1, A1/A2 and A2/B in monolith <33> from A1/A2 in monolith <32> analysis / interpretation of the depositional and post-depositional characteristics recorded in these samples (*)	Likely to take 3 months to prepare the thin sections.
Comparison of the sequence and chronology of events with valley sediment profiles from other CTRL sites and from the published literature for the area.	Geoarchaeologist

* It is suggested that the thin sections / pollen slides should initially be scanned to assess their potential and, if suitable the analysis should be undertaken.	

Bibliography

Allen, MJ 1995 'The prehistoric land-use and human ecology of the Malling Caburn Downs' *Sussex Archaeological Collections 133* 19-43

Godwin, H, 1962 'Vegetational History of the Kentish chalk downs as seen at Wingham and Frogholt' *Veroff. Geobot. Inst., Zurich*

Thomas, KD, 1989 'Vegetation of the British Chalklands in the Flandrian period: a response to Bush' *Journal of Archaeological Science 16* 549-553

Preece, RC, and Bridgland, DR, 1998 *Late Quaternary Environmental Change in NW Europe: excavations at Holywell Coombe, SE England*

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Waller, MP, & Hamilton, SD, 1998 'The vegetational history of the South Downs: Mount Caburn' in *The Quaternary of Kent and Sussex, QRA Field Guide* Eds. Murton *et al*

PS: AREA 330 ZONE 2 WATCHING BRIEF

APPENDIX 8: ASSESSMENT OF MOLLUSCS

Alan Pipe

Introduction

Mollusc shells were recovered during excavation works at the sites ARC SSR 99 and ARC STP 99.

Mollusc shells were recovered by wet-sieving/flotation of bulk samples taken in the field. These were washed using a modified Siraf tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. These fractions were air-dried and visually sorted for mollusc remains, which were bagged and labelled as individual sample groups.

The material was assessed to determine any possible value to the Fieldwork Event Aims:-

to establish changes in the local environment through the recovery of suitable palaeo-environmental samples from the fill of cut features
to determine the spatial organisation of the landscape, and changes through time

Methodology

All samples containing mollusc remains were recorded onto a table template in terms of habitat preference and approximate quantification as specified in the CTRL project requirements. No sub-sampling of sample groups was carried out. Preliminary identifications of genus and species were made using a binocular microscope and following Cameron & Kerney 1976; allocations of habitat preference followed Kerney 1999.

Quantifications

A total of seven small groups of mollusc shells, an approximate total of 87 shells, were assessed. This material derived entirely from terrestrial species; there were no marine or freshwater forms. The identified taxa recovered were:

Cecilioides acicula, Vallonia sp., Retinella sp. and Helicella sp.

The table below groups this material in terms of habitat preference and relative abundances specified by the CTRL assessment template.

The assemblage included open country (*Helicella sp., Vallonia sp.*), shade-loving (*Retinella sp*) and burrowing forms (*Cecilioides acicula*). Although the bulk of the shells derived from *C.acicula*, ARC SSR 99 also produced shade-loving species, and ARC STP 99 produced a few open-country snails.

Provenance

The material is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure precise identification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample group in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

There is no reason to discard any of the mollusc assemblage.

Comparative material

Although the very small size of this assemblage does not justify detailed inter-site comparison with any other particular site, for completeness it should be included in any overall review of the CTRL zonal molluscan groups.

Potential for further work

The assemblage has very little potential for further study in terms of quantification of species, or of ecological interpretation, and will be of little value for either of the selected Fieldwork Event Aims. Identification of all species will allow some comment on the general nature of the local environments at ARC SSR 99 and ARC STP 99. It will not be possible to specify spatial and temporal variation resulting from changes in landuse or to accurately define the characteristics of the habitat at each site.

Bibliography

Cameron, R A D & Redfern, M, 1976 British land snails *Linnean Society of London synopses of the British fauna no. 6* London

Kerney, M, 1999 *Atlas of the land and freshwater molluscs of Britain and Ireland* Harley Books. Colchester

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Table 6: Assessment of molluscs from Zone 2

Event code	**ARC SSR 99**	**ARC SSR 99**	**ARC SSR 99**	**ARC STP 99**	**ARC STP 99**	**ARC STP 99**	**ARC STP 99**
Column/Sectn							
Sample	2	7	11	15	16	17	23
Context	13	35	43	63	65	67	88
Date /interpretation	/ditchfill	/demolition oven feature	Modern/pitfill	fill stakehole	fill stakehole	fill stakehole	modern/pitfill
Depth							
Catholic species							
Open country species				+			+
Shade-loving species	+		+				
Burrowing species	+	+		+++	+++	+	+++
Aquatic species							
Approx totals	**2**	**5**	**5**	**20**	**30**	**5**	

ARC SSR 99, ARC STPP 99 and ARC 330 8

APPENDIX 9: ASSESSMENT OF CHARRED PLANT REMAINS & CHARCOAL

Lisa Gray-Rees

Introduction

This assessment reports on environmental samples taken during excavations at ARC SSR 99, ARC STPP 99 and ARC 330 8. Fifty-three environmental samples were taken. Fifty samples were bulk samples and were processed by flotation. The remaining samples were column samples. Seven of the bulk samples produced flots. The purpose of the study of this material was to gain further information about the contemporary environment and landscape and possible economic activities, for example, crop processing.

Methodology

Fifty samples were processed using a Siraf type flotation tank. Residues were collected in a 1mm mesh and flots were collected in a 250-micron mesh. Flots and residues were dried prior to scanning. Residues were scanned by eye. Environmental remains and artefacts (such as burnt flint, brick or tile fragments) were collected and transferred to the relevant specialists. Flots and plant remains recovered from the residues were examined in more detail using a low powered stereo microscope.

The modes of preservation, species diversity and abundance of organic remains in each sample were recorded on sheets then entered into the Oracle MoLAS/MoLSS database and transferred to the RLE Datasets. Full sample details are given below.

Quantifications

Preservation

Charring or waterlogging preserved the plant remains in these samples. The quality of preservation was generally poor. Full details of these samples are given in the tables below. For ARC SSR 99 plant remains were present in eleven out of 23 samples with low numbers of poorly preserved grain present in seven samples. For ARC STP 99 plant remains were present in nine of the 25 bulk samples with seven of those sampled producing flots.

Recording

The quantities of remains were estimated and recorded in the following manner: -

For charred remains
+ = 1-10
++ = 11-50
+++ = 51-100
++++ = 101-1000
1000+ = >1000.

For waterlogged remains
+ = 0-5
++= 6-10

+++=11+

Provenance

South of Station Road (ARC SSR 99)

Ten of these samples were Roman and one was Iron Age/Roman. Identifiable fragments of charred wood were present in low numbers in four of the samples. These were Roman ditch fill samples <6>, <2> and <4>, and a Roman sample from a demolition layer, sample <19>. Seven of these samples were pot-dated as Romano-British; <7>, <8>, <16>, <17>, <19>, <20> and <21>. One was provisionally dated as Iron Age/Roman, sample <23>.

The richest sample was sample <7> ([35] sg 114) from the oven feature. This sample was pot dated as early Roman. The flot and residue contained moderate numbers of poorly preserved charred wheat (*Triticum* spp.) grains. The flot also contained low numbers of chaff fragments, glumes, charred seeds, campion (*Silene* sp.) and plantain (cf. *Plantago* sp.). In addition there were uncharred seeds including goosefoot (*Chenopodium* spp.) and sedge (*Carex* sp.).

Temple East of Springhead (ARC STP 99)

Of the 25 samples, 16 were dated as Neolithic to Early Bronze Age, eight samples were technically undated and one was modern. Identifiable fragments of charred wood were present in the residues of <2> <4> <9> <15> and the flots of <16> <17> and <23>. Samples <2> and <15> were undated and <23> was modern.

Low numbers of poorly preserved charred grain were present in the residues of <2>, <4> and <10>. A charred weed seed, bedstraw (*Galium* sp.) was recovered from sample <15>.

Uncharred root and moss fragments were present in the flots.

Watching brief - New Barn Road (ARC 330 98)

No flots were produced from these samples. The only plant remains were low to moderate quantities of charred wood fragments in samples <83> and <87>.

Conservation

Sample ARC SSR 99 <7> should be retained for further analysis. Sub-samples of identifiable charred wood fragments (larger than $5mm^3$ in size) from ARC STP 99 <2> <4> <9> <15> <16> <17> and ARC 330 98 <83> should be saved and stored dry prior to further analysis.

Comparative material

The richest remains in this zone came from an early Roman oven feature (<7> [35] sg 114 g 18) from ARC SSR 99. These may be compared with charred plant remains from Roman sites in along the CTRL route, particularly those at West of Northumberland Bottom (Area 330 Zone 3) but also with other samples in Kent such as Lullingstone near Orpington (Arthur 1974; Metcalf and Doherty 1974) and Keston in Bromley (Hillman 1991; Straker 1999).

Potential for further work

It is recommended that further work be carried out on sample <7> from ARC SRR 99. This sample has the most potential to provide detail information about cereal cultivation.

Identifiable fragments of charred wood were found in the following samples provisionally dated as pre-historic or undated:-

ARC STP 99 <2> <4> <9> <15> <16> and <17>
ARC 330 98 <83>

The wood samples which can be firmly dated as prehistoric should be identified for the information about landscape and fuel use.

The flot sample will be examined using a stereo-microscope with magnifications of between 10 and 40 times. Modern seed and cereal reference collections and reference manuals (eg Anderberg 1994, Berijinck 1947 and Berggren 1969,1981) will be used.

Charred wood will be examined using an epi-luminating microscope. Diagnostic features will be recorded and the wood identified using an atlas of microscopic wood anatomy (Schweingruber 1978).

Plant remains will be identified as closely as their level of preservation allows. Quantities of uncharred remains and charred wood fragments will be estimated and charred remains will be counted. This data will be recorded onto record sheets and transferred to the MoLAS/MoLSS Botanical ORACLE database.

Additional work:

Identification and recording of the contents in one dry flot
Identification of charred wood in 7 samples
Table creation and data analysis
Report Writing
Editing and Archiving

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Table 7: Assessment of Charred Plant Remains & Charcoal

Sample Details							***Flot Details***							**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC SSR 99	16	117	28/fill of ditch [014]	RO	3	20	-	-	-	-	-	-	3000/ yes
ARC SSR 99	16	118	30/fill of ditch [029]	PR	5	20	-	-	-	-	-	-	1000/ yes
ARC SSR 99	16	117	12/fill of ditch [014]	RO	6	20	-	-	-	-/+	+	-	5000/ yes
ARC SSR 99	17	116	13/fill of ditch [009]	RO	2	10	-	-	-	-	+	-	1500/ yes
ARC SSR 99	17	116	10/fill of ditch [009]	RO	4	10	-	-	-	-	+	-	1500/ yes
ARC SSR 99	17	116	39/fill of ditch [009]	RO	10	10	-	-	-	-	-	-	2000/ yes
ARC SSR 99	18	114	35/oven feature	RO	7	3	5	++	+	+/+	-	stem frags	500/ yes
ARC SSR 99	18	114	35/oven feature	RO	13	20	-	-	-	-	-	-	?/no

Sample Details							***Flot Details***						**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC SSR 99	18	114	40/oven feature	RO	14	20	-	-	-	-	-	-	2000/ yes
ARC SSR 99	18	114	42/oven feature	RO	15	10	-	-	-	-	-	-	4000/ yes
ARC SSR 99	18	115	60/oven feature	RO	16	3	-	+	-	-	-	-	500/ yes
ARC SSR 99	18	115	49/oven feature	RO	17	10	-	+	-	-	-	-	1000/ yes
ARC SSR 99	18	115	59/oven feature	RO	18	10	-	-	-	-	-	-	500/yes
ARC SSR 99	18	115	60/oven feature	RO	19	10	-	+	-	-	+	-	1500/ yes
ARC SSR 99	18	115	62/oven feature-floor	RO	20	10	-	+	-	-	-	-	1000/ yes
ARC SSR 99	18	115	63/chalk floor of oven	RO	21	3	-	+	-	-	-	-	2000/ yes
ARC SSR 99	18	115	64/clay wall of oven	IA/RO	22	10	-	-	-	-	-	-	1000/ yes

Sample Details							***Flot Details***						**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC SSR 99	18	115	65/ charcoal floor of oven	IA/RO	23	6	-	+	-	-	-	-	2500/ yes
ARC SSR 99	19	103	24/fill of ditch [25]	RO	12	10	-	-	-	-	-	-	500/yes
ARC SSR 99	22	101	43/fill of ditch [44]	MO	11	10	-	-	-	-	-	-	1000/ yes
ARC SSR 99	23	108	1/fill of ditch [002]	RO	1	10	-	-	-	-	-	-	3000/ yes
ARC SSR 99	26	109	56/ lower fill of pit [32]	PR	9	30	-	-	-	-	-	-	3000/ yes
ARC SSR 99	26	109	31/ fill	RO	8	10	-	+	-	-	-	-	2000/ yes
ARC STP 99	3	2	86/ natural gravel and silt	?PR	24	-	-	-	-	-	-	-	column sample
ARC STP 99	3	2	2/ natural gravel and silt	?PR	26	-	-	-	-	-	-	-	column sample

Sample Details							***Flot Details***						**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC STP 99	4	21	46/posthole-possible occup.	NE/EBA	6	2	10	-	-	-/+	++++	root and stem frags	?/no
ARC STP 99	4	22	61/ posthole-possible occup.	NE/EBA	9	2	2	-	-	-	++	root frags	500/yes
ARC STP 99	4	23	63/ posthole-possible occup.	UN	15	5	10	-	-	+/-	++++	root frags	400/yes
ARC STP 99	4	24	65/ posthole-possible occup.	NE/EBA	16	5	10	-	-	-	+++	root & moss frags	?/no
ARC STP 99	4	25	67/fill of post-hole[68]	NE/EBA	17	5	10	-	-	-	+++	root frags	?/no
ARC STP 99	4	26	69/ posthole-possible occup.	NE/EBA	18	2	-	-	-		-	-	?/no

Sample Details							***Flot Details***						**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC STP 99	4	27	71/ posthole-possible occup.	NE/EBA	19	2	5	-	-	-	+++	root, stem & moss frags	?/no
ARC STP 99	5	30	41/natural hollows	UN	5	10	-	-	-	-	-	-	100/yes
ARC STP 99	5	39	78/ natural hollows	UN	21	30	0.5	-	-	-	-	-	?/no
ARC STP 99	5	29	81/gully	?PR	22	20	-	-	-	-	-	-	100/no
ARC STP 99	6	34	50/fill of posthole	UN	8	3	-	-	-	-	-	-	?/no
ARC STP 99	6	35	52/fill of post-hole[	UN	11	10	-	-	-	-	-	-	300/yes
ARC STP 99	6	36	54/fill of post-hole	UN	12	?	-	-	-	-	-	-	?/no
ARC STP 99	7	38	60/pit	UN	7	10	-	-	-	-	-	-	100/no
ARC STP 99	7	37	56/pit	UN	13	10	-	-	-	-	-	-	100/no
ARC STP 99	7	37	57/pit	UN	14	?	-	-	-	-	-	-	?/no

Sample Details							***Flot Details***						**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC STP 99	8	18	36/ ?occup. deposit	NE/EBA	4	10	-	+	-	-	-	-	100/yes
ARC STP 99	9	3	4/fill of small pit containin g burnt flint	UN	1	10	-	-	-	-	-	-	2000/ yes
ARC STP 99	9	4	6/pit	UN	2	5	-	+	-	-	+	-	200/yes
ARC STP 99	9	11	20/pit	UN	3	10	-	-	-	-	-	-	100/yes
ARC STP 99	9	32	45/pit	UN	10	10	-	+	-	-	-	-	500/yes
ARC STP 99	9	28	74/pit	UN	20	5	-	-	-	-	-	-	?/no
ARC STP 99	11	1	85/ hillwash, colluvium	?PR	24	-	-	-	-	-	-	-	column sample
ARC STP 99	11	1	84/ hillwash and colluvium	?PR	25	-	-	-	-	-	-	-	column sample

Sample Details							***Flot Details***						**Residue**
Site	Group	Sub-group	Context & type	Period/ Pot-date	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Char-coal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ Proport-ion checked
ARC STP 99	11	1	1/ hillwash and colluvium	?PR	26	-	-	-	-	-	-	-	column sample
ARC STP 99	12	42	87/ subsoil	?PR	24	-	-	-	-	-	-	-	column sample
ARC STP 99	12	42	87/subsoil	?PR	25	-	-	-	-	-	-	-	column sample
ARC STP 99	13	43	88/pit	MO	23	10	10	-	-	-/+	-	root frags	?/no
ARC STP 99	33	2	3/ natural silt	?PR	26	-	-	-	-	-	-	-	column sample
ARC 330 98	?	1049	368/ditch	UN	83	-	-	-	-	-	+++	-	3000/yes
ARC 330 98	?	1051	370/ditch	UN	84	-	-	-	-	-	-	-	1000/ yes
ARC 330 98	2004	2003	304/ditch	MO	78	-	-	-	-	-	-	-	1800/ yes
ARC 330 98	2002	2086	381/ditch	UN	87	-	-	-	-	-	++	-	600/yes

APPENDIX 10: ASSESSMENT OF GEO-ARCHAEOLOGY
Jane Corcoran

Introduction

Monolith samples were recovered from two sections (26 and 23) during excavation works at ARC STP 99 (Figure 5). The sections cut through a sequence of sediments that were provisionally interpreted as soliflucted and colluvial slope deposits, eroded from the higher land to the north and south and accumulated in the northern dry valley floor. The aim of the geo-archaeological assessment is to determine the potential of the samples to provide information with which the changing landscape and geomorphological processes operating on the site might be reconstructed. This would provide a better understanding of the environment of the Late Neolithic, Bronze Age, Iron Age and Roman settlement found in the environs of the site (Area 330 Zone 3).

The monolith samples form 3 profiles. For each profile, overlapping monolith tins (0.50m x 0.05m x 0.05m) were hammered into the cleaned section face. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith locations were marked on the section drawing and a level related to ordnance Datum was taken on the top of each tin. Each tin was wrapped in cling film and plastic bags, labelled and stored in the MoLAS fridge prior to assessment.

Methodology

The sediments sampled in each tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions clast-size and dip.

For each profile, every distinct unit was given a separate number and the nature of the contacts between each unit noted. Where several units appear to be part of the same depositional phase or event they have been grouped into a larger unit [indicated by a letter]. The units identified during description are related to the contexts described on site in the profile description tables (Table 3, Table 4 and Table 5) and where possible the profiles are discussed in terms of the contexts as opposed to the units identified in the monolith tins.

In order to characterise the contexts sampled, in terms of composition and texture, a small measured sub-sample from various locations down each profile was washed over a 63um and 500um mesh and the residues air dried and re-weighed. Rapid scanning of the dried residues under a binocular microscope (at x16-x64) magnification attempted to assess the component characteristics of each sample. The object of this part of the assessment was to determine the potential for more sophisticated particle size or mineral grain analysis to identify different sediment sources, transport mechanisms, depositional and post-depositional processes operating during the time the sediments accumulated.

Quantifications

This section gives the results of the monolith assessment. In Table 3, Table 4 and Table 5 the sequences sampled are described. Table 11 sets out the results of wet sieving in terms of texture and composition.

Sample <24>: section 26

This sample consisted of 4 overlapping monolith tins taken from the south-west part of section 26, through contexts ([87], [85] and [86]). This sample was at a slightly higher elevation than sample <25>, which was also taken from section <26>, but closer to the valley axis.

Table 3: Assessment of Geo-Archaeology: Sample <24> section 26

Context	**Zone & unit**	**elevation of contact (m OD)**	**description and contacts**	**tin**	**sub-samples** (see Table 11)
		14.79	Top of sequence sampled		
87	A	[0.16m thick]	Dark yellowish brown 10YR4/6 slightly sandy silt, with possibly some clay. Moderately abundant chalk and flint inclusion of granular to 10mm diameter. Massive (the chalk and gravel clasts are distributed throughout the unit with no apparent orientation or structure). Compact.	A	24A
		14.63	Distinct		
85	B	[0.48m thick]	Dark yellowish brown 10YR4/6 slightly sandy silt, with possibly some clay. No chalk or flint clasts within the matrix, but very occasional grit-sized chalk within root channels. Occasional root channels are visible as humic stained voids c.5mm thick and as carbonate precipitated veins (1mm thick) that occur towards the base of the unit and extend across the contact with unit C. Compact	A B	24B
		14.15	Distinct sub-horizontal		
86	C1	[0.35m thick]	Yellowish brown 10YR5/8. Soft and compact slightly sandy silt. Holey porous structure. Very occasional granular flint. Frequent carbonate precipitations as threads and flecks, especially towards top of unit.	B C	24C1
	C2	[0.40m thick]	As above but slight decrease in carbonate precipitations	C D	24C2
	C3	[0.20m thick]	As above but faint bedding structures visible as slightly clayey lenses and a sand lens or bed about 20mm thick occurs at about 13.4m OD.	D	24C3
		13.20	Base of profile sampled		

Sample <25> Section 26

This sample consisted of 3 overlapping monolith tins taken from the north-east part of section 26, through contexts ([87] and [84]). Sample <25> was at a lower elevation and closer to the axis of the dry valley than <24>, which was taken at the south-western end of the same section face.

Table 4: Assessment of Geo-Archaeology: Sample <25> section 26

Context	Zone & unit	elevation of contact (m OD)	description and contacts	tin	sub-samples (see Table 11)
		13.56	Top of sequence sampled		
87	A	[0.25m thick]	Dark yellowish brown 10YR4/4 slightly sandy silt, with possibly some clay. Compact & smooth. Chalk granules associated with root channels. Occasional flint inclusions of granular to 10mm diameter.	A	25A
		13.31	Possible contact		
84	B	[0.65m thick]	Dark yellowish brown 10YR4/4 slightly sandy silt, with possibly some clay. Softer and slightly darker than unit A. This unit is also possibly slightly more humic, slightly more clayey and has a rougher & looser structure. Occasional faint carbonate precipitations, which decrease with depth, picking out root channels. Occasional gravel and chalk inclusions within matrix as opposed to within root channels. Very occasional manganese flecks.	A B C	25B
		12.66	Distinct sub-horizontal		
84	C	[0.35m thick]	Dark yellowish brown 10YR4/4 slightly sandy silt, with possibly some clay. Compact and smooth. Manganese flecks and some iron-staining occurs throughout unit. Very infrequent carbonate precipitations. Very occasional root channels, containing chalk and (a single) brick granules.	C	25C
		12.41	Base of profile sampled		

Sample <26>: section 23

This sample consisted of 6 overlapping monolith tins taken from the north-east part of section 23, through contexts ([1], [2] and [3]).

Table 5: Assessment of Geo-Archaeology: Sample <26> section 23

Context	**Zone & unit**	**elevation of contact (m OD)**	**description and contacts**	**tin**	**sub-samples (see Table 11)**
		18.19	Top of sequence sampled		
1	A	[0.87m thick]	Strong brown 7.5YR5/6 slightly sandy silt. Very compact & hard. Decalcified (does not fizz with HCL). Angular blocky structure. Occasional flint grit and granules. Very occasional chalk granules. Occasional greenish grey 'soily' clasts / disrupted root tubules. Humic stained roots, some followed by fine white modern rooting. Occasional manganese flecks.	A B	26A
		17.32	Sharp irregular contact		
2	B	[0.94m thick]	Yellowish brown 10YR5/6 slightly sandy silt. Compact but moderately soft. Occasional large tufa-like clasts. Frequent carbonate concretions as flecks, threads and lumps. Very occasional faint root channels visible as slightly darker (more clayey or humic) stains. Holey porous structure. Possible increase in sand and decrease in carbonate concretions downwards.	B C D E	26B1 26B2 26B3
		16.39	Gradual / indistinct		
3	C1	[0.40m thick]	Yellowish brown 10YR5/6. Compact sandy silt. Occasional carbonate precipitations. Occasional more clayey lenses and traces of sub-horizontal bedding.	E F	26C1
	C2	[0.30m thick]	Yellowish brown 10YR5/6. Wavy, intermittent beds / laminae of sand, silty sand and very fine chalk & flint grit.	F	26C2
		15.71	Base of profile sampled		

Results of wet sieving:

Table 11: Assessment of Geo-archaeology: Texture and Composition - Sample 24

Context	**Sub-sample**	**Weight (g)**	**>500um (%) coarse sand and grit**	**63-500um (%) fine-medium sand**	**<63um (%) silt + clay**	**Composition characteristics**
Sample	**24**					
87	24A	34.00	2.0	10.3	87.7	Mostly quartz + mod. chalk (in fine gravel + sand fractions); iron-stained quartz + iron concreted sand grains, but fewer than <24B>; occ. charcoal
85	24B	17.33	0.6	10.9	88.5	Increase in iron stained quartz, otherwise similar to <24A> but with less chalk. Occ.shell; occ. Iron + manganese concretions; occ. Iron concreted carbonate precipitations.
86	24C1	24.28	0.8	14.3	84.9	Mostly quartz., less iron stained than <24B> but more iron stained carbonate concretions / agglomerations than the samples above. Very occasional shell and chalk.
86	24C2	20.28	0.5	23.6	75.9	Similar to <24C1>
86	24C3	16.86	0.6	17.8	81.6	Mostly quartz. Frequent carbonate concretions / precipitations and many are white ie: (not iron-stained)

Table 12: Assessment of Geo-archaeology: Texture and Composition - Sample 25

Context	**Sub-sample**	**Weight (g)**	**>500um (%) coarse sand and grit**	**63-500um (%) fine-medium sand**	**<63um (%) silt + clay**	**Composition characteristics**
Sample	**25**					
87	25A	20.66	1.7	10.7	87.6	Mostly quartz: occasionally iron-stained. Occasional shell frags. Occ. chalk + flint gravel clasts - slightly iron stained. More iron-staining than <24A>. Occ. Iron concreted carbonate concretions.
84	25B	20.58	3.5	9.5	87.0	Mostly quartz, frequently iron-stained. Moderate carbonate concretions / precipitations, mostly iron-stained. Moderate manganese and iron concretions.
84	25C	12.92	0.5	7.9	91.6	Mostly quartz, frequently iron-stained. Occasional carbonate concretions / precipitations, mostly iron-stained. Frequent manganese and iron concretions.

Table 13: Assessment of Geo-archaeology: Texture and Composition - Sample 26

Context	**Sub-sample**	**Weight (g)**	**>500um (%) coarse sand and grit**	**63-500um (%) fine-medium sand**	**<63um (%) silt + clay**	**Composition characteristics**
Sample	**26**					
1	26A	16.99	0.1	15.5	84.4	Mostly quartz, occasionally iron-stained. Very occ. chalk fine gravel and sand. No carbonate concretions.
2	26B1	22.77	1.0	7.9	91.1	Mostly quartz and occ sand sized chalk. V. occ. Shell frags. Abundant white carbonate concretions.
2	26B2	18.40	1.7	12.9	85.4	Mostly quartz low iron-staining. Moderate chalk grains and carbonate concretions
2	26B3	31.49	2.1	24.5	73.4	Mostly quartz low iron-staining. Occasional chalk. Fewer carbonate concretions than above + some manganese
3	26C1	20.48	6.0	27.6	66.4	Very few carbonate concretions in fine fraction. Occasional manganese grains. Possibly wider mineral diversity than other samples.
3	26C2	17.07	3.6	34.3	62.1	As <26C1>
loess	(Dines *et al* 1954)		0.5	9.5	90.0	10% carbonate, 15% clay minerals, 75% quartz (Langhor, pers. comm.) other minerals include glauconite

Provenance

The samples will be discussed together, as the sequence of sediments observed in each profile have lateral relationships to one another. The deposits have also been related to the sediment sequence described in the ARC STP 97 evaluation report (URL 1997).

Both sections 23 and 26 were located on the north-north-east facing slope of the dry valley.

Section 23, from which sample <26> was taken, was located further up the slope and close to the depression of a tributary channel, joining the dry valley from the south-east.

Section 26 was located about 40m north-west (ie: both down-valley and down-slope) of section 23.
Sample <24> taken from the south-west end of section 26
Sample <25> was taken from the north-east end of the section (at a lower elevation and about 30m closer to the valley axis).

The sediments sampled correspond to those observed in the ARC STP 97 evaluation trenches. The lowest parts of sample <26> (context 002 and 003) and <24> (context [86]) appear to cut through the 'loessic sand'. This was shown (URL 1997, fig.4) to form a wedge of sediment mantling the south-west dry valley side. It thickened into the valley from the higher land to the south-east, thinning towards the foot of the slope where it interfingered between the overlying colluvium and underlying 'head gravels'. Although these gravels were observed at the very base of both sections they were not sampled owing to their coarse nature.

The overlying colluvium was recorded in the 1997 evaluation report as comprising 3 contexts, infilling the valley floor and lower valley side. Each colluvial deposit became thicker downslope, towards the foot of the valley side and across the valley floor. These colluvial deposits have also been identified in ARC STP 99 as contexts [85] (and possibly [1]), [84] and [87]. Although all 3 colluvial contexts were yellowish brown clay silts and difficult to differentiate, the differences recorded during the 1997 evaluation were on the whole representative of the sequence of colluvial sediments observed in section 26. The lowest ('primary colluvium') had occasional gravel and may correspond with ARC STP 99 context [85], and also possibly [1], in sample <26>. The middle ('secondary colluvium') was more clayey with very few inclusions and probably corresponds to context [84]. The upper ('chalk flecked colluvium') was characterised by frequent chalk fragments and is likely to correspond to context [87].

Assessment of the monolith samples taken through these deposits has allowed some refinements to be made of the original interpretations and has provided material with potential for more detailed analysis.

Although contexts [2]=[86] and [3] are likely to have a loessic component, the evidence for bedding seen in [3] (sample <26> unit C2) is more indicative of a waterlain deposit. However gravel stringers do occur locally in loess, such as can be observed in the exposures at Pegwell Bay (Murton *et al* 1998, 36-37). The high sand content (Table 11) of context [3] also suggests it is derived from sandy beds within the Thanet sands, or from reworking of the underlying sandy valley gravels. This latter is more likely, owing to the more diverse mineral assemblage in the sand grains of context [3] than in any other samples. Loess is essentially windblown silt (Lowe & Walker 1999, 121).

Recent micromorphological examination of inter-laminated silt and sand in part of a loess / brickearth profile at Heathrow airport, has shown that wind blown sedimentation was likely to have occurred in winter and surface wash during the summer months (Rose *et al* 2000) in some episodes of loess deposition. Similar laminations are common in loess profiles within the Belgium Loess.

The gradual transition from context [3] to context [2] in section 23 was represented in the monolith sample <26> (Table 5) by unit C1, which had occasional faint laminations. The transition between the two contexts was also seen in the gradual increase in silt and clay and decrease in sand from [3] to [2] indicated by the wet sieving results (Table 11). This might suggest that a loessic input was increasingly being incorporated into the accumulating sediment, perhaps as a result of increasingly cold and dry conditions.

The Thanet Beds in this area were described as silt (URL 1997) and may have contributed to contexts [2] and [86]. However, the calcareous nature of these contexts suggest that their silt content was more likely to be derived from loess. Loess is typically 10% carbonate, 15% clay minerals and 75% quartz (R. Langhor, pers. comm.). Although the 'loessic sand' was described as mostly decalcified in the evaluation report, contexts [2] and [86] had a calcareous matrix and were enriched with carbonate precipitations, particularly as root pseudomorphs. The calcareous matrix suggests that these contexts have been at sufficient depth since they were deposited, to not become decalcified. This is echoed by the carbonate precipitations, which also imply that carbonate has been leached from the formerly calcareous upper horizons of the deposit and percolated down the profile. The precipitation around root channels suggests that plants were growing in the deposit, implying that it formed the lower horizons of a soil. It is therefore likely that contexts [2] and [86] represent the lower part of a former loess derived deposit in which weathering and soil formation has taken place.

The non-calcareous upper parts of sections 23 and 26 (contexts [1], [85] and [87] may therefore be the *in situ* decalcified upper horizons of the originally calcareous 'loessic sand'. However, when decalcified, loess becomes highly erodible. It is thus likely that the upper contexts are colluvial and represent decalcified soil material derived from loess and Thanet Sands, transported downslope by water and gravity-aided slope processes during the Holocene. Other evidence for downslope movement of these deposits, such as their morphology (thickening towards the slope foot and valley floor) and the inclusion of apparently rolled and compacted soil clasts in context [1] would support this interpretation. If samples for soil micromorphology were taken, which has potential to identify characteristics such as rolled soil clasts, small scale structure and matrix composition may be seen (Macphail 1992; Allen 1992; Rose *et al* 2000).

The iron stained quartz grains that were common in <24B> might support the suggestion (URL 1997) that evidence for pedogenesis (soil formation) may exist at the surface of the 'primary colluvium' (context [85]). This was tentatively interpreted as a possible Bronze Age landsurface. Although this was not seen in ARC STP 99 due to contractors works, further micro-morphological analysis would be the best way for its identification.

Context [84] in ARC STP 99 was described as secondary colluvium in the 1997 evaluation. It is more clay-rich, with manganese flecks and occasional iron staining, and it is possible that it has resulted from the damper and possibly episodically wet or flooded conditions in the lowest parts of the valley floor. Past hillwash events are likely to have deposited coarser sandy sediment at the valley edge but carried finer particles into the axis of the valley. The identification of possible channel features in both the present investigation and during the 1997 evaluation (URL 1997) within the valley axis suggests that seasonal bournes were likely to have existed in the valley in the past. However, the lack of coarser material implies that during these episodes the valley floor may have been flooded or soggy as opposed to containing flowing water.

The name and location of 'Springhead' Roman settlement, down-valley from the site indicates that springs are likely to have existed in the valley in the past. The water table oscillates rapidly in chalk in response to winter rains and summer drought (Sumbler 1996, 148). As a result, spring heads of seasonal streams move up and down the valley depending on the water level in the chalk aquifer. Thus springs may have seeped from a number of places at the contact of the alluvium / colluvium and chalk after heavy rains.

It has been suggested that the many shallow sub-rounded features excavated below the colluvium (generally cut into [2]/[86] and sealed by [1]/[85] were springs. The features in ARC STP 99 appear to be located on the valley floor and some are certainly archaeological. It is likely that springs would have emerged where chalk exists close to the surface and the group of bowl-shaped features recorded in ARC 330 98 to the south-west of ARC STP 99 appear to conform to this view. The ARC 330 98 features were all very similar, were associated with a possible stream area, and contained no finds. In addition they cut through the lower colluvium and appear to represent a spring line during the colluviation.

It is possible that all the features have been truncated by downslope soil movement. The 'cuts' in ARC STP 99 are only visible in the carbonate concreted parts of the profile [2] and [86]. These contexts are more cohesive and less susceptible to erosion than the overlying sandier decalcified sediments. Valley side sediments are only 'in transit'. The valley sides are likely to have been both a source and a zone of accumulation of sediment (Allen 1992). Therefore it is very likely that features originally cut through decalcified soil material mantling the slope and into the *in situ* loess-derived calcareous subsoil, will eventually be reworked and eroded, leaving only the lower part, cut into the less erodible subsoil, surviving.

The generally well-sorted fine texture and lack of flint and chalk gravel within the colluvial deposits differs from the poorly sorted calcareous valley sediments seen in many downland dry valleys (eg: ARC CXT 97 Area 330 Zone 6). This is probably due to the finer grained source material available, but may also be caused by different types of colluvial processes operating. It would appear that on the present site a continuous process of surface wash has operated, together with soil creep, as there is no evidence for the coarser sediments that accumulate at the foot of rills or gulleys.

A distinct change in colluviation is indicated by the inclusions of chalk fragments in the uppermost deposit [87]. This might suggest that at this time activity was focused on the chalk slope to the sides of the valley, as opposed to the south-west slope, which is capped with Thanet Sand and mantled in loessic material and which was probably the source of the earlier erosion events (and activity). It is possible that this later erosion may have been associated with the use of the Roman land surrounding Springhead Roman Town. Although marling (chalk added to the soil to increase its fertility) and deeper ploughing in the medieval and later periods is another possibility.

Assessment of the monolith samples has suggested that the bedded sand, silt and chalk-flint granules (context [3]), immediately overlying valley gravels, probably accumulated as a result of seasonal meltwater in the Devensian period. On the south-west slopes of the dry valley, loess or locally redeposited loess then accumulated, probably in dry periglacial conditions. It would seem that the earliest loess deposition was contemporary with the same processes that deposited the underlying waterlain deposit, as the transition between contexts [3] and [2] appears to be gradual. Loess deposition has been dated from about 10ka to 25ka BP in this area (Bateman 1998).

Subsequently, probably during the early Holocene, weathering and soil formation took place, which decalcified the surface of the loess. The decalcified loess will have been susceptible to soil erosion. Human activity, especially deforestation and clearance on the plateau and slopes of the dry valley may have triggered hillwash processes, which have eroded the upper decalcified loess and soil from the valley sides and redeposited it further downslope (as contexts [1] and [85]). This seems to have been a continual and gradual process for no evidence for more catastrophic erosion was found (such as the flint and chalk gravel typically found at the foot of rills and gulleys). Material found during the 1997 evaluation dated this colluvial episode to the Bronze Age. Wetter conditions seem to have existed on the floor of the dry valley (as seen by context [84]), perhaps as a result of the seepage of springs from the valley side (as seen in the ARC 330 98 features).

Evidence for a watercourses (though probably temporary) was found directly cutting the valley gravels in 1997, cut into the Late Devensian deposits in ARC STP 99 and cut into the lower colluvium during ARC 330 98. However the more clayey [84], which may correspond to the (undated) secondary colluvium observed in the evaluation ARC STP 97, may represent increasingly wet climatic conditions. During this period a higher water table may have led springs to seep more regularly across a wetter valley floor (as seen in ARC 330 98). The upper 'chalk flecked' colluvium described in the ARC STP 97 evaluation report corresponds with context [87]. This may be derived from more intensive activity on the valley sides, which cut into the chalk, or it may result from marling to improve the fertility of the soil at any time from the Iron Age onwards, but probably during the medieval and post-medieval periods.

The monoliths have sampled all the colluvial contexts identified during fieldwork. However in order to reconstruct the sequence of events and provide information regarding the evolving landscape, environment and soils available to be exploited by the prehistoric and historic communities who occupied the environs of the site, further work on these samples is required. The most useful technique would be to examine the sediments in thin section. As no blocks for soil micromorphology were taken during the excavation, it would be necessary to make thin sections from the monolith samples, if possible. In addition, the fine waterlogged sediment in sample <25> is likely to preserve pollen, which could provide information on the changing ecology and possible human activities within the catchment of the valley. If these colluvial sediments remain undated, pollen might also be able to provide a rough age estimate for their accumulation (in terms of established Holocene pollen zones for the Kent area).

Conservation

If thin sections are made of the monolith blocks they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths the samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. In addition thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined, further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monoliths will be easier to store and less likely to deteriorate than the original soil material.

Long term storage as monolith samples is likely to be costly and is not an efficient use of space or archive material.

Comparative material

Much geo-archaeological research has been undertaken on the slope deposits in the dry valleys of south-east England. This has focussed on identifying periods of instability (sediment accumulation) and stability (soil formation) and attempting to correlate these events with evidence for human activity (Burleigh & Kerney 1982; Bell 1983, Allen 1992).

The colluvial and soliflucted sediments infilling dry valleys have also been investigated by Quaternary Scientists, with the aim of reconstructing Late Glacial environments. Evidence for buried interstadial soils have sometimes been found within these deposits (Preece 1994). Recent work on brickearth, with similar characteristics to the 'loessic sand' (contexts [2] and [86]) on the present site has shown that periods of Late Glacial and early Holocene soil formation can also be detected by soil micromorphology (Rose *et al* 2000).

Examination of deeply stratified colluvial profiles have shown that, as a result of accelerated soil erosion, the deep brown earth soils that developed in the early Holocene below woodland have been removed (Bell and Boardman 1992). Where the colluvial deposits have been well dated (mostly by pottery inclusions or the burial of dated features) the periods of accelerated erosion and stability have been directly correlated with episodes of human occupation and activity upslope (Macphail *et al* 1990; Bell & Walker 1992, 193, Allen 1992).

Valley sediments have been recorded and sampled from several of the CTRL sites (for example Area 330 Zones 3, 4 and 6). As such they record sequences and chronologies for periods of landscape stability and instability that might be compared with each other and to other evidence for human settlement and activity across the North Downs landscape.

In addition, CTRL work being to the north of the A2 and A2-M2 widening scheme works should provide further comparative material.

Potential for further work

The data from the monolith samples has potential to address the following landscape zone and fieldwork aims:

To study the natural landscape, its geomorphology, vegetation and climate, as the context within which the archaeological evidence can be interpreted.
Farming communities (2000 BC-100 BC): to consider environmental change resulting from landscape organisation and re-organisation.

In addition, sample <26> has potential to provide information about the Late Glacial environment.

The achievement of these aims requires a well-dated framework within which to place the geo-archaeological data. The main sequence of colluviation in ARC STP 99 appears to be cut by Late Bronze Age features (and a Bronze Age horizon was identified in the evaluation ARC STP 97) and material seals Neolithic occupation deposits. It is therefore considered that sufficient dating evidence for deposits exist for soil micromorphological examination of thin sections made from the monoliths. This work might enable the sequence of events that record the changing landscape and environment of the valley to be reconstructed. Combined with pollen analysis of the finer sediment towards the valley floor (sample <25>) this could provide information about past ecology and landuse and human–landscape interactions.

In order to extract the most reliable information from the thin sections, it is recommended that prior to resin impregnation for thin section manufacture the monolith inserts should first be x-rayed and subject to loop-sensor magnetic susceptibility determination. In addition, closer-spaced sub-samples than those taken for assessment should also be taken from the tins in case background particle size, loss-on-ignition and phosphate analysis is also needed to provide a suite of data with which trends through the profiles can be reconstructed. Such information is very important when interpreting thin section characteristics.

This data should be examined in conjunction with the archaeological and dating evidence from the site. As a result of these new data the monolith assessment presented here should be refined in order to make the most reliable interpretations about past landuse and environmental change for the environs of the site.

In order to achieve this potential it is suggested that the following further works are attempted:

Table 14: Recommendations for further work on the monolith samples

	Task	staff / technology
1	** a) X-ray and b) magnetic susceptibility determination of 12 monolith inserts. c) Loss on ignition and d) particle size analysis at 30mm intervals through the profiles (30 sub-samples)	Geoarchaeologist (no report at this stage)
2	* Preparation and analysis of 12 pollen samples	Pollen specialist
3	* Impregnation of the monolith samples, manufacture of 6 thin sections of c.110 x 70mm and analysis / interpretation of the depositional and post-depositional characteristics recorded in these samples	Likely to take 3 months to prepare the thin sections.
4	Comparison of the sequence and chronology of events at ARC STP 99 with the archaeological evidence on-site and with valley sediment profiles from other CTRL sites and from the published literature for the area.	Geoarchaeologist
	NOTES;	
	* It is suggested that the thin sections / pollen slides should initially be scanned to assess their potential and, if suitable the analysis should be undertaken.	
	**The results of task 1 analysis will need to be made available to whoever does task 3b. The task 1 analysis will in turn need task 3 information to enable the task 1 data to be interpreted. It is suggested that the task 1 data are sent as uninterpreted data to the task 3 specialist, who will prepare his / her report. The results of task 1 and 3 will then be available, together with the task 2 report for geoarchaeological interpretation. This will form task 4, in which the results of the various geoarchaeological analysis will be integrated.	

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APPENDIX 13: ASSESSMENT OF MOLLUSCS

Alan Pipe

Introduction

Mollusc shells were recovered during excavation works at West of Tollgate (ARC TGW 97), West of Northumberland Bottom (ARC WNB 98), the Area 330 watching brief (ARC 330 98) and Hazells Road diversion (ARC HRD 99).

Study of the molluscan shell was intended to assist the following Fieldwork Event Aims:

to determine the palaeo-economy of settlement through recovery of palaeo-economic indicators

to establish changes in the local environment through the recovery of suitable palaeo-environmental samples from the fills of cut features

to determine the late and immediate post-Roman landscape.

Methodology

In each case, the soil was processed using a modified Siraf-type tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. The flot and residue fractions were air-dried in a warm drying cabinet and then visually sorted for mollusc shell.

Each sample was roughly quantified and then scanned under a binocular microscope to determine the species-composition of the assemblage. Taxonomic identifications were made using the MoLSS reference collection in conjunction with Cameron & Redfern 1976; and Kerney & Cameron 1979. Allocation of identified taxa to habitat groups, as specified by the CTRL post-excavation assessment report template, followed these sources together with Kerney 1999.

All mollusc groups were examined; no sub-sampling was required.

Quantification

ARC TGW 97 produced nine sample groups containing approximately 160 shells from cut features. The mollusc group from the monolith sequence was, in general poorly preserved, but still produced identifiable species remains.

ARC 330 98 produced six sample groups containing approximately 80 shells from cut features.

ARC WNB 98 provided a total of 14 column sample groups containing approximately 402 shells from ditch [332]; the fills of which dated to the Middle/Late Iron Age. These groups were recovered from column samples taken at measured depths at 0.1m intervals. A further 41 sample groups containing approximately 4,900 shells, were wet-sieved/floated from bulk samples from pits, postholes, ditches and other cut features.

ARC HRD 99 produced a total of 18 sample groups containing approximately 160 shells from cut features.

The material derived almost entirely from terrestrial species with a very minor component of edible marine species; there were no freshwater species.

Identified terrestrial taxa recovered were Oxychilus sp., Vallonia sp., Vallonia *pulchella, Vallonia costata, Cepaea nemoralis, Helix aspersa, Hygromia sp., Retinella sp., Helicella sp.*, *Helicigona lapicida*, *Ena montana*, *Cochlicopa lubrica, Pupilla muscorum, Columella edentula, Pomatias elegans*, *Clausilia sp., Balaea perversa, Cecilioides acicula* and *Discus rotundatus.* Shells of common whelk *Buccinum undatum*, common mussel *Mytilus edulis*, common cockle *Cardium edule,* and common/flat oyster *Ostrea edulis* were also recovered.

The Table (below) groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

The material comprised almost entirely of terrestrial species with no freshwater forms, with minor recovery of edible marine species. The terrestrial assemblage included catholic, shade loving, open country, and burrowing species.

The material is, in general, from well dated Iron Age, Roman and medieval features (see tables below), is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure identification and quantification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample groups in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality ‘shoe-box’.

There is no reason to discard any of the mollusc assemblage.

Comparative material

The material from these sites can be compared directly with similarly dated deposits from other sites within the CTRL project.

Comparison may also be made with north Kent sites summarised in Philp 1984; and Philp, Parfitt, Willson & Williams 1999.

Potential for further work

The assemblage has some potential to contribute to study of each of the listed Fieldwork Event Aims related to the nature of local habitats and landuse. The molluscs have considerable potential for further study in terms of species identification and accurate quantification. Once this work is done, it will then be possible to detect spatial and temporal variation resulting from changes in local conditions, such as shading, and to consider their implications for changes in landuse.

It may also be possible to obtain Accelerator Mass Spectrometry (AMS) radiocarbon dates on the snails obtained from the bulk samples (Contexts [2] and [3] from ARC TGW 97), if required. AMS dating of the snails would probably be the best way of dating the sediment sequence seen in the monolith sequence. Unfortunately there were no snails preserved in the lowest redeposited soil material.

The very sparse marine fauna does not generally provide potential for further study although the large group of oyster shell from ARC WNB 98 [238] subgroup (38) has some potential for metrical analysis which may give an insight into the nature of the exploited oyster population.

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Table 15: Assessment of molluscs from ARC TGW 97

+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Event code	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**	**ARC TGW 97**
Column/Section									
Sample	5	6	7	8	9	14	16	13	15
Date/interpretation	natural	Natural	natural	natural	natural	/ditch	/ditch		/ditch
Context	2	2	2	3	3	101	124	154	170
Depth (m)									
Catholic species				+			+		
Open country species	++	+++	+		+		+		++
Shade-loving species							+++	+	+++
Burrowing species									
Aquatic species									
Marine species									
Approx totals	10	25	5	1	1	0	50	1	65

Table 16: Assessment of molluscs from ARC WNB 98

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section							
Sample							
Date/interpretation	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch
Context	[332]	[332]	[332]	[332]	[332]	[332]	[332]
Depth (m)	0-0.1	0.1-0.2	0.2-0.3	0.3-0.4	0.4-0.5	0.5-0.6	0.6-0.7
Catholic species	+++	+	+	+		+	+
Open country species				+			+
Shade-loving species	+++	+	+++	+++	+++	++	+++
Burrowing species							
Aquatic species							
Approx totals	110	2	21	25	16	12	36

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB98**
Column/Section							
Sample							
Date/interpretation	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch	IA/ditch
Context	[332]	[332]	[332]	[332]	[332]	[332]	[332]
Depth (m)	0.7-0.8	0.8-0.9	0.9 –1.0	1.0-1.1	1.1-1.2	1.2-1.3	1.3-1.4
Catholic species					+	+	+
Open country species						+	
Shade-loving species	+++	+++	+++	+++	+++	+++	+++
Burrowing species							
Aquatic species							
Approx totals	30	25	25	13	16	34	37

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section									
Sample	38	35	34	75	77	36	1	37	2
Date/interpretation	/ditch	/ditch	/ditch	/oven	/oven	/ditch		/ditch	
Context	238	268	269	292	292	296	302	362	372
Depth (m)									
Catholic species	+++					+++		+++	
Open country species						+			
Shade-loving species	+++	+	+++			+++		+++	
Burrowing species		+++	+++	+	+++		+++		+++
Aquatic species									
Marine species	+++								
Approx totals	320	150	40	5	120	755	25	80	20

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section								
Sample	3	10	17	18	24	28	30	16
Date/interpretation	/ditch	/ditch	/ditch	/ditch	/pit	/pit	/pit	/crem
Context	381	392	397	421	447	451	510	518
Depth (m)								
Catholic species				+				
Open country species			+					
Shade-loving species	++		+++	++	++			++
Burrowing species	++	+++			++	+++		
Aquatic species								
Marine species	+++						+++	
Approx totals	45	20	50	20	20	50	75	10

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section									
Sample	59	73	5	6	7	8	11	12	13
Date/interpretation	/ditch	/fill	/phole	/pit	/pit	/pit	/pit	/pit	/pit
Context	526	565	1004	1008	1009	1026	1027	1032	1033
Depth (m)									
Catholic species		+							
Open country species	+								
Shade-loving species	+++	+++			+++	+++		+++	
Burrowing species	++	+++	+++	+++	+++			+++	+++
Aquatic species									
Marine species	+						+		
Approx totals	30	120	30	500	400	30	3	200	50

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Sectn										
Sample	14		26	27	55	54	65	56	58	63
Date/interpretation	/pit		/pit	/pit	/ditch	/ditch	/kiln	/ditch	/phole	/grave
Context	1036	1037	1043	1046	1048	1051	1056	1063	1099	1191
Depth (m)										
Catholic species					+			+		
Open country species	+				++	+		++		
Shade-loving species	+++	+	+++	+++	+++	+++	+++	+++	++	+
Burrowing species	+++	+	+++	+++	+++	+++	+++	+++	++	+
Aquatic species										
Marine species	+					+				
Approx totals	600	10	200	95	240	120	40	140	25	10

Event code	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**	**ARC WNB 98**
Column/Section				
Sample		70	78	81
Date/interpretation		/ditch	/oven	/?crem
Context	1202	1279	1281	2163
Depth (m)				
Catholic species		+		
Open country species		+		
Shade-loving species		++	+	
Burrowing species	+++	+++	+++	+++
Aquatic species				
Approx totals	100	40	20	75

Table 17 : Assessment of molluscs from ARC 330 98

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Section						
Sample	21	80		57	67	144
Date/interpretation	M/LIA/pit	M/LIA/pit				/quarry pit
Context	141	324	325	338	344	561
Depth (m)						
Catholic species	+				+	+
Open country species						
Shade-loving species			+++	+		++
Burrowing species		+		+		
Aquatic species						
Marine species						
Approx totals	5	1	50	5	1	15

Table 18: Assessment of molluscs from ARC HRD 99

Event code	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**
Column/Section										
Sample	1	2	43	5	6	10	34	16	35	40
Date/interpretation	Rom/hearth	/hearth	ext.occ				med/ditch	med/ditch	med/ditch	LRom/pit
Context	2	3	7	15	20	26	53	60	77	80
Depth (m)										
Catholic species	+							+		+
Open country species					+					
Shade-loving species		+	++		+++	+	+	+	+	+
Burrowing species				+						+
Aquatic species										
Marine species							+			
Approx totals	1	5	10	2	25	3	5	5	5	10

Event code	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**	**ARC HRD 99**
Column/Section								
Sample	27	36	37	38	53	45	46	54
Date/interpretation		/ditch	med/ditch	LRom/ditch	LRom/ditch	med/ditch	med/ext.surf	
Context	98	104	105	106	131	156	163	213
Depth (m)								
Catholic species	+	+			+	++	+	
Open country species	+			+	+	++		
Shade-loving species	+	+	+	+	+	++		+
Burrowing species	+							
Aquatic species								
Marine species						+	+	
Approx totals	15	10	5	10	5	30	5	5

PS: WEST OF NORTHUMBERLAND BOTTOM

APPENDIX 14: ASSESSMENT OF CHARRED PLANT REMAINS & CHARCOAL
Anne Davis

Introduction

A total of 167 bulk soil samples were taken for environmental analysis during the excavation of the three sites in Zone 3; 64 came from ARC WNB 98, 51 from ARC HRD 99, and 52 from ARC 330 98. The sampled deposits came from a wide variety of features and ranged from late Bronze Age to medieval in date. Sample sizes ranged from 5 to 30 litres. An interim assessment report had been written previously on twelve of the samples from ARC WNB 98 (Giorgi 1997), and information from this has been included here.

The study of botanical material from this site should assist in determining the palaeo-economy of the settlement. This could include the functions of features and settlement areas, and the activities taking place there, in each of the periods represented.

Methodology

The samples were processed by flotation, using a Siraf flotation tank, with meshes of 0.25mm and 1.0mm to catch the flot and residue respectively. All flots and residues, were dried. The residues were fully sorted by eye for artefacts and biological material, except in a few cases, where substantial numbers of charred seeds and grains remained in the residue after processing. In these samples, the larger residue fraction (>2mm) was fully sorted, and the smaller retained for sorting at the post-assessment stage of the project. The flots were briefly scanned using a low-powered microscope, and the abundance, and general nature of plant macrofossils and any faunal remains were recorded, using the following scale for the number of charred items per sample:

+ = 1-10, ++ = 11-50, +++ = 51-100, ++++ = 101-1000, 1000+ = >1000.

Results were recorded on the MoLAS ORACLE CTRL botany database, subsequently translated onto RLE Datasets.

All samples with flots were included in the assessment. Most of the flots were less than 100ml in volume, but where they exceeded this, 100ml sub-samples were assessed. In a few cases, where samples were very rich and the plant remains quite uniform, these sub-samples were reduced to 50ml, but in all cases the estimated quantities are for the entire sample. Occasionally plant remains were recovered from the residues of samples with no flots, and these were also included.

Quantification

Of 167 samples processed, 81 produced flots and a total of 134 included charred plant material in flots and/or residues, although in many cases this consisted only of flecks of charcoal. Charred cereal grains were seen in 73 samples, and 23 of these contained over 50 grains, although many other samples had fewer than ten grains. Cereal chaff was recorded from 30 samples (over 50 items in nine), and charred seeds from 58 samples (over 50 seeds in

11 samples). Preservation of the plant remains ranged from moderate to very poor. In the majority of samples charcoal was reduced to very small fragments, but pieces large enough for species identification were recorded from ten samples. No waterlogged plant remains were recovered from these sites. Assessment data for the more productive samples from each site are shown in the tables below.

In almost all samples wheat (*Triticum* spp.) seemed to be the predominant grain, with both glume wheats and free-threshing species present. Grains of barley (*Hordeum sativum*), rye (*Secale cereale*) and oats (*Avena* spp.) were also seen in some samples. Cereal chaff also came mainly from species of wheat and included glume bases, spikelet forks, and rachis fragments. The majority of charred weed seeds were from disturbed-ground species, with corn gromwell (*Lithospermum arvense*) seen in very great numbers in some samples from ARC WNB 98. Fragments of hazelnut (*Corylus avellana*) shell and stones of *Prunus* sp. were seen occasionally, and pulses, probably peas (*Pisum sativum*) or horse beans (*Vicia faba*) were quite abundant in some of the medieval samples.

The majority of samples included variable amounts of rootlets and/or moss, and sometimes uncharred seeds, presumably of modern origin. It is therefore possible that some of the charred plant remains are also intrusive. This is unlikely to be a problem where large and relatively uniform assemblages are concerned.

Provenance

Samples from late Bronze Age and Iron Age features in the area of Hazell's Farm on ARC 330 98 (Figure 5), and mid-late Iron Age deposits in Area A/B on ARC WNB 98 (Figure 6), were mostly devoid of any plant remains except charcoal flecks. Twelve samples from pit fills at the former site however, and five from ditch- and pit fills at the latter, contained very low numbers (less than 10) of charred cereal remains and/or weed seeds. A charred fruit of ?*Prunus* sp. was also found in a ARC WNB 98 pit fill. Four of the ARC 330 98 samples included a few identifiable fragments of charcoal.

Over 50 cereal grains, and smaller quantities of chaff and weed seeds were found in three samples from the late Iron Age/early Roman ovens/hearths/firepit fills in Area A/B on ARC WNB 98 (Figure 10). Six samples from ditch fills and other contemporary features in this area contained smaller charred assemblages, and a cremation sample included a little identifiable charcoal.

A number of very large assemblages of charred plant remains were recovered from Roman features in Area C, ARC WNB 98(Figure 16). Two of these, from the fill of a roadside ditch, and a pit fill at the eastern end of the area, consisted predominantly of cereal chaff and may represent local crop-processing activities. A further seven samples, from pit fills within a square enclosure to the north of the east to west droveway, each contained many hundreds of cereal grains, chaff and weed seeds. Varying amounts of charred material were found in four samples associated with clay oven (Plate 5), but one, possibly a rake-out deposit, contained very many chaff fragments, with a smaller number of cereal grains. Some of these remains are likely to represent fuel used in the oven, but others may also provide clues as to its function. Samples from the enclosure ditches in this area contained very few plant remains.

Abundant charred plant remains were again found in samples associated with the partially excavated Roman malting oven or 'corn dryer' at ARC HRD 99 (Figure 7, Plate 6). Cereal grains predominated in the ten samples from this feature, and in four of these many hundreds or thousands of grains were estimated to be present. All these samples included very many weed seeds, and two also had many chaff fragments. Around 100 grains, and identifiable charcoal, were seen in a sample from a hearth or kiln on the same site, and there were occasional charred remains in samples from other features, including ditch and pit fills.

Two of the three samples from a tread deposit within a medieval sunken building in Area A/B, ARC WNB 98 (Figure 13), contained many charred cereal grains, mostly wheat. A substantial number of charred pulses were also seen, most of them probably peas, as well as occasional fruit stones.

At ARC HRD 99 five samples associated with a medieval malting oven or kiln contained very many charred cereal grains, rachis fragments and weed seeds (Figure7, Plate 7). Two of these samples also contained identifiable charcoal. Occasional charred plant remains were also present in medieval ditch fills from this area.

Conservation

The dried flots, and plant material from the residues, have no particular conservation requirements.

Comparative material

Very little comparative material has been found in the area. A few grains of spelt wheat and six-row, hulled barley were recovered from four Iron Age pits at Farningham Hill in the Darent Valley (Vaughan 1984), and similar remains were found in a late Roman ditch at the Keston Roman villa site. These also included several grains of spelt, as well as a few glume bases and spikelet forks from the same species, one oat grain, and a grass seed (Hillman 1991). While these remains are very limited, they are similar to those found from the same periods at the Zone 3 sites, and on other sites in southern England. A charcoal sample from Keston contained mostly pieces of probable hawthorn (*Crataegus* sp.) (Straker 1999).

Potential for further work

Few plant remains were recovered from the Bronze Age and Iron Age samples within Zone 3, so their value in answering the project aims is limited. Very little material of this date, and from this area of Kent, has been previously studied however, and analysis of the 12 samples will improve our knowledge of cereal use and cultivation in these periods. Identification of the four charcoal samples will give an idea of the wood species being exploited.

Many of the samples from Roman (and possibly late Iron Age) features, in different parts of the study area, were very rich in charred plant remains, and have the potential to contribute substantially to our knowledge about the palaeo-economy of the settlements. Oven and hearth features in ARC WNB 98 Areas A/B, C, and on ARC HRD 99 all contain rich assemblages of charred plant remains, which can be used to investigate their functions, and to compare the nature of the materials used as fuel. Very large assemblages from ten pitfills inside the square enclosure in ARC WNB 98 Area C, and from a ditch fill and pit fill nearby will help to determine the nature and economy of this settlement, and also what crop-related activities were taking place. Samples with moderate-sized assemblages from Roman ditch and pit fills will provide extra background data on cereal use and processing.

Charred plant remains from the medieval sunken building in ARC WNB 98 Area A/B, which included pulses and fruit stones as well as cereal remains, may be useful in determining the function of the feature. These remains will also provide information on the economy of the site and, to a limited extent, the diet of its inhabitants. The function of the medieval oven/kiln in ARC HRD 99 may be revealed by analysis of the plant remains associated with it. Plant materials used as fuel in this feature can also reflect aspects of the site economy.

Comparisons should be made between the settlement areas, both within and between periods. In addition to exploring the importance of different cereals, and the implications of cereal chaff, to the functions of features and the economy of the site, assemblages of arable weed seeds should also be compared. Analysis of their soil and habitat preferences may indicate possible areas of origin for the crops, and may vary between periods or settlement areas.

Due to the very large assemblages in many samples, it may be desirable to select representative samples for analysis, where several samples have been taken from the same, or closely related contexts. It is suggested that all 17 of the prehistoric samples (which contain few plant remains) should be analysed, together with five from the late Iron Age/early Roman settlement (ARC WNB 98, Area A/B), ten from Roman levels in Area C, and six from ARC HRD 99. From medieval deposits it is suggested that two samples from area A/B and three from ARC HRD 99 should be analysed. Final selection should take place in consultation with stratigraphic specialists, prior to the commencement of analysis.

Flots from the selected samples will be sorted, and macrofossils from flots and residues identified and counted, using a low-powered microscope. Large flots and assemblages will be sub-sampled, and sufficient sub-samples sorted to produce at least 500 items. The remaining flot will then be rapidly scanned for any new species not seen in the sub-samples. Where partially sorted residues containing charred remains have been retained, these too will be sub-sampled if necessary, and the same proportions of flot and residue sorted. Analysis of the results will include calculating the relative abundance of each cereal, and of grains, chaff and weed seeds, in each sample and within features and areas. The environmental preferences and soil requirements of weed species will also be investigated. Charcoal samples would be identified to species where possible, using an epi-illuminating microscope.

The tasks may be itemised as the requirement to complete the recording and analysis of the 43 suggested samples, and preparation of the report:

Sorting and identification of charred remains from 43 flots and retained residues

data entry
preparation of tables
analysis
preparation of publication report

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Table 19: Assessment of Charred Plant Remains & Charcoal from ARC WNB 98

Key: gp: Group; SG: Subgroup

sample details						flot and residue details							residue	
gp	**SG**	**Context no.**	**sample no.**	**Feature type**	**sample vol (l)**	**flot vol (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**	**size (ml)**	**% sorted**
22	452	268	35	Ditch	10	10			+	+	+	Modern moss.	4000	100
22	452	269	34	Ditch	20	20			+	+	++	Modern moss.	3000	100
22	454	278	33	Ditch	5	2			+	+	++	Some rootlets.	2000	100
23	446	510	30	Pit	5	30	+		+	++	+	1 complete charred fruit - Prunus? Mostly unch'd roots, pods,stems, wheat rachis.	4000	100
23	447	451	28	Posthole	5	30	+		+	++	++	Mostly rootlets.	2000	100
38	167	2163	81	Grave	10	50			+		++++	Cremation? Flot all charcoal, few frags identifiable.	1500	100
74	57	818	72	Pit	5	5	+		+		++	Rootlets.	800	100
81	299	518	16	Grave	10	20	+		+		1000+	Lithospermum seeds, few grains.	200	100
81	309	372	2	Oven	10	20	+++	++	++	+	+++	>50 grains. Rootlets.	300	100
81	312	302	1	Oven	10	20	+++	++	++	+	++	C.50 grains, mostly wheat. Rootlets.	300	100
82	267	381	3	Ditch	20	20	++	+	+		+++	C. 12 grains, poor condition. Many rootlets.	5000	100
82	278	426	19	Ditch	?	10	+		+		++	Rootlets	2000	100
82	279	392	10	Ditch	20	10	++		++	+	+++	Grains mostly wheat. Few rootlets.	2000	100
82	286	526	59	Ditch	20	10	+	++	+		++	C.10 glume bases; grass & legume seeds.	4000	100

sample details						**flot and residue details**							**residue**	
gp	**SG**	**Context no.**	**sample no.**	**Feature type**	**sample vol (l)**	**flot vol (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**	**size (ml)**	**% sorted**
85	306	916	74	Pit	20	20	+++	++	++		++	C.70 grains-poor cond. Weeds eg Centaurea, Lathyrus/Vicia, Rumex spp. Rootlets.	1500	100
95	64	1051	54	Ditch	10	30	+	+	+		++	V. few wheat grains, glume bases, legumes. Many rootlets.	2000	100
97	102	1009	7	Pit	30	200	++	++	++	++	+++	Grain poorly preserved. Wheat glume bases, barley rachis. Rootlets. 3000		100
97	108	1008	6	Pit	30	25	++			++	++	10-20 grains. Rootlets.	300	100
97	111	1026	8	Pit	30	100	++	+	+	++	++	10-20 grains, poor preservation. Rootlets.	4000	100
97	114	1027	11	Pit	30	0	++++	++++	1000+	+	++++	Lithospermum &g rass seeds. Grain poor, most wheat.<4mm res. unsorted. Rootlets.	2000	85
97	114	1056	65	Pit	30	60	++++	++++	++++		++	Wheat. Lithospermum & grass seeds. Gl bases, sp forks, rachis. Rootlets.	1500	90
97	114	1032	12	Pit	30	150	++++	++++	++++		++++	Mainly wheat grains, glume bases. Lithospermum seeds. Rootlets. 3500		100
97	114	1033	13	Pit	30	100	++++	++++	++++		++++	Mainly wheat grains, glume bases. Lithospermum seeds. Rootlets. 1000		100

sample details						flot and residue details								residue	
gp	**SG**	**Context no.**	**sample no.**	**Feature type**	**sample vol (l)**	**flot vol (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**		**size (ml)**	**% sorted**
97	117	1036	14	Pit	30	200	++++	++++	++++	++		Mainly wheat grains, glume bases. Lithospermum seeds. Rootlets. 2000			100
97	117	1043	26	Pit	30	150	+++	++	+++		+++	Mainly wheat grains, glume bases. Weed seeds. Prunus sp. Rootlets. 4000			100
97	118	1046	27	Pit	30	50	++++	++	++	++	++	100+grain, most wheat, poor cond. Many mollsc.<4mm res unsorted. Rootlets.		3500	90
98	4	1262	69	Ditch	20	30	+++	1000+	++		++	>1000 chaff frags, c80 grains, mostly wheat. Rootlets.		500	100
111	8	1201	68	Pit	10	40	+++	1000+	++	+	++	1000s gl bases, sp forks. c100 grains, mostly wheat. Rootlets.		500	100
114	68	1281	78	Oven	10	20	++	+	++		+	C.20 grains, hazelnut, weed seeds. Rootlets.		500	100
114	69	1270	71	Oven	10	10	+	+	+	+		Rootlets.		2000	100
114	70	1279	70	Ditch	10	40	+++	++++	++	+	++	C.50 grains, >100 chaff. Weeds Lithospermum, Ranunculus, Rumex spp.		1000	100
	231	292	75	Floor	20	50	+++	++	+++	++	++	>50 ?peas, few ?beans, Prunus sp., weed seeds. Uncharred seeds.		1500	100
	231	292	76	Floor	20	2	+ +		+		++	Few pulse fragments. c.10 grain including rye.		1500	100
	231	292	77	Floor	20	30	++++		+++		++	Much wheat. C.40 ?peas, ?beans, Prunus sp.,weed seeds.		1000	100

Table 20: Assessment of Charred Plant Remains & Charcoal from ARC HRD 99

Sample details					**flot and residue details**							**residue**	
SG	**context no.**	**Sample no.**	**Feature type**	**Sample vol (l)**	**flot vol (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**	**vol (ml)**	**% sorted**
725	14	19	Demol-ition	20	40	+++		+++		>1000	c.50 grains -wheat, rye, oats. c.50 weeds. Few id ch'cl frags. Moss.	500	100
727	163	46	Layer	10	50	++++	+++	+++		>1000	c.800 grains+frags. Rachis frags. Arable weeds + *Prunus* sp. Moss.	4000	100
738	184	49	Occupation	10	40	>1000	+++	+++		>1000	>1000 grains, most ?bread wheat. Rachis frags. 400ml unsorted res. ?id ch'cl. Moss.	500	20
741	187	50	Occupation	10	40	++++	+	++		>1000	c.200 grains, most ?bread wheat. Moss.	400	100
747	169	47	Oven	10	10	++++		++		>1000	c.150 grains, most ?rye & ?bread wheat.	1500	100
758	3	2	Hearth	5	2	+++				+++	c.100 grains, most wheat - poor cond. ID charcoal. Modern moss.	500	100
800	18	41	Pit	10		++		+		++	10-15 grains, 1 large legume.	1500	100
805	63	24	Layer	10		++					20-30 grains, most wheat & oats. Poor condition.	1000	100
809	102	29	Demolition	30	10	++		+		++	c.15 grains, few legume seeds. Rootlets.	2000	100
809	102	30	Demolition	20	20	+	+	+		+++	1 wheat rachis. Much moss.	1000	100
810	103	31	Layer	10	30	>1000	+	++++		>1000	>300 grains + more in 300ml unsorted res.>300weeds,most legumes. Little moss.	800	60
810	103	32	Layer	10	10	++				++++	25-30 grains - poor condition. Moss.	500	100
810	132	42	Layer	10	15	++		+		+++	c.15 wheat & barley grains, fragmentary. Moss.	1000	100
810	132	44	Layer	10	5	+		+			Flot mainly clinker.	500	100
810	132	57	Layer	10	10	+++		++		+++	c.100 grains - most wheat. Frag of *Prunus* sp.	1000	100

sample details					flot and residue details							residue	
SG	context no.	sample no.	Feature type	sample vol (l)	flot vol (ml)	grain	chaff	charred seeds	unch'd seeds	charcoal	comments	vol (ml)	% sorted
810	217	58	Layer	10	300	>1000	++++	++++		>1000	Flot 90% grain. Most ?spelt/emmer. Glume bases,sp forks. 600ml unsorted res.	3000	80
810	218	59	Layer	10	100	>1000	+++	+++		>1000	Flot 99% grain. Most wheat. Glume bases, sp forks. 600ml uns res. Id ch'cl. Moss.	2500	75
819	219	61	Oven	5	30	++++	++	+++		>1000	c.400 grains, mostly wheat. Glume bases.100ml unsorted res. Moss.	300	67

Table 21: Assessment of Charred Plant Remains & Charcoal from ARC 330 98

sample details					flot and residue details							residue	
SG	**context no.**	**sample no.**	**feature type**	**sample vol (l)**	**flot vol (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**	**vol. (ml)**	**% sorted**
	no.	**no.**		**vol. (l)**	**vol. (ml)**			**seeds**	**seeds**				**sorted**
3002	112	13	Pit	20						++	?id charcoal	1000	100
3004	110	9	Pit	20						+	Id charcoal	300	100
3008	121	20	Pit	10	10	+	+	+	+	++	Wheat grains	200	100
3009	141	21	Pit	8	10	+	+			+++	Few grains, glume base. Rootlets, moss.	500	100
3011	315	60	Pit	10	15	+			+	++	Few grains. Rootlets.	1000	100
3012	138	16	Pit	4		+				+	1 grain, 1 frag.	2000	100
3013	561	144	Pit	30				+		+++	Hazelnut shell frag.	500	100
3014	146	44	Pit	30	20	++		+		++++	C.6 grains. Charcoal sample. Roots & moss.	1000	100
3014	264	53	Pit	20	80	+	+			>1000	Few grains & glume base. Some id charcoal. Rootlets.	500	100
3015	148	22	Pit					+			2 frags hazelnut shell	300	100
3015	149	23	Pit	7	30	+	+	++	+	++++	Few wheat grains+glume bases. Moss & rootlets	1500	100
3036	325	65	Pit	10		+				+	3-4 grains	2000	100
3039	344	67	Ditch	10		+			+	+	2 grains	200	100
4162	225	54	Pit							+++	Id charcoal	200	100

APPENDIX 15: ASSESSMENT OF GEO-ARCHAEOLOGY - DOWNS ROAD
Jane Corcoran

Introduction

One monolith sample was obtained from slightly down-slope of a multi period area which showed evidence for burning on a north-facing slope to the north of Hazell's Farm. The monolith assessment aimed to investigate whether the deposits had accumulated as a result of Iron Age activity or rake-out from the post-medieval kiln and the processes that may have been involved.

The monolith sample was obtained by hammering a 500mm x 50m x 50m tin into the cleaned section face. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith location was marked on the section drawing and a level, related to Ordnance Datum was taken on the top of the tin.

Methodology

The sediments sampled in the tin were cleaned and described using standard sedimentary criteria (Jones, 1999). This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

Every distinct unit was given a separate letter and the nature of the contact between each unit was noted. The units identified during description are related to the contexts described on site in the profile description and, where possible, the profile is discussed in terms of contexts as opposed to the units identified in the monolith tin, in section 4.

Quantification

This section gives the results of the monolith assessment. The sequence is described in the table below. In this table the elevation (in m OD) is given for the contacts between the units and brackets denote the thickness of the individual units.

Table 22: Assessment of Geo-Archaeology: ARC 330 98

Unit	Elevation of contact (m OD)	Description and Contacts Sample <68>	Context
	23.57	TOP OF MONOLITH SEQUENCE	
1	[0.15m thick]	Dark yellowish brown 10YR4/4 compact, slightly clayey fine sandy silt. Occasional angular and sub-angular chalk granules and very occasional granular sized flint gravel. Charcoal flecks are moderately abundant and increase but become more minute with depth. This unit has a slightly greyer colour than units 2 & 3 and may be derived from charcoal and clay. Very occasional iron concretions and CBM flecks.	[339]
		diffuse contact to:	
2	[0.20m thick]	Dark yellowish brown 10YR4/6 compact sandy silt. Colour becomes gradually paler downwards. Frequent minute charcoal speckles, more minute than in unit 1 and become less abundant downwards. Diffuse speckled patches of carbonate (?precipitations).	none
		sharp contact (follows irregular crack) to:	
3	[0.15m thick]	Yellowish brown 10YR5/4 sandy silt. Humic stained root channels terminate at contact with unit 2, some contain chalk granules. Fewer charcoal flecks and very occasional diffuse carbonate precipitations than in units 1 & 2.	none
	23.07	BASE OF MONOLITH SEQUENCE	

Provenance

The sediments are not specifically dated. However, they are from a sequence that appears to include the first evidence for human activity from this section, above a colluvial deposit. It is therefore likely that the humanly derived material relates to the Mid to Late Iron Age activity recorded further upslope, where there is extensive evidence for burnt material (furnaces [1427], charcoal, burnt daub, burnt flint).

Unit 3 at the base of the monolith sample appears to be a lower horizon of a soil, which developed in brickearth-like parent material (probably derived from colluvial processes).

This has been truncated, perhaps by the same activity or process that deposited unit 2. Although unit 2 is also brickearth-like it does not have root channels and contains many charcoal speckles, together with diffuse carbonate patches, which may be derived from ash. Unit 2 also becomes a darker, slightly greyer colour upwards.

This trend is continued into the upper unit (unit 1, context [339]) which is greyer, slightly clayey and contains larger charcoal flecks together with chalk and flint granules.

The monolith description suggests that there may have been deliberate truncation of the former vegetated ground surface. The sediment accumulation above this appears to have built up as a result of sediment movement down slope and inclusions of charcoal and possibly ash imply that at least some of the sediment may have been derived from burning. Larger particles of charcoal occur in the upper unit, which has a greyer colour, which may be caused by a soot or a finely comminuted charcoal component. This may have been washed down through the profile, or it may indicate an intensification or slight change in the activities and processes undertaken up slope.

Conservation

If thin sections are made of the monolith they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths, samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. Thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monolith will be easier to store and are less likely to deteriorate than the original soil material and will provide supporting information to the thin sections.

Long term storage as a monolith sample is likely to be costly and is not an efficient use of space or archive material. After analysis, if not impregnated with resin and converted to thin sections, the sample should be discarded.

Comparative material

The thin sections produced should be compared to those from the colluvial sediments from other parts of the CTRL route, including those from the dry valley in the eastern part of Zone 3, the Medway Valley and Whitehorse Stone. These thin sections would act as a control, representing the products of colluviation in 'un-modified' soil materials in this area. They should also be compared to thin sections of burnt brickearth (eg: floor slabs, as found in Boudican and Hadrianic fire deposits from London) and to slides of trampling and ash deposits (typically those from cave sediments). These comparisons would enable the characteristics of the deposits from the present site to be identified and interpreted.

The magnetic susceptibility results should also be compared to magnetic susceptibility values from other sites along the CTRL route, to provide a background level against which the values from the present site can be compared. Interpretation of the results should be made in the light of relevant published literature (Dearing 1999; Oldfield *et al* 1984)

Potential for further work

The data from the monolith samples has potential to address the following research objectives:

Farming communities (2,000 – 100BC): Consider environmental change resulting from landscape organisation and re-organisation

The sediments sampled from ARC 330 98 would appear to have potential for further investigation into the activities occurring in the vicinity of Hazells Farm (Figure 5). This should involve thin section analysis and magnetic susceptibility determinations. The analysis should attempt to determine the mechanisms that deposited units 1 and 2: was it 'natural' erosion of waste materials as a result of hillwash or soil creep and wind blowing charcoal and ash? Or were they deliberately dumped deposits? It should also attempt to establish whether the changes in the characteristics of units 1 and 2 are the result of slightly different activities. Or are they a result of subsequent soil formation and weathering of waste materials, translocating the fine components down through the profile.

The magnetic susceptibility of a sediment is enhanced by burning (amongst other things). Thus the products of burning activities which produced the charcoal and burnt daub should, even if disintegrated and redeposited produce higher values than un-modified brickearth. As magnetic susceptibility is also enhanced by weathering, a soil will have higher values than un-modified brickearth.

Thus by comparison of the values obtained through the monolith profile with those for local unmodified brickearth and results would give an indication of if the sediment is derived from occupation burnings or industrial activities might be inferred.

If thin sections were to be made of the monolith sediments a more reliable indication of their components would be obtained. High incidence of components such as phytoliths (often found as the main component of ash) and burnt clay might indicate a brick-clamp and their micro-stratigraphic relationships may be able to suggest whether they have been dumped and become weathered *in situ* or transported downslope by hillwash or soil creep processes. Examination of the thin sections may also be able to interpret the difference that appears to exist between units 1 and 2. This may be a result of soil formation or different inputs or depositional processes.

Recommendations for further work:

Task
Further sedimentological work (Geo-archaeologist): Scrape continuous 20mm sub-samples from the surface of the monolith for magnetic susceptibility and other analysis as required, to support the micromorphological results. Carry out: magnetic susceptibility by pot sensor method (and possibly loss on ignition, phosphate and particle size analysis of these sub-samples as discussed with the micromorphologist) Make the results of these techniques available to the soil micromorphologist
c) **Thin section analysis** (Soil micromorphologist): Set monolith sample in resin Manufacture thin sections, each 35mm x 90mm covering: 1 / 2 and 2/3 interfaces Examination of these thin sections and production of a report
d) **Interpretation of the results** (Geoarchaeologist) integration of the results of (a) with the results of (b), other CTRL sites, especially ARC-TGW97, published sources and this assessment report.

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APPENDIX 16: ASSESSMENT OF GEO-ARCHAEOLOGY – WEST OF TOLLGATE

Jane Corcoran

Introduction

This report presents the results of the assessment of four monolith samples recovered from the east-facing section of ARC TGW 97 trench 1472TT, located towards the base of the dry valley at the eastern end of Zone 3. The sediments sampled were provisionally interpreted as colluvial slope deposits during excavation.

The objective of the geoarchaeological assessment is to examine the depositional and post-depositional processes that have taken place on the site. In particular, this might enable periods of erosion landscape stability to be identified. Periods of erosion (and landscape instability) might be marked by accumulations of colluvial sediment transported downslope by gravity and water-aided slope processes. Periods of stability may be characterised by episodes of soil formation and vegetation growth. If these processes can be dated, they may be linked to episodes of human activity on the site and its environs. Thus it may be possible to investigate the impact and repercussions of human disturbance on the changing landscape in the environs of the site.

Each monolith sample was obtained by hammering a 500mm x 50mm x 50mm tin into the cleaned section face. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith locations were marked on the section drawing and a level, related to Ordnance Datum was taken on the top of each tin. A column of associated bulk samples was taken adjacent to the monolith sequence for landsnail analysis.

Methodology

The sediments sampled in each tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

The 4 monoliths were described as one profile. Every distinct unit was given a separate letter and the nature of the contact between each unit was noted. The units identified during description are related to the contexts described on site in the profile description (Table below) and, where possible, the profile is discussed in terms of contexts as opposed to the units identified in the monolith tins, in section 4.

Quantification

This section gives the results of the monolith assessment. The sequence is described in the table below. In this table the elevation (in m OD) is given for the contacts between the units and brackets denote the thickness of the individual units.

Table 23: Assessment of Geo-Archaeology: ARC TGW 97

tin	Unit	Elevation of contact (m OD)	Description and Contacts	context	Assoc. samples
		34.89	TOP OF MONOLITH SEQUENCE		
<4>	1	[0.05m	Dark greyish brown 10YR4/2 sandy clay silt.	[001]	

		thick]	Cloddy. Slightly humic and contains frequent modern roots. Crumbly blocky structure. Occasional flint and chalk clasts.		
			diffuse contact to:		
<4>	2	[0.40m thick]	Dark yellowish brown 10YR4/6 slightly sandy silt. Frequent chalk and flint granule to small pebble sized gravel. Crumbly blocky structure.	[002]	<5> <6>
			diffuse contact to:		
<4> + <1>	3	[0.23m thick]	Dark yellowish brown 10YR4/6 slightly sandy silt. Frequent chalk granule to small pebble sized gravel. Compact and cohesive. Occasional diffuse carbonate precipitations.	[002]	<7>
			Gradual contact to:		
<1>	4	[0.15m thick]	Dark yellowish brown 10YR4/4 slightly sandy silt. Slightly darker and less cohesive than unit 3. Frequent chalk granule to small pebble sized gravel.	[002]	<8>
			Sharp contact followed by pebble-sized gravel clasts and marked by chalk granules above the contact and none below.		
<1> + <2>	5	[0.22m thick]	Dark yellowish brown 10YR4/6 slightly sandy silt. Compact and cohesive. Occasional faint and diffuse carbonate precipitations. Occasional manganese speckles.	[003]	<9>
			Gradual contact to:		
<2> + <3>	6	[0.54m thick]	Dark yellowish brown 10YR4/6 slightly sandy silt. Compact and cohesive. Darker than unit 5 and characterised by a more clayey matrix with common charcoal flecks, occasional flint gravel <0.10m diameter and no carbonate precipitations.	[003]	<10> <11>
			Distinct contact to:		
<3>	7	[0.12m thick to base of profile]	Yellowish brown 10YR5/6 (ie: paler) silty fine sand. Very occasional manganese flecks, grit and possible rooting marked by white ?carbonate or bleached sand channels.	[010]	
		33.18	BASE OF MONOLITH SEQUENCE		

Provenance

Below the sampled sediments was a rubbly deposit of flint nodules in a reddish silty clay matrix [007] that may be derived from clay-with-flints, redeposited by solifluction processes in a periglacial environment at the end of the Pleistocene.

Unit 7 (context [010]) overlay context [007] and was at the base of the profile sampled. It was a very fine sand that may have been deposited by fluvial or aeolian processes as it was very well sorted. If of fluvial origin it probably accumulated during a period of swift river discharge in the late Pleistocene, as a result of seasonal snow-melt. If aeolian (it is too coarse for loess) it was probably the result of harsh winds redepositing loessic and fluvially derived sediments during the arctic winters of the late Pleistocene.

There is slight evidence that vegetation developed in this fine sand prior to the accumulation of unit 6 (context [003]).

Unit 6 represents the lower part of context [003]. This appears to be redeposited brown-earth soil material. The common charcoal flecks within it suggest that human deforestation activities may have been responsible for the erosion event, which transported it downslope.

The gradual contact between units 6 and 5 implies that further sediment gradually accumulated above the initially eroded topsoil material. This may have been the result of a prolonged period of agricultural activity on the cleared land (as discussed in Allen 1992). It would appear that, during this period, an accretionary soil developed in sediment gradually accumulating by soil creep processes, as indicated by the slightly leached upper part of context [003] and the faint carbonate precipitations observed within it.

A much higher magnitude erosion event appears to mark the contact between contexts [002] and [003] (units 4 and 5). This probably truncated the upper part of the soil that had developed in the earlier colluvium and the gravel found along the contact may be the lag deposit left by valley side gulley erosion, which probably took place during the erosion event.

It is possible that human activities may have triggered this event. Adoption of winter ploughing has been proposed as a cause of accelerated soil erosion during the Iron Age and Romano British periods elsewhere (Allen 1992).

The loose and possibly humic deposit (unit 4) directly above the interface of contexts [002] and [003] is probably soil material redeposited as a result of this second more dramatic erosion event. However it is different in character to the lower soil material (unit 6) as it contains chalk granules, indicative of shallower soils and possibly ploughing activities biting into the chalk bedrock.

This suggests that considerable erosion of soil material in the intervening period had denuded the valley sides, perhaps as a result of continued agricultural activity. Because of this soil deterioration, the soils available for exploitation on the valley sides had become shallower and more gravelly.

Further gradual soil erosion and deposition is indicated by the accumulation of the upper part of context [002] again perhaps as a result of soil creep mechanisms.

A later period of landscape stability is indicated by the (recent) soil [001] developed in these colluvial sediments.

Conservation

If thin sections are made of the monolith blocks they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths the samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. In addition thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monoliths will be easier to store and less likely to deteriorate than the original soil material and will provide supporting information to the thin sections.

Long term storage as monolith samples is likely to be costly and is not an efficient use of space or archive material. After analysis, for those monoliths not impregnated with resin and converted to thin sections, what remains of the samples should be discarded.

Comparative material

Similar studies elsewhere on the North and South Downs (Bell and Boardman 1992; Bell 1983) have been able to link periods of erosion with human activity, especially deforestation and agriculture, up-slope. However other causes of erosion such as those triggered by climatic fluctuations and general landscape evolution (eg weathering, soil deterioration and time) are likely to have contributed to the downslope movement of sediment. The nature, timing and duration of any colluvial processes identified must therefore be viewed in the light of other evidence for human activity and the geomorphology of the site and what is known of climatic trends, as obtained from published sources (Lamb 1981, Evans 1975, Bell & Walker 1992).

Colluvial deposits have been found in many of the CTRL sites along the North Downs (especially at White Horse Stone, near Aylesford). The erosion events represented should be compared in terms of their timing and characteristics, in a similar fashion as was done in Wessex (Allen 1992). This may provide valuable insights into the activities and impact of prehistoric and early historic people on the landscape in this area and the changing resource potential of the environment to successive human groups.

The evidence should also be compared with samples taken recently by MoLAS through colluvial sequences on sites during A2/M2 widening work alongside the CTRL corridor in Kent.

Potential for further work

The data from the monolith samples has potential to address the following research objectives:

Early Agriculturalists (4,500-2,000BC): Define nature of contemporary environment; and determine nature and effect of clearance for agricultural activity.

Farming communities (2,000 – 100BC): Consider environmental change resulting from landscape organisation and re-organisation

In order to refine the model for local environmental and landscape change on the site suggested here, it is suggested that thin sections be made from the monolith tins. The examination of these thin sections might enable ephemeral evidence of soil formation within the sedimentary sequence to be more reliably identified and interpreted (Rose *et al* 2000). It may also allow the causes of colluviation (such as agriculture up slope) to be identified (Macphail *et al,* 1990; Macphail 1992) and the characteristics of the redeposited soil material to be inferred.

The landscape evolution and possible causes outlined in Section 4 above might be tested and enhanced by pollen and soil micromorphological analysis, together with further analysis of the samples taken for mollusc analysis adjacent to the monolith profile. If preserved, pollen could reconstruct the changing vegetation of the valley. This might enable a better understanding of the causes of the colluvial events to be gained. Pollen assemblages might be able to tie in episodes of woodland clearance with colluvial events and perhaps link them to evidence for agriculture. Similarly evidence for different crop types or more intensive agriculture might be observed that would tie in with the second dramatic erosion event. Although these inferences have been obtained from analysis of colluvial sequences elsewhere (Bell & Boardman 1992) they need to be tested before they can be assumed to be the cause of the erosion events on the present site.

Pollen is not often preserved in calcareous soils, however the carbonate content of these sediments seems to be low. It is therefore suggested that, in order to tie in the erosion events with vegetation change and possibly correlate it with evidence for agricultural activity, pollen analysis be undertaken. This should preliminarily identify whether pollen is preserved within these sediments and if it is, analysis of pollen sub-samples should proceed.

The results of pollen assessment and soil micromorphology should be compared to the results of further analysis of the adjacent snail samples. This will allow a more reliable reconstruction the changing landscape processes and the changing environment of the dry valley and adjacent interfluves.

However unless datable materials (such as pottery or charcoal) have been found stratified within contexts [002] and [003] the episodes of erosion and stability identified would not be able to be tied in to a specific time frame. Nevertheless, if dateable inclusions were found within context [002] and [003] they should allow the possibility of a high magnitude erosion event immediately pre-dating the accumulation of context [002] to be related to other evidence for human activity or natural events in the environs of the site.

It may also be possible to obtain Accelerator Mass Spectrometry (AMS) radiocarbon dates on the snails obtained from the bulk samples, if required. As a sequence of samples for snail analysis was taken adjacent to the monolith sequence, AMS dating of the snails would probably be the best way of dating the sediment sequence. Unfortunately there were no snails preserved in the lowest redeposited soil material and it will not be possible to date the charcoal from the unit as there is insufficient, and the monoliths will be set in resin.

This evidence should be compared with samples taken recently by MoLAS through colluvial sequences on sites during A2/M2 widening work alongside the CTRL corridor in Kent and with previous work undertaken on colluvial deposits in Wessex (Allen 1992). This will help indicate any trends/anomalies over the wider region of southern England.

Further work can be summarised as a table:

Task
Further sedimentological work (Geoarchaeologist): Sub-sample the monoliths for pollen at 40mm intervals. Scrape continuous 40mm sub-samples from the surface of the monoliths for further sedimentological analysis, to support the micromorphological results. Carry out: loss on ignition and possibly magnetic susceptibility, phosphate and particle size analysis of these sub-samples as discussed with the micromorphologist Make the results of these techniques available to the soil micromorphologist
b) **Pollen analysis** at 80mm intervals through the profile (16 samples: units 3-7) and production of a report (following preliminary scanning of the samples to ensure that pollen is preserved)
c) **Thin section analysis** (Soil micromorphologist): Set monolith samples <1, 2 & 3> in resin Manufacture 6 thin sections each 35mm x 90mm covering:

¾, 4/5, 5/6. 6/7 interfaces and from within units 6 & 7 Examination of these thin sections and production of a report
d) **Radiocarbon (AMS)** on snails taken from samples <9> and <8> from the adjacent snail sample column.
d) **Interpretation of the results** (Geoarchaeologist) Integrate the results of (a) with: The results of (b & c) This assessment report Other specialist reports from the site (especially the results of any further landsnail analysis if undertaken) Data from other CTRL sites and work undertaken on colluvial sequences in the area Aim: to report on the sequence of colluvial and soil forming events and possible linkages and implications for human activity on the site and within the region.

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PS: TOLLGATE

APPENDIX 12: ASSESSMENT OF MOLLUSCS FROM AREA 330 ZONE 4

Alan Pipe

Introduction

Mollusc shells were recovered during excavation works at Tollgate ARC TGS 97 and ARC TLG 98 and from the watching brief excavations ARC 330 98.

Mollusc shells were recovered by wet-sieving and flotation of bulk samples taken in the field. The material was processed using a modified Siraf tank fitted with 1.0 mm and 0.25 mm flexible nylon meshes to retain the residue and flot fractions respectively. The residues and flots were then air-dried, bagged and labelled as sample groups. Each group was then visually sorted for mollusc shells.

All samples containing mollusc remains were recorded onto a table template in terms of habitat preference and approximate quantification as specified in the CTRL project requirements. No sub-sampling of sample groups was carried out. Preliminary identifications of taxa were made using a binocular microscope and following Cameron & Kerney 1976; and Hayward, Nelson-Smith & Shields, 1996. Allocations of habitat preference followed Kerney 1999.

Methodology

In each case, the soil was processed using a modified Siraf-type tank fitted with 1.0mm and 0.25mm flexible nylon meshes to retain the residue and flot fractions respectively. The flot and residue fractions were air-dried in a warm drying cabinet and then visually sorted for mollusc shell.

Each sample was roughly quantified and then scanned under a binocular microscope to determine the species-composition of the assemblage. Taxonomic identifications were made using the MoLSS reference collection in conjunction with Cameron & Redfern 1976; and Kerney & Cameron 1979. Allocation of identified taxa to habitat groups, as specified by the CTRL post-excavation assessment report template, followed these sources together with Kerney 1999.

All mollusc groups were examined; no sub-sampling was required.

Quantification

A total of 26 small groups of mollusc shells, an approximate total of 129 shells, were assessed. This material derived almost entirely from terrestrial species with a few very fragmented shells of marine species. There were no open-country or freshwater species. The identified taxa recovered were *Cecilioides acicula*, *Vallonia sp*., *Cepaea nemoralis*, *Helix aspersa*, Clausilidae, *Pomatias elegans*, *Retinella sp*., *Helicigona lapicida, Hygromia sp., Oxychilus sp.,* common/flat oyster *Ostrea edulis,* common cockle *Cerastoderma edule*, and common mussel *Mytilus edulis.*

The table below groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

The material is in good condition and presents no difficulty in terms of species identification.

Mollusc shells were recovered from ARC TGS 97 ([102], a Late Iron Age/Romano-British pit), ARC TLG 98 (four undated samples {1}-{4}), and ARC 330 98. The material from ARC 330 98 derived from an early Iron Age pit fill [741] (Pit [740] Figure 6), a Late Iron Age/Romano-British pit fill [1193] (Pit 1172, Figure 6), a Romano-British pit fill[160] (Pit [160], Figure 11), a medieval hearth fill [418] (Hearth 419, Figure 11), ditch fill [1136] (Ditch 1135), and pit fill [773] (Pit [1148], Figure 8) together with a small group of undated pit, ditch, external, ?furnace and unknown contexts.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure precise identification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. There should therefore all be stored by context/sample group in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality 'shoe-box'.

There is no reason to retain the very limited material from ARC TGS 97 and ARC TLG 98; the larger and more diverse group from ARC 330 98 should be retained for further identification and quantification.

Comparative material

Although the very small size of this assemblage does not justify detailed inter-site comparison with any other particular site, for completeness it should be included in any overall view of the CTRL zonal molluscan groups.

Potential for further work

The assemblage has generally little potential for further study in terms of quantification of species, or of ecological interpretation, indeed the material from ARC TLG 98 all derived solely from the burrowing species *C.acicula*.

Further identification of species present will allow some comment on the general nature of the local environment. This is mainly applicable to the catholic and shade-loving species recovered from ARC TGS 97 and, particularly, ARC 330 98. Identification of the species in the catholic and shade-loving assemblages may allow some interpretation of the local habitat, in terms of vegetation and drainage, in view of the known current distribution of these species in SE England (Kerney 1999). There is no potential for further study of the marine species or of the entirely *C.acicula* group from ARC TLG 98.

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+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Table 24: Assessment of molluscs from ARC TLG 97 and ARC TLG 98

Event code	**ARC TGS 97**	**ARC TLG 98**	**ARC TLG 98**	**ARC TLG 98**	**ARC TLG 98**
Column/Sectn					
Sample	6	1	2	3	4
Context	102				
Date/interpretation	?Late Iron Age/Romano-British/ pit	unknown	Unknown	unknown	unknown
Catholic species					
Open country species					
Shade-loving species	++				
Burrowing species		+	+	+	+++
Aquatic species					
Marine species					
Approx totals	**6**	**3**	**5**	**5**	**11**

Table 25: Assessment of molluscs from Area 330 Zone 4

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Sectn						
Sample	29	45	102	146	204	165
Context	161	198	418	426	575	617
Date/ interpretation	Romano-British/pit	unknown/ditch	medieval/ hearth	unknown/mech fixture	unknown/destr debris	unknown/ditch
Catholic species		+	+	+	+	+
Open country species						
Shade-loving species			+		+	
Burrowing species		+				
Aquatic species						
Marine species	+					
Approx totals	**2**	**5**	**2**	**1**	**5**	**5**

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Sectn								
Sample	181	178	183	188	203	211	224	238
Context	638	656	684	688	710	741	773	805
Date/ interpretation	unknown	unknown /furnace	unknown /ditch	unknown/ ditch	unknown/ furnace	Early Iron Age/pit	medieval/ pit	unknown/ external
Catholic species				+		+	+	
Open country species								
Shade-loving species		+++	+				+	+
Burrowing species						+		
Aquatic species								
Marine species	+							
Approx totals	**1**	**35**	**1**	**2**	**1**	**2**	**5**	**5**

Event code	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**	**ARC 330 98**
Column/Sectn							
Sample	240	241	244	282	340	315	345
Context	814	818	825	890	1193	1136	1215
Date/ interpretation	unknown/ pit		pit		Late Iron Age/early Romano-British/pit	medieval/ditch	
Catholic species	+	+				+	+
Open country species							
Shade-loving species				+	+		+
Burrowing species							
Aquatic species							
Marine species			+				
Approx totals	**5**	**5**	**1**	**1**	**1**	**2**	**10**

APPENDIX 13: ASSESSMENT OF CHARRED PLANT REMAINS & CHARCOAL
Lisa Gray-Rees

Introduction

This report assesses the contents of 242 environmental bulk samples in Area 330 Zone 4 (sites ARC TLG 98 and contexts from ARC 330 98). These were processed by flotation in a Siraf type flotation tank. 149 samples, all from ARC 330 98, produced botanical remains. The environmental bulk samples from ARC TLG 98 were botanically sterile.

Methodology

Each sample was processed using a Siraf type flotation tank. Residues were collected in a 1mm mesh and flots were collected in a 250-micron mesh. Flots and residues were dried prior to scanning. Residues were scanned by eye. Environmental remains and artefacts (such as burnt flint, brick or tile fragments) were collected and transferred to the relevant specialists. Flots and plant remains recovered from the residues were scanned using a low powered stereo microscope. Charred wood fragments roughly larger than $5mm^3$ were sampled for identification.

The modes of preservation, species diversity and abundance of organic remains in each sample were recorded on sheets then entered into the MoLAS/MoLSS Oracle database and transferred to RLE Datasets. Full sample details are given in the table below.

Quantifications

Full details of these samples are given in the table below.

Charred wood was present in all but seven samples. Charred grain was present in 33 samples; five of these were rich. Charred chaff was present in three samples. Charred seeds were present in sixteen samples; four of these were rich. Uncharred seeds were present in twenty samples; two of these were rich. Uncharred root, stem or moss fragments were present in 55 samples.

The quantities of remains were estimated and recorded in the following manner:

For charred remains:

+ = 1-10
++ = 11-50
+++ = 51-100
++++ = 101-1000
1000+ = >1000.
For waterlogged remains:
+ = 0-5
++= 6-10
+++=11+

Provenance

Bronze Age

Each sample contained flecks of charred wood. A low number of larger identifiable fragments of charred wood were present in the sample from context [352], a quarry pit [372] (Figure 7).

None of these samples were rich. A poorly preserved charred grain was found in context [384] (Pit [372]) along with moderate numbers of uncharred goosefoot (*Chenopodium sp.*) seeds. Samples from contexts [352] and [390] (Pit [387], Figure 7) contained abundant uncharred root fragments.

Late Bronze Age/ Early Iron Age (Figure 7)

These samples were taken from pit fills and one from a posthole fill. The following contexts contained identifiable charred wood:

from pits: [389], [394], [412] (Pit [387]) (Figure 7), [681], [691] (Pit [679]), [693] (Pit [702]), [680] (Pit [704]) (Figure 5) [1176] (Pit [1174], [1186] (Pit [1172] (Figure 6)
from posthole fill [399] (Posthole [396], Figure 7)

Low numbers of charred grains and seeds were present in several samples from pitfills. Poorly preserved grains were recovered from, contexts: [401], [1173], [1176] and [1187]. Other charred remains included low numbers of hazelnut (*Corylus avellana* L) shell fragments in context [373] and low numbers of cleavers (*Galium* spp.) seeds in samples from context [394] and [450].

Occasional uncharred seeds were present in pitfills from contexts [402], [412], [420] and [1188]. These included seeds of goosefoot (*Chenopodium* spp.) and elder (*Sambucus nigra* L).

Uncharred moss fragments were recovered from samples in contexts [389], [401], [394], [411], [412], [420], [450] and [458]. Uncharred fragments were present in samples [389], [401], [412], [420], [450], [680], [1176] and [1188]. Moderate amounts of uncharred wood fragments were present in the sample from context [693].

Iron Age

These samples contained very few plant remains; only flecks of charred wood in all but the sample from [425] (Pit [414], Figure 7), which contained moderate uncharred root fragments.

Late Iron Age/ Early Roman

Occasional fragments of charred identifiable wood were present in each sample. No other botanical remains were recovered.

Roman

Charred wood fragments were present in two pits, contexts [1193] (Pit 1172, Figure 6) and [196].

Occasional charred wheat (*Triticum* spp.) grains were present in two pits in contexts [1193] and [863]. Low numbers of poorly preserved grains were present in ditchfills, contexts [525] and [526] (Ditch 522, Figure 10) and pitfills, contexts [160], [677], [678]. Moderate numbers of poorly preserved grains were present the pitfill, context [609] (Pit [673], Figure 10).

Moderate amounts of cereal chaff, glume fragments, were present in the ditch fill in context [526]. This sample also contained occasional charred weed seeds. Occasional poorly preserved charred seeds were also present in two ditchfill samples from contexts [526] and [844] and from one pitfill sample from context [160].

Uncharred seeds were present in low numbers in samples from pitfills from contexts [160], [534], [863] and from a ditchfill from context [848]. These included seeds of goosefoot (*Chenopodium* spp.) and rush (*Juncus* spp.).

Uncharred, possibly modern fragments of roots, stems and moss were present in samples from pit fills in contexts [136], [534], [664], [863], [932] and from a layer interpreted as external metalling/cobbling, context [1232].

Medieval

Charred wood was present in each sample. Identifiable wood fragments were present in a ditchfill from context [809] (Ditch [806], Figure 8); a post-hole fill from context [786], associated with pit [1148] (Figure 8) and hearth layer, context [418] (Pit [419], Figure 11).

Occasional charred wheat grains were present in pitfill samples from context [771], pit [1148], and in poor condition in a sample from a hearth layer, context [418]. Moderate numbers of poorly preserved grains were present in samples from pitfills in contexts [162] and [1045] (a ploughsoil) and in a ditchfill sample from context [809]. Moderate numbers of well-preserved wheat grains were present in a pitfill, context [179].

Charred seeds were present in pitfills from contexts [162], [179] and [771]. These included seeds of cleavers (*Galium* sp.), vetch/tare (*Lathyrus*/*Vicia*) and brome (*Bromus* sp.). Moderate numbers of poorly preserved uncharred seeds were present in the pitfill from context [162].

Uncharred, possibly modern fragments of moss, root and stem fragments were present in pitfill samples, contexts [162], [179], [769], [771]; hearth layer, context [418], and from a posthole fill, context [786].

Undated (no pot dates)

Each of these samples contained charred wood fragments. Four samples were particularly rich. These were a pitfill sample from contexts [225], an unspecified external deposit from context [805] a furnace/oven/kiln deposits from context [500] and a ditch fill sample from context [907].

The pitfill contained abundant charred seeds; mostly (over 700) those of dock (*Rumex* spp.). The external deposit produced abundant quantities of charred wheat and oat (*Avena* sp.) grains. The furnace/kiln sample contained abundant charred wheat (*Triticum* spp.) grains and charred hazelnut (*Corylus avellana* L) shell fragments. The ditch sample contained abundant and diverse uncharred seeds, including knotgrass (*Polygonum* spp.) and black nightshade (*Solanum nigrum* L).

Conservation

Twenty-one samples have been recommended for further analysis and are listed below. These should be stored and kept dry prior to examination. No further work is recommended on the remaining samples so they may be discarded.

Comparative material

Prehistoric archaeo-botanical remains are scarce and where present often poorly preserved, for example the charred grain deposit at the Iron Age farmstead in Farningham (Vaughan 1984).

The Romano-British remains may be compared with charred plant remains from Roman sites in Kent such as Lullingstone near Orpington (Arthur 1974; Metcalf and Doherty 1974) and Keston in Bromley (Hillman 1991; Straker

Potential for further work

Potential by period

Bronze Age:

Very few plant remains were recovered form this period but it is recommended that identifications are made of the wood and grain because so little archaeo-botanical work has been carried out for prehistoric Kent.

Late Bronze Age/ Early Iron Age:

The charred wood from the pits should be identified. If waste was deposited in the pits the identification of the wood would provide information about the types of wood used for fuel. These fragments are too small to provide information about woodland management or wood working.

Charred grains and seeds were present in several pitfill samples. These assemblages will provide information about cereal use and cultivation. The identification of the seeds will provide information about the environmental conditions in which the crop was grown.

Iron Age:

These samples were too poor to recommend any further work.

Late Iron Age/ Early Roman:

These samples were too poor to recommend any further work.

Romano-British:

The identification of charred wood fragments from pitfills, in contexts [196] and [1193], may reveal which species of wood were used as fuel. These fragments are too small to reveal information about woodland management or woodworking.

Identification of the charred grain, chaff and seed remains in the pit fills from contexts [526] and [609] will provide information about cereal processing, husbandry and the environmental conditions of the fields.

Medieval:

Identification of the charcoal form the hearth layer, context [418], would provide information about the species of wood used as fuel.

Occasional charred wheat grains were also present in this hearth layer. Examination of these and the larger number of grains and charred seeds in the pitfills, context [162] and [179] would provide information about crop husbandry, processing and the environmental conditions in the fields.

Undated (no pot dates):

These should only be analysed if reliable dates can be assigned.

The abundant charred seeds in the pitfill, context [225], may be cereal sieving waste. Full identification of the seeds in this sample may reveal whether this is a sieving waste deposit or a store of dock (*Rumex* spp.) seeds for a particular use. The seeds of some species of dock have medicinal uses. If the full assemblage seems to suggest that it is sieving waste then it may reveal information about the ecology of the cereal fields.

The analysis of abundant quantities of the charred assemblages from the external deposit, context [805], and the furnace/oven/kiln feature, context [500] may clarify the interpretation of each feature and produce information about cereal production.

The analysis may clarify the interpretation of the feature and will add information about cereal production

The analysis of abundant and diverse uncharred seeds in the ditch sample may reveal environmental information if it comes form the primary fill of the ditch.

List of samples recommended for further analysis

Bronze Age: [352] <81>
Late Bronze Age/ Early Iron Age: [389] <91>, [394] <98>, [412] <101>, [691] <190>, [693] <192>, [680] <195>, [681] <197>, [1176] <329>, [1186] <339>
Romano-British: [1193] <340>, [196]<42>, [526] <133>, [609]<186>
Medieval: [162]<29>, [179] <30>, [418] <102>
Undated (no pot dates): [225] <54>, [500] <153>, [805] <233>, [907] <277>

These will be examined using a light microscope with magnifications of between 10 and 40 times. Modern seed and cereal reference collections and reference manuals (e.g. Anderberg 1994, Berijinck 1947 and Berggren 1969,1981) will be used

Charred wood will be identified by using an epi-luminating microscope to examine fragments of wood in transverse, radial longitudinal and tangential longitudinal sections. These sections will be examined for diagnostic features and identification made using an anatomical key (e.g. Schweingruber 1973).

Plant remains will be identified as closely as their level of preservation allows. Quantities of uncharred remains and charred wood fragments will be estimated and charred remains will be counted. This data will be recorded onto record sheets and transferred to the MoLAS/MoLSS Botanical ORACLE database.

Further work:

Identification and recording of the contents in 21 dry flots
Charcoal identifications
Table creation and data analysis
Report Writing
Editing
Archiving

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Table 26: Assessment of Charred Plant Remains & Charcoal

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
3031	377 / external unspecified	UN	85	30	0	-	-	-/-	+		800ml
4001	642 / pit	UN	179	10	0	-	-	-/-	+		500ml
4002	652 / furnace, oven, kiln	UN	147	20	10	-	-	-/-	+++	low numbers of uncharred root fragments	200ml
4004	656 / furnace, oven, kiln	UN	178	10	25	-	-	-/-	++	low numbers of uncharred moss fragments	2000ml
4016	619 / ditch	UN	166	c10	2	+	-	-/-	++	abundant uncharred root fragments	1000ml
4020	623 / ditch	UN	168	30	0	-	-	-/-	+		1500ml
4021	832 / pit	UN	248	30	2	-	-	-/-	+++	abundant uncharred root and moss fragments	500ml
4022	833 / pit	UN	249	30	0	-	-	-/-	++		500ml
4023	835 / pit	UN	255	20	10	+	-	-/-	++++	moderate numbers of uncharred root and moss fragments	0ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4023	836 / pit	UN	256	10	20	-	-	-/+	+++		100ml
4028	878 / pit	LBA/EIA	266	30	0	-	-	-/-	+++		400ml
4029	693 / pit	LBA/EIA	192	30	0	-	-	-/-	+		500ml
4030	692 / external unspecified	UN	191	30	0	-	-	-/-	+		800ml
4031	681 / pit	LBA/EIA	197	10	0	-	-	-/-	+		1000ml
4031	691 / pit	LBA/EIA	190	20	0	-	-	-/-	+		5000ml
4031	705 / pit	LBA/EIA	217	10	0	-	-	-/-	++		600ml
4032	680 / pit	LBA/EIA	195	30	0	-	-	-/-	+	occasional fragments of waterlogged wood/roots	2000ml
4033	710 / furnace, oven, kiln	UN	203	30	0	-	-	-/-	+		4000ml
4034	736 / pit	UN	207	30	10	-	-	-/+	+++	low numbers of uncharred root fragments	100ml
4034	737 / pit	UN	208	60	0	-	-	-/-	+		500ml
4035	742 / pit	UN	209	10	0	-	-	-/-	++		400ml
4035	751 / pit	UN	213	30	0	-	-	-/-	+		1000ml
4037	712 / furnace. oven, kiln	UN	216	20	10	-	-	+/-	+++++	abundant uncharred root and stem fragments	700ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4038	714 / posthole	UN	202	1	5	-	-	-/-	++	abundant uncharred root and moss fragments	0ml
4039	713 / posthole	UN	201	3	10	-	-	-/-	+++	low numbers of uncharred moss and root fragments	50ml
4040	684 / ditch	UN	183	10	5	-	-	-/-	-	occasional fragments of uncharred root and stem fragments	1000ml
4041	397 / posthole	UN	94	10	5	-	-	-/+	+++	uncharred modern moss and root fragments	600ml
4042	399 / posthole	LBA/EIA	95	6	0	-	-	-/-	+		2000ml
4055	431 / posthole	UN	117	10	0	-	-	-/-	++		800ml
4071	352/ quarry pit	BA	81	20	20	-	-	-/-	++++	abundant uncharred root fragments	4000ml
4071	384 / quarry pit	BA?	88	20	5	+	-	-/++	+++		5000ml
4071	386 / quarry pit	BA	89	30	20	-	-	-/-	+++		1500ml
4072	416 / pit	IA	99	30	0	-	-	-/-	++		500ml
4072	416 / pit	IA	99	30	0	-	-	-/-	++		500ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4072	417 / pit	IA?	105	20	0	-	-	-/-	+		5000ml
4072	425 / pit	IA?	106	30	5	-	-	-/-	-	very little, uncharred root fragments	1000ml
4073	552 / pit	LIA/RO	123	30	0	-	-	-/-	++		500ml
4073	553 / pit	LIA/RO	124	30	0	-	-	-/-	+		2000ml
4074	428 / pit	UN	107	10	0	-	-	-/-	+		500ml
4077	500 / furnace, oven, kiln	UN	153	20	20	++++	-	+++/-	+++	low uncharred moss fragments	1000ml
4078	509 / pit	LIA/RO	120	c10	0	-	-	-/-	+		2000ml
4080	480 / pit	UN	116	20	0	-	-	-/-	+		500ml
4081	436 / pit	UN	118	10	0	+	-	+/-	+++		800ml
4082	373 / pit	LBA/EIA	82	c10	?	-	-	+/-	+++		1000ml
4082	458 / pit	LBA/EIA	158	10	2	-	-	-/-	+	low numbers of moss fragments	1000ml
4083	401 / pit	LBA/EIA	96	20	5	+	-	-/+	++	uncharred moss and root fragments	5000ml
4083	402 / pit	?LBA/EIA	97	20	0	-	-	-/-	+		2100ml
4083	420 / pit	?LBA/EIA	103	20	5	-	-	-/-	++	moderate numbers of uncharred moss and root fragments	1000ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4083	430 / pit	LBA/EIA	109	c10	5	-	-	-/+	+++++	moderate numbers of uncharred moss and root fragments	1500ml
4083	450 / pit	LBA/EIA?	112	20	10	-	-	+/-	++++	abundant moss and root fragments	1000ml
4083	547 / pit	LBA/EIA?	119	20	0	-	-	-/-	++		1000ml
4083	566 / pit	LBA/EIA?	121	20	0	-	-	-/-	+++		1000ml
4084	388 / pit	LBA/EIA	90	20	0	-	-	-/-	+++		2000ml
4084	389 / pit	LBA/EIA	91	20	5	-	-	-/-	+++	uncharred moss and root fragments	2000ml
4084	390 / pit	BA	92	10	5	-	-	-/-	+++	modern root fragments	6000ml
4084	393 / pit	?LBA/EIA	93	10	0	-	-	-/-	+++		800ml
4084	394 / pit	LBA/EIA?	98	20	2	-	-	+/-	+	uncharred moss fragments	1500ml
4084	411 /	LBA/EIA?	100	20	5	-	-	-/-	+++	low numbers of uncharred moss fragments	600ml

Sample Details					Flot Details						Residue
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4084	412 / pit	LBA/EIA	101	20	2	-	-	-/-	+++	moderate numbers of uncharred moss and root fragments	5000ml
4085	741 / pit	IA	211	c10	0	-	-	-/-	+++++		4000ml
4085	743 / pit	IA?	212	10	0	-	-	-/-	+		500ml
4086	1175 / pit	LBA/EIA	328	30	0	-	-	-/-	+++		3000ml
4086	1176 / pit	LBA/EIA	329	20	5	+	-	-/-	++++	abundant root fragments	2000ml
4086	1187 / pit	LBA/EIA	334	30	0	+	-	-/-	++		500ml
4087	1173 / pit	LBA/EIA	327	c10	0	+	-	-/-	+++		5000ml
4087	1182 / pit	LBA/EIA	331	10	0	-	-	-/-	+		1000ml
4087	1186 / pit	LBA/EIA?	339	c10	0	-	-	-/-	+++		4000ml
4087	1188 / pit	LBA/EIA	336	c10	10	-	-	-/+	+++	abundant root fragments	2500ml
4087	1193 / pit	RO	340	c10	20	+	-	+/-	++++	abundant root fragments	2000ml
4091	611 / furnace, oven, kiln	UN	324	10	20	-	-	+/-	++++	abundant uncharred root fragments	500ml
4091	612 / furnace, oven, kiln	UN	325	10	10	-	-	-/-	+++	moderate numbers of uncharred root fragments	20ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4093	1169 / furnace, oven, kiln	UN	326	30	5	-	-	-/++	+++	moderate numbers of uncharred root and moss fragments	1000ml
4096	907 / ditch	UN	277	10	5	+	-	-/+++	+++	abundant uncharred stem and moss fragments	400ml
4099	777 / hearth	UN	227	10	10	-	-	-/-	+++++	abundant uncharred moss fragments	1000ml
4100	807 /ditch	UN	235	20	10	+	-	+/+	+	abundant uncharred root and moss fragments	2000ml
4101	809 / ditch	MD	236	30	0	+++	-	-/-	+		1000ml
4105	823 / ditch	UN	243	10	0	-	-	-/-	+		100ml
4107	805 / external unspecified	UN	233	20	10	+++	-	-/+	+	abundant uncharred modern root and moss fragments	2000ml
4108	462 / pit	MD	159	10	0	-	-	-/-	++		600ml
4113	583 / ditch	UN	145	10	0	-	-	-/-	++		300ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4114	433 / pit	UN	110	10	5	-	-	-/-	+++++	low numbers of uncharred modern moss fragments	2000ml
4115	448 / pit	UN	111	10	0	-	-	-/-	+		300ml
4117	615 / natural strata	UN	164	c10	0	-	-	-/-	-	occasional fragments of waterlogged wood	300ml
4120	614 / sump-waterhole	RO?	163	30	0	-	-	-/-	+		250ml
4120	631 / sump-waterhole	RO	170	30	0	-	-	-/-	+		1750ml
4120	633 / sump-waterhole	RO?	171	c10	0	-	-	-/-	+		250ml
4120	664 / pit	RO?	174	30	5	-	-	-/-	++	moderate numbers of moss and root fragments	500ml
4124	1164 / ditch	UN	322	30	0	-	-	-/-	+		100ml
4125	769 / pit	MD	231	30	10	-	-	-/-	++	abundant root and stem fragments	200ml
4125	771 / pit	MD	223	20	20	+	-	-/+	+++	abundant modern root fragments	800ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4125	773 / pit	MD	224	30	0	-	-	-/-	+		1500ml
4125	786 / posthole	MD	232	10	10	-	-	-/-	++++	abundant root and stem fragments	1000ml
4125	1149 / pit	RO	318	30	0	-	-	-/-	+		200ml
4130	1183 / pit	UN	333	10	0	-	-	-/-	+		200ml
4132	754 / hearth	UN	218	10	0	-	-	-/-	+++		1000ml
4133	669 / hearth	UN	221	10	0	-	-	+/-	+		1000ml
4137	1141 / ditch	UN	323	30	0	+	-	-/-	++		600ml
4140	1045 / pit	MD	311	10	0	++	-	-/-	+++		400ml
4148	152 / ditch	UN	24	20	0	-	-	-/-	+		1000ml
4151	196 / pit	RO	42	20	0	+	-	-/-	+++		200ml
4154	198 / ditch	UN	45	10	5	+	-	-/+	-	uncharred root fragments	500ml
4155	162 / pit	MD	29	10	10	++++	-	+++/+++	+++++	uncharred stem and root fragments	400ml
4155	179 / pit	MD?	30	10	10	++	-	+/+	+++	uncharred stem and moss fragments	200ml
4158	192 / pit	UN	35	c10	0	-	-	-/-	+		1000ml
4159	174 / external unspecified	RO	31	0	0	-	-	-/-	+		600ml
4162	225 / pit	UN	54	10	30	+	-	++++/-	+++++	some uncharred moss	200ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4163	418 / hearth	MD	102	20	30	+	-	-/-	+++	abundant uncharred root, stem and moss fragments	3000ml
4164	534 / pit	RO	136	10	5	-	-	-/+	++	uncharred moss and root fragments	300ml
4164	536 / pit	RO	138	10	10	-	-	-/-	+++		300ml
4165	525 / ditch	RO	132	10	0	+	-	-/-	+		200ml
4165	526 / ditch	RO?	133	10	5	+	++	+/-	-		150ml
4165	527 / ditch	RO?	134	10	0	-	-	-/-	+		400ml
4167	531 / ditch	UN	125	20	0	-	-	-/-	++		200ml
4168	523 / ditch	RO	108	10	0	-	-	-/-	+		100ml
4169	567 / ditch	UN	131	10	5	-	-	-/-	+	low numbers of uncharred moss and stem fragments	100ml
4171	570 / pit	UN	130	10	0	-	-	-/-	+		150ml
4172	572 / external unspecified	UN	141	10	0	+++	+	+++/-	+++		1000ml
4173	529 / pit	BA	140	10	0	-	-	-/-	++		1500ml
4176	575 / destruction debris	UN	204	30	5	-	-	-/-	+++		8000ml
4176	576 / destruction debris	UN	205	10	700	-	+	-/-	++++	low numbers of uncharred moss fragments	4000ml

Sample Details					**Flot Details**						**Residue**
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4176	686 / destruction debris	UN	184	30	15	-	-	-/-	+++		5000ml
4176	759 / destruction debris	UN	222	30	0	-	-	-/-	+		5000ml
4176	778 / destruction debris	UN	225	10	0	+	-	-/-	+++		1000ml
4176	781 / destruction debris	UN	226	10	5	-	-	-/-	+++	occasional uncharred moss fragments	1000ml
4177	160 / pit	RO	33	10	0	+	-	+/+	+		1000ml
4178	186 / pit	UN	34	10	0	-	-	-/-	+		500ml
4184	609 / pit	RO	186	30	0	++	-	-/-	++		600ml
4184	677 / pit	RO	198	20	0	+	-	-/-	-		2000ml
4184	678 / pit	RO	196	10	0	+	-	-/-	+		800ml
4193	984 / external metalling/ cobbles	UN	306	30	0	-	-	-/-	+		500ml
4197	955 / external metalling/ cobbles	UN	290	30	0	-	-	-/-	+		100ml
4200	941 / ditch	UN	281	30	0	-	-	-/-	++		0ml
4200	980 / ditch	UN	298	20	0	-	-	-/-	+		2000ml
4202	848 / ditch	RO	254	30	0	-	-	-/-	+		2000ml
4202	953 / layer	UN	289	30	0	-	-	-/-	+		

Sample Details					Flot Details						Residue
Sub group	Context & type	Period	Sample number	Sample size (l)	Sample Size (ml)	Grain	Chaff	Weed Seeds charred/ uncharred	Charcoal	Comments	
4203	840 / natural erosion feature	UN	251	30	2	-	-	-/+	-	occasional uncharred moss and root fragments	800ml
4203	841 / natural erosion feature	UN	252	30	0	-	-	-/-	++		800ml
4207	863 / pit	RO	258	30	5	+	-	-/+	++++	abundant moss and root fragments	1500ml
4207	932 / pit	RO?	279	10	10	-	-	-/-	++++	occasional root fragments	300ml
4208	816 / ditch	UN	239	10	0	-	-		+++		1500ml
4210	828 / pit	UN	245	30	0	-	-	-/-	+		2000ml
4211	844 / ditch	RO	253	c10	2	-	-	-/+	+++		600ml
4214	820 / pit	UN	242	10	0	-	-	-/-	+++		1000ml
4215	825 / pit	UN	244	10	10	+	-	-/-	++++	abundant uncharred root and moss fragments	1000ml
4226	1232 / external metalling/ cobbles	RO	355	c10	30	-	-	-/-	+	occasional moss fragments	100ml
4234	1212 / ditch	UN	343	c10	0	-	-	-/-	+		800ml
4235	1215 / ditch	UN	345	c10	0	-	-	-/-	+		500ml

APPENDIX 14: ASSESSMENT OF GEO-ARCHAEOLOGY

Jane Corcoran

Introduction

Four monolith samples were taken through Quaternary slope deposits exposed in section midway down the present side of the Wrotham Road (A227) dry valley (Figure 4, ARC TLG 98). The aim of the monolith assessment was to describe and provisionally interpret these deposits and suggest any further work that might provide information on the sequence of Pleistocene events and environments they represent.

The monolith samples were obtained by hammering a 500mm x 50mm x 50mm tin into the cleaned section face. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith location was marked on the section drawing and a level, related to Ordnance Datum was taken on the top of the tin.

Methodology

The sediments sampled in each tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions clast-size and dip.

Every distinct unit was given a separate number and the nature of the contacts between each unit noted. Where several units appear to be part of the same depositional phase or event they have been grouped into a larger unit [indicated by a letter].

Quantifications

The results of the monolith assessment are set out in the following table:

Table 27: Assessment of Geo-Archaeology

tin	**Unit**	**Elevation of contact & thickness of unit**	**Description and Contacts**	**Assoc. bulk samples**
			The top of the monolith sequence lay about 0.30m below present ground-level, which sloped from south to north along the trench and was about 47.5m OD in the sampling location. About 0.30m of ploughsoil lay above the monolith sequence.	
		47.14	TOP OF MONOLITH SEQUENCE	
1	A1	[0.30m thick]	Dark yellowish brown 10YR4/6 slightly sandy clayey silt. Clay especially infilling root channels. Other root channels are humic filled. Soft and compact. Very occasional grit. Very occasional fine rootlets. This unit thins to the south where unit B rises close to the surface, but otherwise follows the dip of the landsurface and ploughsoil down valley. Clear contact to:	Bulk <1>
1	A2	[m thick]	Yellowish brown 10YR5/6 slightly sandy silt. Occasional fine chalk granules. Frequent carbonate flecks and threads. This unit thickens down valley (to the north) and wedges out to the south where unit B rises close to the surface.	
		c.46.80	Sharp wavy irregular contact sloping from south down to north	
2	B	[c.75m thick]	Poorly sorted angular chalk and flint rubble in clay and sand matrix. This unit was too coarse for sampling, however the lowest part of it, mainly pellety chalk with occasional angular flints and clay lenses, was sampled in the top of monolith 2.	bulk<2>
		c45.60	Sharp irregular sub-horizontal contact	
2	C	[0.10m thick]	Dark yellowish brown 10YR4/6 clayey sandy silt matrix with occasional poorly sorted sub-rounded chalk granules and sub-angular flint pebbles. Occasional fragmented bedding. Moderately compact and soft.	
		45.50	Distinct irregular contact	

tin	Unit	Elevation of contact & thickness of unit	Description and Contacts	Assoc. bulk samples
2/3	D1	[0.18m thick]	Interbedded brown 10YR5/4 sandy clay-silt; pale brown 10YR6/3 sandy silt; dark yellowish brown 10YR4/4 sandy clay-silt; and occasional white 10YR8/1 sand laminae, speckles and patches. Compact and moderately hard. Very common iron concretion nodules (1-3mm diameter) and manganese speckles. Diffuse contact to	
2/3	D2	[0.40m thick]	Predominantly brown 10YR5/4 sandy clay-silt. Similar to D1 but beds exist only as disrupted patches and an increase in white (leached) speckles and patches of fine sand towards base of unit. Possible root void with carbonate precipitations. Fewer iron concretions than D1 or D3 and those that exist are less nodular and more thread-like or speckled. Diffuse contact to:	bulk<3>
3/4	D3	[0.50m thick]	Pale brown 10YR6/3 with brown 10YR5/3 patches. Slightly clayey silty fine sand. Very frequent iron nodules 1-5mm diameter: more frequent and larger than in either D1 or D2. Frequent white 10YR8/1 speckles. No visible bedding or laminations.	bulk<3>
		44.42	BASE OF MONOLITH PROFILE	

Provenance

The sediments were located midway up the side of a dry valley about 250m south of the monolith samples taken at Northumberland Bottom (ARC TGW 97). These were from closer to the valley floor in the same dry valley. The present site was also about 500m west of the location of a lower palaeolithic handaxe found in solifluction deposits at about 60.30m OD (ARC TGS 97).

The sediments appear to represent four main units. Unit D may be derived from Thanet Beds and is in general a silty fine sand fining up to a sandy silt. It is characterised by frequent iron nodules and bleached patches with manganese speckles and discontinuous white sandy laminae. These are characteristics of ice segregation and waterlogging in arctic soils, where waterlogging at the surface occurs, with impeded drainage due to frozen subsoil (Fedorova & Yarilova 1972; Van Vliet-Lanoe 1985; Vepraskas et al 1994). Similar characteristics have been found in Quaternary pedosedimentary profiles (Kemp 1985; Kemp et al 1992) and it is inferred that these sediments were close to the landsurface during a period of wet periglacial climate.

The sub division of this unit into three sub-units may suggest either fluctuations in the climate at this time, gradual accretion of the deposit (during summer snowmelt) or it may result from the different depths of each sub-unit below the former ground level. The disturbed nature of D2 with possible evidence for rooting and fewer iron nodules and the bedded D1 above it, which has slightly finer iron concretions than D3, may indicate a fairly stable earlier arctic soil

(D2+3) that was buried by faster sediment accretion (D1) perhaps as snow melt increased and the climate ameliorated.

If this is the case, unit C might be interpreted as redeposited brown-earth type soil material. This may have developed across the landscape in an intervening warm period and would therefore have been the first sediment to be eroded and redeposited downslope as climate deteriorated once again, prior to the thick solifluction deposits (unit B) accumulating. Evidence for an argillic brown earth soil developing during the Windermere interstadial has recently been observed at Heathrow Airport (Rose et al 2000).

However the increasing silt content up through unit D, together with the more distinct banding in the sediment might indicate increasingly dry conditions with loessic input and less water in the soil. In which case The cold wet environment during which unit D accumulated and probably the dry valley was cut may have immediately predated the accumulation of soliflucted deposits on the valley sides and floor.

Soil micromorphological investigation may be able to test and elaborate on these alternative interpretations.

Large scale erosion of the landscape must have occurred during the period represented by these dry valley sediments. This is illustrated by the source material of the earlier fill (unit D) being derived from Thanet Beds, which would have been far more extensive prior to the late Devensian, and the later fill (unit B) being derived largely from the chalk, indicating that by this time the Thanet Beds had been removed from the immediately surrounding landscape.

It is thought that the large scale erosion that created the dry valleys of the present landscape occurred during the late glacial period (14-10ka BP) and especially during the Loch Lomond Stadial (Younger Dryas) the cold stage immediately prior to the Holocene (11-10ka BP). The date of organic remains buried below a swathe of coombe rock eroded from the Devils Kneadingtrough, a dry valley close to Wye in Kent, and forming a fan above the Gault Clay plain is around 11-12ka BP (Preece 1994) suggesting that the dry valley must have been formed or massively re-shaped after 11ka BP. However the incision of Holywell Coombe, a dry valley near Folkstone, was probably closer to the Last Glacial Maximum (c.18-25ka BP) as it contained organic deposits dated to the early late glacial period (Preece & Bridgeland 1998).

The late glacial is thought, in Britain, to consist of a cold period, prior to 13ka BP (Oldest Dryas), followed by the Windermere Interstadial a warm period, around 13-11ka BP and finally the Loch Lomond Stadial (Younger Dryas), a cold period from 11-10ka BP (Lowe & Walker 1997). In continental Europe evidence for a very short lived cold stage, the Older Dryas is found within what is our Windermere Interstadial, separating it into the Bolling and Allerod interstadials.

Further analysis of the characteristics of, and trends within, units C and D in the present profile may therefore be able to suggest whether this dry valley was carved out during a single cold stage or whether a warm stage intervened, which would help to place it within the chronological framework of the Late Glacial. The sediments are also likely to preserve evidence with which the changing vegetation and landscape for the Late Glacial period in this area might be reconstructed. The most appropriate techniques for these purposes would be pollen and soil micromorphology.

The hand-axe found at ARC TGS 97 came from a soliflucted deposit, but was in fresh condition, which suggested it had not been transported far. The deposit was at 60.30m OD, considerably further upslope than the present soliflucted deposits. Whilst this does not necessarily mean they could not have been deposited at the same time, the soliflucted material at ARC TGS 97 was reported to have come from the north-west of the ARC TGS 97 site - an area that is today a dry valley. This implies that the soliflucted deposit in which the handaxe was found accumulated prior to the incision of the dry valley system. Its deposition was likely to have been between 25-14ka BP (URL 1997). Thus, if similar material were to have been found within the coombe rock (unit B) of the dry valley, it would be one stage further redeposited than its context upslope, and the dry valley deposits would be of little use in reconstructing the environment contemporary with the use of the handaxe (somewhere between 500-50ka BP).

Above the coombe rock the fine sediments (unit A) were calcareous and silty (and similar in these respects to some extent was unit C). This is likely to be a result of a loessic input and soil formation in this and weathered chalk material from the early Holocene onwards. The unit represents the clay enriched 'Bt' horizon (A1) and the carbonate precipitated 'Cca' horizon (A2) of an argillic brown earth type soil. These characteristics most probably developed before the recent period of agricultural activity, which has created the upper ploughsoil (not sampled).

Unit A resembles the sediment sampled further down valley in Northumberland Bottom (ARC TGW 97). It is thinner than the Holocene deposits at ARC TGW 97 as the latter was sampled close to the valley floor and was thus in a predominantly sediment receiving location in the landscape. In contrast, the present site, midway upslope, will have lost more sediment to erosion than it will have received itself from further upslope.

Although there is no direct dating evidence for this deposit it would be valuable to compare its pollen profile with that from Northumberland bottom. Using pollen as a rough dating guide this should be able to provide more information on the pulses and environment of sediment erosion and stability within the valley catchment, and enable inferences to be made regarding the possible involvement of human activities in local landscape change.

Conservation

If thin sections are made of the monolith they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths, samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. In addition thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monolith will be easier to store and less likely to deteriorate than the original soil material and will provide supporting information to the thin sections.

Long term storage as a monolith sample is likely to be costly and is not an efficient use of space or archive material. After analysis, if not impregnated with resin and converted to thin sections, the sample should be discarded.

Comparative material

These monolith samples should be compared to those from ARC TGW 97, which were taken from the same dry valley but slightly downslope and closer to the valley floor. The ARC TGW 97 samples appear to correspond with unit A and the upper part of B of the ARC TLG 98 samples and are likely to represent the colluvial accumulation during the Holocene period.

Much geo-archaeological research has been undertaken on the slope deposits in the dry valleys of south-east England. This has focussed on identifying periods of instability (sediment accumulation) and stability (soil formation) and attempting to correlate these events with evidence for human activity (Burleigh & Kerney 1982; Bell 1983, Allen 1992).

Examination of deeply stratified colluvial profiles have shown that, as a result of accelerated soil erosion, the deep brown earth soils that developed in the early Holocene below woodland have been removed (Bell and Boardman 1992). Where the colluvial deposits have been well dated (mostly by pottery inclusions or the burial of dated features) the periods of accelerated erosion and stability have been directly correlated with episodes of human occupation and activity upslope (Macphail *et al* 1990; Bell & Walker 1992, 193, Allen 1992).

Valley sediments have been recorded and sampled from several of the CTRL sites (assessment currently in progress). As such they record sequences and chronologies for periods of landscape stability and instability that might be compared with each other and to other evidence for human settlement and activity across the North Downs landscape.

In addition, work being undertaken by MoLAS on the A2-M2 widening scheme should provide further comparative material.

The Pleistocene deposits at the base of the profile should be compared to the evidence from ARC STP 99, in the adjacent dry valley, where thick loessic Late Glacial sediments were sampled. Comparison should also be made with other evidence from SE England and the North Downs in particular for Late Glacial climate, environment and landscape change (Kerney 1963, 1965; Preece 1994, 1998; Preece and Bridgeland 1998; Rose *et al* 2000).

Potential for further work

The data from the monolith samples has potential to address the following landscape zone and fieldwork aims:

To study the natural landscape, its geomorphology, vegetation and climate, as the context within which the archaeological evidence can be interpreted.
Farming communities (2000 BC-100 BC): to consider environmental change resulting from landscape organisation and re-organisation.

However the main potential of the samples will be to provide information about the Late Glacial environment.

This potential might best be achieved by examination of soil micromorphological thin sections and pollen analysis.

Table 28: Recommendations for further work on the monolith samples

Task	requirement
Preparation and analysis of pollen samples (*): 12 at c. 0.40mm intervals through unit A (select 8 for analysis) 32 at c.0.40mm intervals through units C+D (select 24 for analysis)	Geoarchaeologist + Pollen specialist

Impregnation of 4.monolith samples and manufacture of 9 thin sections of c.110 x 70mm from across contacts A1/A2 contact and A2 base in monolith <1> from B/C, C/D1 and D1/D2 contacts in monolith <2> from D2 and D2/D3 contact in monolith <3> from upper and lower parts of D3 in monolith <4> analysis / interpretation of the depositional and post-depositional characteristics recorded in these samples (*)	Geoarchaeologist + Stirling University (Likely to take 3 months to prepare the thin sections) Soil micromorphologist / geoarchaeologist
Integration of the pollen and micromorphological data and comparison of the sequence and chronology of events with the sites and sources outlined in section 6.	Geoarchaeologist
* It is suggested that the thin sections / pollen slides should initially be scanned to assess their potential and, if suitable the analysis should be undertaken on selected samples if necessary.	

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APPENDIX 15: ASSESSMENT OF LUMINESCENCE DATING

Sarah M. Barnett, University of Durham

Introduction

Samples were taken from two locations:

Location 1: sediments beneath the sarsen stones (Group 1, Figure 9)
Location 2: sediments from a large cut, possibly a well adjacent to the sarsen stones (Group II, [630] Figure 9)

In total, six subsamples, three from each of the two locations, were selected for testing. Tests were made using infrared stimulated luminescence (IRSL) in which the dominant emissions are from feldspars within the silt-sized (2-10µm) fraction selected for measurement. Dates were obtained for the three samples from the pit/well; the sediments from beneath the sarsen stones were incompletely bleached and no dates were determined.

Methodology

Location 1

A monolith was taken of the colluvium at the top of the section beneath Group I Sarsen stones (contexts 628 and 698). The flint layer prevented a second monolith being taken and lower samples were taken in film canisters knocked into the section.

Samples taken:

Sample number	*Distance from top of section*	*Notes*	*Context*
6	0.13m to top of monolith	0.50m monolith	628 & 698
7	0.66m	canister	698
8	0.79m	canister	698
9	0.87m	canister	698

Subsamples were taken in the laboratory under subdued red light conditions.

Samples were extracted from the film canisters under subdued red light conditions by slicing through both sediment and canister at the top and bottom. The ends of the sample which had been exposed to light were discarded and the central portion used for luminescence measurements. Samples for dose-rate measurements were collected in a separate bag at the time of sampling from the section. Sample 255-8 was very dry and crumbly and not possible to subsample.

When sampling from the monolith, the sediment which had been exposed to light during sampling was removed and five subsamples were taken:

255-6-5	@ 50 – 80mm from top of monolith.
255-6-15	@ 0.13 – 0.15m.
255-6-25	@ 0.25 – 0.27m.
255-6-35	@ 0.35 – 0.37m.
255-6-45	@ 0.45 – 0.47m.

Three sub-samples were selected for luminescence testing: 255-6-5, 255-6-45 and 255-9.

Location 2

Two monoliths taken from the section of the pond [630] (contexts 614 and 744) with 19 cm overlap.

Samples taken:

Sample number	*Distance from top of section*	*Notes*	*Context*
10	70mm to top of monolith	50 cm monolith 614	
11	0.48m to top of monolith	50 cm monolith 614 & 744	

When sampling from the monolith, the sediment which had been exposed to light during sampling was removed. Three sub-samples were taken from sample 255-10 and two samples from 255-11:

255-10-12	@ 0.10 – 0.12m from top of monolith	context 614
255-10-30	@ 0.29 – 0.31m	context 614
255-10-45	@ 0.43 – 0.45m	context 614
255-11-25	@ 0.23 – 0.26m from top of monolith	context 614
255-11-45	@ 0.38 – 0.42m	context 744S

Three sub-samples (255-10-12, 255-10-30, 255-10-45) were selected for luminescence testing. The lower sub-samples (255-11-25 and 255-11-45) were considered too dry and crumbly for reliable sampling.

Luminescence Measurements

The subsamples were dried at 105°C and sieved to isolate material of <90 μm diameter. The <90 μm fraction was treated with H_2O_2 for 24h to remove organic material and then with 15% HCl at 50°C for 24h to remove carbonates. Material of 2 - 10 μm grain size was extracted by settling in a 20 cm column of 0.01N sodium oxalate for 20 minutes, pouring off the suspension and settling this in a 20 cm column of 0.01N sodium oxalate for 4 hours. The 2-10 μm material collects at the bottom of the column during this settling. After recovering and drying this material, it was deposited by settling in acetone onto abraded 10 mm diameter aluminium discs. This provides a monolayer of material, with approximately 2 mg per aliquot.

Measurements were made in a Risø TL-DA-12 automated reader. Laboratory beta doses were administered by a calibrated ^{90}Sr/^{90}Y beta source mounted on the reader and alpha doses by an external calibrated ^{241}Am foil. Infrared stimulation was provided by an array of IR diodes within the reader. The luminescence was detected by an EMI photomultiplier with a Schott BG39 filter used to isolate the blue luminescence from the stimulating IR light.

Aliquots were normalised by a 1s exposure to infrared light; correction was subsequently made for depletion of the signal due to this normalisation measurement. The palaeodose was determined from measurements made using the additive dose technique (Aitken 1985). Following irradiation, aliquots were preheated to 220°C for 10 minutes to remove the component of the signal unstable over archaeological time scales. IR stimulation of 250 s duration was sufficient to reduce the signal to within 5% of the background signal. The background, comprising photomultiplier dark count and breakthrough from the IR diodes, was measured by an extended (2000 s) stimulation of one aliquot.

Dose rate measurements

Laboratory measurements using beta TL dosimetry (Bailiff 1982) and thick source alpha counting were used to calculate the annual dose. No radon loss was detected using thick source alpha counting of sealed and unsealed samples from any of the samples tested and secular equilibrium has been assumed. The 'as-dug' water content and the organic content of the sediments were measured in the laboratory by successive heatings to 105°C, 500°C and 900°C. The total dose rate was corrected for both the water and the organic content of the sediments.

Age calculation

The luminescence age is determined from the Age Equation:

$$\text{Luminescence Age (years)} = \frac{\text{Palaeodose (Gy)}}{\text{Dose rate (Gy / year)}}$$

Quantifications

In total, six subsamples, three from each of the two locations, were selected for testing.

Provenance

Location 1

Three sub-samples of sediment beneath the sarsen stones were tested: from 0.38m (255-6-25), 0.58m (255-6-45) and 0.87m (255-9) below the top of the section. Subsample 255-6-25 was from fine sediments above the layer of medium-sized (<8 cm) flints; while subsample 255-6-45 was from just below this flint layer. Sub-sample 255-9 was from the manganese stained layer.

Palaeodoses of ~150 Gy and ~300 Gy were obtained for sub-samples 255-6-25 and 255-6-45, indicating ages in excess of 50 ka for both samples. This, together with the younger date for the lower sample (255-9), suggests that the sediments were not well bleached at the time of deposition and no further measurements were made on these samples. A palaeodose of ~40 Gy was obtained for 255-9, indicating an age of 13 – 19 ka. The luminescence age for 255-9 may reflect the time of deposition, but this cannot be tested and no further measurements were made on this sample.

Location 2

Sub-samples from 0.18m, 0.37m and 0.51m below the top of the section of the pit/well were selected for dating. The section was *c*1m deep but, unfortunately, samples taken from the lower part of the section were unsuitable for luminescence dating being very dry and crumbly.

The dates for the upper part of the fill indicate a gradual silting up of the pond and give a terminus ante quem of 120 BC ± 200 for the start of infilling.

Conservation

No conservation is necessary.

Comparative material

The luminescence date is given with associated errors at the 68% level of confidence. Both the random error and the overall error are quoted; the random error should be used for inter-comparison of the luminescence dates while the overall error should be used in comparison with independent dating evidence.

Potential for further work

The Luminescence dates have potential to add to the corpus of dating evidence, but little potential to answer the research aims.

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Table 29: Assessment of Dating

Sample ref.	Luminescence date ± random error ± overall error
255-10-12	AD 360 ± 140 ± 160
255-10-30	AD 0 ± 140 ± 180
255-10-45	120 BC ± 140 ± 200

Sample ref.	Palaeodose P (Gy)	Total Dose Rate (mGy/a)	Dose rate components (%) α	β	γ	cosmic	Water content (%)	Organic content (%)	a-value
255-10-12	5.28 ± 0.24	3.20 ± 0.09	25	42	28	5	19 ± 2	3.8 ± 0.4	0.096 ± 0.008
255-10-30	5.51 ± 0.33	2.77 ± 0.08	28	38	29	5	19 ± 2	4.5 ± 0.5	0.093 ± 0.008
255-10-45	7.06 ± 0.38	3.33 ± 0.09	30	39	26	5	20 ± 2	3.1 ± 0.3	0.119 ± 0.009

PS: COBHAM GOLF COURSE

APPENDIX 9: ASSESSMENT OF CHARRED PLANT REMAINS & CHARCOAL
Anne Davis

Introduction

A total of 26 bulk soil samples were taken for environmental analysis during the excavation of the two sites in Zone 5; 20 came from ARC CGC 98, and six from ARC 330 98. The sampled deposits came from mainly from fills of pits and ditches, with a few from post-holes and a possible furnace. Those which have been spot-dated so far are all from the middle to late Bronze Age, but the majority are currently undated. Sample sizes ranged from 3 to 40 litres. A report on two further samples was written as part of the evaluation (Campbell & Pelling 1997), and concluded that charred remains were poorly preserved on the site.

It was hoped that the study of botanical material from this site would provide information on economic activities, for example crop husbandry.

Methodology

The samples were processed by flotation, using a Siraf flotation tank, with meshes of 0.25mm and 1.0mm to catch the flot and residue respectively. All flots and residues, were dried, and the residues were fully sorted by eye for artefacts and biological material. The flots were briefly scanned using a low-powered microscope, and the abundance, and general nature of plant macrofossils and any faunal remains were recorded, using the following scale for the number of charred items per sample:

+ = 1-10
++ = 11-50
+++ = 51-100
+++ = 101-1000
1000+ = >1000.

Results were recorded on the MoLAS ORACLE CTRL botany database.

Quantifications

Charred material was recovered from 21 of the assessed samples, mainly in the form of wood charcoal. In many cases this was poorly preserved and highly fragmented, although pieces large enough for species identification were recovered from 11 samples. Occasional charred cereal grains were seen in four samples, and cereal chaff, in the form of wheat glume bases and spikelet forks in two. Four samples contained very occasional weed seeds. The numbers of all these remains were very low, usually less than five items per sample.

Assessment data for the samples with identifiable charcoal or other remains is shown in tables 17 and 18.

Provenance

The charred cereal remains referred to above were found in four pitfills and a ditch fill, two of which were spot-dated to the late Bronze Age, while the remaining three are currently undated. Identifiable charcoal was recovered from a possible furnace, six pitfills, three ditch fills, and a post-hole, two of which have been dated to the middle or late Bronze Age.

The condition of the charred material was generally poor, and it may not be possible to identify all grains to species. Charcoal was mostly broken into very small fragments, but larger pieces were retrieved from some of the samples, as mentioned above, and may be identifiable. The majority of samples included rootlets, and sometimes uncharred seeds, of modern origin. It is therefore possible that some of the charred material could be intrusive.

Conservation

The dried flots, and plant material from the residues, have no particular conservation requirements.

Comparative material

No comparative material has been found from Bronze Age sites in this area of Kent. No Bronze Age environmental material was recovered from Area 330 Zones 1 to 4. There is a good sample from Area 350 Zone 6 (Cuxton ARC CXT 98 – sample <11>) but this is dated to the middle Iron Age. In addition there are good samples from White Horse Stone (ARC WHS 98) but these are dated to the Neolithic.

Further afield, similarly small assemblages of charred cereals and charcoal have been found from Bronze Age features at Cranford Lane, Heathrow (Giorgi 1995), and excavations at the Beddington Sewage Farm, Croydon (de Moulins forthcoming).

Potential for further work

Very few plant remains were recovered from the samples within the Zone 5 area, so their value in answering the project aims is limited. As there have been very few studies of plant remains from Bronze Age sites in this area of Kent, analysis of the five samples containing cereal remains may contribute to our knowledge of cereal use and cultivation in this period. Identification of the 11 charcoal samples will indicate the wood species being exploited, although it is unlikely that the small fragments found will reveal much about woodland management. This work would be justified as the deposits concerned can be securely dated.

There is potential for using the charcoal from the barrow ditch ([227] and [229]) for radiocarbon dating.

Four flots (samples <4>, <<10>, <11> and 12>, based on the grain, chaff, charred seeds and uncharred seeds contents), will be sorted, and charred cereal remains from these and from the sample residues, identified and counted, using a low-powered microscope. The environmental preferences and soil requirements of weed species will also be investigated. Charcoal samples will be identified to species where possible, using an epi-illuminating microscope.

The resources required to complete this work, and preparation of a publication report, are as follows:

Sorting and identification of charred cereal remains
charcoal identification
data entry & preparation of table
preparation of publication report

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de Moulins D. forthcoming

Table 30: Assessment of Charred Plant Remains & Charcoal from ARC CGC 98

Key + = 1-10, ++ = 11-50, +++ = 51-100, +++ = 101-1000, 1000+ = >1000.

Sample Details					**Flot & Residue Details**							**Residue**	
context no.	**Sample no.**	**feature type**	**period**	**Sample vol. (l)**	**flot vol. (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**	**vol. (ml)**	**% sorted**
132	15	Ditch	LBA	10		+				+++	No flot. 5 grains (wheat?) in residue.	1000	100
136	4	Pit	LBA	10	200	++	+	+	+	>1000	C.10 grains. 5 glume base & sp forks. 5-10 seeds incl legume. Rootlets.	2000	100
140	12	Pit		10	250			+	+	>1000	V. few seeds. ?identifiable charcoal.	300	100
144	10	Pit		10	70		+	+	+	>1000	<5 charred seeds, chd stems. 1 glume base. ?identifiable charcoal. Rootlets.	500	100
150	11	Pit		10	80				++	>1000	?identifiable charcoal. Rootlets.	200	100
160	6	Pit	LBA	10						+	Few ?identifiable charcoal frags.	2000	100
176	9	Posthole	M/LBA	10	5	+				++	1 grain seen. Few ?identifiable charcoal frags. Rootlets.	1000	100
180	8	?hearth		10	100					>1000	Some identifiable charcoal frags.Rootlets.	1000	100
227	20	Ditch	?EBA	10	5			+		+++	1/2 large charred seed. ?identifiable charcoal. Rootlets.	1000	100
229	21	Ditch	?EBA	10	40					+	Few ?identifiable charcoal frags.	500	100

Table 31: Assessment of Charred Plant Remains & Charcoal from ARC 330 98 (Zone 5)

Sample Details				**Flot & Residue Details**							**Residue**	
context no.	**sample no.**	**feature type**	**sample vol. (l)**	**flot vol. (ml)**	**grain**	**chaff**	**charred seeds**	**unch'd seeds**	**charcoal**	**comments**	**vol. (ml)**	**% sorted**
361	70	Ditch	10	10				+	>1000	Few ?identifiable charcoal frags. Rootlets.	2000	100
605	161	Pit	10		+				+	No flot. 3 ?wheat grains in residue. Few ?identifiable charcoal frags.	1500	100
606	160	Pit	10						+	Few ?identifiable charcoal frags.	1000	100

APPENDIX 10: ASSESSMENT OF GEO-ARCHAEOLOGY
Jane Corcoran

Introduction

Two monolith samples were taken through the fills of a Bronze Age ring ditch. The aim of the monolith assessment was to characterise and attempt to interpret the fills in terms of the changing landscape processes on the site; and to suggest further work that should be undertaken in order to gain a better understanding of the changing environment and human activities in the environs of the site.

The monolith samples were obtained by hammering a 500m x 50mm x 50mm tin into the cleaned section face. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith location was marked on the section drawing and a level, related to Ordnance Datum was taken on the top of the tin.

Methodology

The sediments sampled in the tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

Each different unit observed was given a separate letter and the nature of the contacts between the units was described.

Quantifications

This section gives the results of the monolith assessment. The sequence is described in the following table. In this table the depth down from the top of the sampled profile is given for the contacts between the units and brackets denote the thickness of the individual units.

Table 32: Assessment of Geo-Archaeology

Unit	**Depth of contact from top of sequence**	**Description and Contacts** **Sample <23> through context (223) ring-ditch cut [224]**	**Slabs of column sample**
		TOP OF MONOLITH SEQUENCE (c.80.65m OD)	
A	[0.50m thick]	Yellowish brown 10YR5/6 slightly clayey slightly sandy possibly humic SILT. Soft and variably compact, or crumbly and loose (may relate to former large root channels). Moderate to frequent small angular, with occasional rounded, flint gravel, typically 10-20mm diameter. Frequent manganese speckles and very occasional iron concretions.	1-9
	0.50m	Diffuse contact to:	
B	[0.10m thick]	Light yellowish brown 10YR6/4 slightly sandy silt. Moderately soft, compact and moderately hard. Moderate to frequent small angular, with occasional rounded, flint gravel, typically 10-20mm diameter. Frequent manganese speckles. This may be a transition Zone between units A and C.	10
	0.60m	Diffuse contact to:	
C	[0.10m thick]	Yellow 10YR7/6 slightly sandy silt. Compact and hard. Occasional small angular, with occasional rounded, flint gravel, typically 10-20mm diameter. Frequent manganese speckles and occasional iron concretions.	11
	0.70m	BASE OF DITCH and monolith profile	

Provenance

The fill in this segment of the ditch had been described as one context (223) on site. However description of the monolith identified a 0.10m thick paler, harder and slightly sandier lower unit (C) with a 0.10m thick gradual interface Zone (B) below a thicker and possibly more humic, silty upper fill (A) that was 0.50m thick.

Manganese and occasional iron concretions were present throughout the profile, suggesting episodically damp conditions in the ditch. However no visible plant remains were preserved.

Looser patches within Zone A may be the result of (ancient or recent) rooting or burrowing although no finer root channels were observed within the profile, which might suggest rapid infilling with little or no vegetation growth.

No depositional structures were observed and it is possible that the sediment accumulated gradually, perhaps as a result of soil creep from the banks and the surroundings of the ditch and became incorporated into the ditch soil. This would be compatible with the gradual contact and interface Zone (unit B) between units A and C. The lack of rooting may possibly result from oxidising and possibly bioturbated conditions.

However the contrast in colour, texture and hardness between the lowest fill (C) and the thicker upper fill (A) indicates different sediment sources, depositional processes and / or post-depositional processes for these deposits.

This might suggest that the greyer unit B developed by weathering of the primary fill, unit C, which may have been derived from the sides of the ditch. This could have taken place at the same time as inputs from the source material (surrounding soil?) of unit C and was later buried by more rapid deposition of unit A.

This may support the suggestion that the initial environment of the ring-ditch was fairly stable but subsequent activities, perhaps linked to the establishment of the nearby late Bronze Age settlement, caused large scale earth movement and possibly levelling of the earthworks.

The very high silt content of the fills is also notable. This may be comparable to the fine, well sorted fills of Bronze Age ditches and postholes frequently found elsewhere in southern Britain. These fills have been attributed to drier climatic conditions during the Bronze Age (Evans 1975, 142) which, together with landscape disturbance is likely to have led to widespread wind erosion and transport.

In order to better understand the significance of the ring-ditch fills in terms of the changing landscape and landuse in the environs of the site, pollen and soil micromorphological analysis should be undertaken. This work will enable the sediment source, depositional processes and changing vegetation of the site and surrounding area to be investigated. The filling of the ditch has been dated by pottery to the early Bronze Age by pottery, furthermore there is the potential for the charcoal in the ditch fill to be dated using ^{14}C and this should provide an adequate framework for this environmental work.

Conservation

If thin sections are made of the monolith they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths, samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. In addition thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monolith will be easier to store and less likely to deteriorate than the original soil material and will provide supporting information to the thin sections.

Long term storage as a monolith sample is likely to be costly and is not an efficient use of space or archive material. After analysis, if not impregnated with resin and converted to thin sections, the sample should be discarded.

Comparative material

The pottery suggests that the ditch was excavated in the early Bronze Age and was filled by the middle Bronze Age (no artefacts from the nearby middle and late Bronze Age settlement were recovered from the ditch).

The evidence from further analysis of the monoliths should be compared to other evidence for the changing environment during the Bronze Age in the North Downs area and further afield. This will enable a better understanding of the perception, exploitation and modification of the landscape by Bronze Age societies to be gained.

No snails were preserved in sample column <22> taken adjacent to the monoliths.

The pollen and soil micromorphological analysis from the monolith samples taken through the Bronze Age barrow ditch at Whitehill Road (ARC WHR 99) should provide good comparative material relating to the infilling of a similar feature and timeframe.

Comparative material will also include the colluvial sequences sampled during CTRL investigations in many of the North Downs sites. Also published or otherwise available accounts of soil, pollen and snail evidence from buried soils and valley sediments from south-east England (eg: Godwin 1962; Thomas, 1989; Allen 1995; Preece & Bridgland 1998; Waller 1998; Waller and Hamilton 1998).

Potential for further work

The data from the monolith samples has potential to address the following landscape Zone and fieldwork aims:

To study the natural landscape, its geomorphology, vegetation and climate, as the context within which the archaeological evidence can be interpreted.
Farming communities (2,000 BC-100 BC): to consider environmental change resulting from landscape organisation and re-organisation.

These aims may be achieved by pollen and soil micromorphological analysis of the ring-ditch fills.

Pollen analysis should enable the nature of the changing landscape during and after the construction of the ring-ditch to be reconstructed and soil micromorphology should enable the sequence of events that led to the infilling of the ditch to be unravelled.

Table 33: Recommendations for further work on the monolith samples

Task	Requirement
Preparation and analysis of pollen samples (*): 5 at c. 0.40mm intervals through units A1 and A2 in <31> 11 at c.40mm intervals through units A1 and A2 in <33>	Pollen specialist
Impregnation of the 3 monolith samples and manufacture of 6 thin sections of c.110 x 70mm from across contacts A1/A2 + A2/B in monolith <31> from A1, A1/A2 and A2/B in monolith <33> from A1/A2 in monolith <32> analysis / interpretation of the depositional and post-depositional characteristics recorded in these samples (*)	Likely to take 3 months to prepare the thin sections. Thin sections to examine PLUS report preparation
Comparison of the sequence and chronology of events with valley sediment profiles from other CTRL sites and from the published literature for the area.	Geoarchaeologist
* It is suggested that the thin sections / pollen slides should initially be scanned to assess their potential and, if suitable the analysis should be undertaken.	

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PS: CUXTON

APPENDIX 12: ASSESSMENT OF MOLLUSCS

Alan Pipe

Introduction

A total of 26 small groups of mollusc shells were recovered from 26 samples taken during excavation. All were assessed.

Eleven groups of molluscs were recovered from bulk samples; the remaining 15 were recovered from spit samples taken at measured depths through the dry valley. In each case, the soil was processed using a modified Siraf-type tank fitted with 1.0 mm and 0.25 mm flexible nylon meshes to retain the residue and flot fractions respectively. The flot and residue fractions were air-dried in a warm drying cabinet and then visually sorted for mollusc shell. Study of the molluscan shell was intended to assist Fieldwork Event Aims 5 and 6

recovering palaeo-environmental remains from ditches and other features
provide information on Iron Age land-use, environment and economy

Methodology

Each sample was roughly quantified and then scanned under a binocular microscope to determine the species-composition of the assemblage. Taxonomic identifications were made using the MoLSS reference collection in conjunction with Cameron & Redfern 1976; and Kerney & Cameron 1979. Allocation of identified taxa to habitat groups, as specified by the CTRL post-excavation assessment report template, followed these sources together with Kerney 1999.

All mollusc groups were examined; no sub-sampling was required.

Quantification

A total of 26 small groups of mollusc shells, an approximate total of 639 shells, were assessed.

This material derived entirely from terrestrial species but with occasional fragments of the marine bivalve common mussel, *Mytilus edulis.* There were no freshwater species.

Identified terrestrial taxa recovered were *Cecilioides acicula*, *Oxychilus sp., Retinella sp. Vallonia pulchella, V. costata, Cepaea nemoralis, C.hortensis, Helix aspersa, Helicella sp., Cochlicopa lubrica, Pomatias elegans, Pupilla muscorum, Clausilia sp., Discus rotundatus* and *Columella edentula.*

The table below groups this material in terms of habitat preference and relative abundance as specified by the CTRL assessment template.

Provenance

Mollusc shells were mainly recovered from the dry valley, with small numbers of shells also recovered from pits (undated and Early Iron Age) and Anglo-Saxon burials.

Conservation

Further analysis of this material would involve more detailed examination under a binocular microscope in order to ensure identification and quantification of all species present. There is no reason why such work would damage the shells or impose any restriction on long-term storage procedures.

The material is in good condition and presents no difficulty in terms of species identification. The value of the assemblage will not be affected by factors of preservation.

The shells are mainly small and fragile and therefore liable to accidental damage by crushing. They should therefore all be stored by context/sample groups in glass tubes or clear plastic boxes, each contained within labelled plastic bags. The complete assemblage should then be stored in an archive quality ’shoe-box’.

There is no reason to discard any of the mollusc assemblage as further identification and quantification may provide some degree of insight into the characteristics of local habitat(s).

Comparative material

The material could usefully be compared with mollusc samples from other sites along the CTRL and in the Darent valley (O’Connor 1984).

Potential for further work

The site lies within the ‘landscape zone’ of the North Downs, Medway River Valley.

The assemblage has some potential to contribute to study of each of the main categories as defined by the CTRL Archaeological Research Strategy. It derives from a range of periods and feature types including an Early Iron Age pit [342], Anglo-Saxon graves [315] and [378], together with a complete series of column samples.

farming communities (2000 – 100 BC); context [342]/column samples
towns and rural landscapes (100bc – AD 1700); contexts [315] and [378]/column samples
recent landscapes (AD 1700 – 1945); column samples

Study of the material will produce data with reference to the Fieldwork Event Aims listed below:-

recovering palaeo-environmental remains from ditches and other features.
provide information on Iron Age land use, environment and economy.

The assemblage has considerable potential for further study in terms of species identification and accurate quantification. Once this work is done, it will then be possible to detect spatial and temporal variation resulting from changes in local conditions, such as shading, and to consider their implications for changes in landuse.

Detailed identification and reporting on all the mollusc groups would be required.

Bibliography

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Kerney, M P, & Cameron, R A D, 1979, *A field guide to the land snails of Britain and north-west Europe* London

O'Connor, T P, 1984, in Philp, B, *Excavations in the Darent Valley*

Number of sample taken (columns/spot etc.) ; number of samples assessed
+ present (0-5 items), ++ some (6-10 items), +++ many (11+).

Table 34: Assessment of Molluscs from ARC CXT 98

Sample	1	12	22	7	11	23
Context	41	156	315	342	342	378
Depth						
Date/interpretation	pit/no date	tree hole	skel/ Saxon	pit/ EIA	pit/ EIA	skel/ Saxon
Catholic species				+		+
Open country species	+++	+++	+++	+++		++
Shade-loving species	+++					+
Burrowing species	+	++	++	+++	+	+++
Aquatic species						
Approx. totals	**25**	**30**	**25**	**40**	**3**	**1**

Table 35: Assessment of mollusc shell from ARC CXT 98 – dry valley samples

Sample											
Context											
Depth	0-10 cm	10-20 cm	20-30 cm	30-40 cm	40-50 cm	50-60 cm	60-70 cm	70-80 cm	80-90 cm	90-100 cm	100-110 cm
Date/interp.	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley	dry valley
Catholic species		+		+	+++						
Open country species		+++	+++	+++	++	+++			++	+	++
Shade-loving species	++	+++	+++	+++	+++	+++	+++	+++	++	+++	+++
Burrowing species	++		+	+	+	++	+	++	+	+	+
Aquatic species											
Approx. totals	**21**	**21**	**30**	**24**	**50**	**45**	**30**	**50**	**25**	**45**	**35**

Sample				
Context				
Depth	110-120 cm	120-130 cm	130-150 cm	150-160 cm
Date/interp.				
Catholic species	dry valley	dry valley	dry valley	dry valley
Open-country species	+++	+		+
Shade-loving species	+++	+	+++	+
Burrowing species	++			+
Aquatic species				
common mussel				+
Approx. totals	**45**	**10**	**20**	**15**

APPENDIX 13: ASSESSMENT OF CHARRED PLANT REMAINS & CHARCOAL
Lisa Gray-Rees

Introduction

This assessment reports on 13 environmental samples taken during excavations at Cuxton (ARC CXT 98) on the northern side of the River Medway in Kent. Six samples were taken for molluscan analysis and were not processed. Seven samples were processed by flotation. Four of these samples produced flots. The purpose of the study of this material was to gain further information about the environment and possible economic activities, for example, crop processing.

Methodology

Each sample was processed using a Siraf type flotation tank. Residues were collected in a 1mm mesh and flots were collected in a 250-micron mesh. Flots and residues were dried prior to scanning. Residues were scanned by eye. Environmental remains and artefacts (such as burnt flint, brick or tile fragments) were collected and transferred to the relevant specialists. Flots and plant remains recovered from the residues were examined in more detail using a low powered stereo microscope.

The modes of preservation, species diversity and abundance of organic remains in each sample were recorded on sheets then entered into the Oracle MoLAS/MoLSS database. Full sample details are given in the table below.

Quantifications

Most of the samples were poor, dominated by modern plant fragments. Sample <11> contained moderate quantities of well-preserved charred cereal grains, wild plant seeds and chaff. Full details of these samples are given in Table 1.

The quantities of remains were estimated and recorded in the following manner:

For charred remains
+ = 1-10
++ = 11-50
+++ = 51-100
++++ = 101-1000
1000+ = >1000.

For waterlogged remains
+ = 0-5
++= 6-10
+++=11+

Provenance

One sample, sample <11>, came from a pit provisionally dated as Iron Age. This sample contained an interesting charred assemblage including wheat (*Triticum* sp.) grains, chaff and seeds of crop weeds, for example vetch (*Lathyrus/Vicia* sp.).

Two samples, sample <22> and <23>, came from the head or stomach areas of skeletons from the Anglo-Saxon cemetery. Unfortunately neither sample produced any useful information. They were dominated by modern plant material (fragments of roots and wood, low numbers of uncharred seeds). Low numbers of charred wood fragments were noted from the residue of sample <23>.

The last sample, sample <12>, from a pit or tree bole feature was not given a provisional date. Modern plant material and charred wood flecks also dominated this sample.

Conservation

All but sample <11> may be discarded.

Comparative material

Sample <11> is the only sample recommended for further analysis. It could help to fulfil the fieldwork event aim to provide information on Iron Age landuse and economy. It will be interesting to compare it with charred remains found at the Farningham Hill (Vaughan, 1984) where low numbers of charred wheat (*Triticum* spp.) and barley (*Hordeum* sp.) grains were recovered form four pits, but no chaff or seeds as in the Cuxton sample.

Potential for further work

A detailed study of sample <11> will give us further information about the cultivation and consumption of cereals during the Iron Age. Identification of the chaff may clarify the species of wheat and identification of the charred seeds may add information about crop husbandry, for example; were these seeds from wild plants gathered accidentally as field weeds or were they part of a mixed crop?

The sample will be examined using a light microscope with magnifications of between 10 and 40 times. Modern seed and cereal reference collections and reference manuals (e.g. Anderberg 1994, Berijinck 1947 and Berggren 1969,1981) will be used.

Plant remains will be identified as closely as their level of preservation allows. Quantities of uncharred remains and charred wood fragments will be estimated and charred remains will be counted. This data will be recorded onto record sheets and transferred to the MoLAS/MoLSS Botanical ORACLE database.

Further work:

Identification and recording of the contents in one dry flot
Table creation and data analysis
Report Writing
Editing and Archiving

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Table 1: Assessment of Charred Plant Remains & Charcoal

Sample Details				Flot Details						Residue
Context & type	Period	Sample no.	Sample size (l)	Flot size (ml)	Grain	Chaff	Weeds Seeds charred/ uncharred	Charcoal	Comments [presence of rootlets, uncharred straw etc.]	Size (ml)/ proportion checked
154 / fill	?	26	c10	-	-	-	-	-	-	4900
156 / pit or tree bole	?	12	10	30	-	-	+/0	-	root and stem fragments	5000
180 / dry valley	?	1	10	-	-	-	-	-	mollusc sample	-
181 / dry valley	?	2	10	-	-	-	-	-	mollusc sample	-
182 / dry valley	?	3	10	-	-	-	-	-	mollusc sample	-
183 / dry valley	?	4	10	-	-	-	-	-	mollusc sample	-
184 / dry valley	?	5	10	-	-	-	-	-	mollusc sample	-
315 / skeleton	?	22	10	20	-	-	-	+	root and wood frags	3600
323 / fill	?	24	c10	-	-	-	-	-	-	900
342 / pit fill	Iron Age	11	30	40	++	+	++/0	+++++	uncharred stems/roots	4500
378 / skeleton	Early Medie val	23	2	40	-	-	0/+	+	uncharred seeds and root fragments	2400
246/fill	?	25	c10	-	-	-	-	-	-	3000

APPENDIX 14: ASSESSMENT OF GEO-ARCHAEOLOGY
Jane Corcoran

Introduction

Two monolith samples were taken from the south-facing section of trench 1071TT. The section cut through a sequence of soliflucted and colluvial slope deposits, which had infilled the dry valley running through the centre of the site. The aim of the geo-archaeological assessment was to determine the potential of the samples to provide information with which the changing landscape and geo-morphological processes operating on the site might be reconstructed. This might provide a better understanding of the environment available to be exploited by people in the past and of the impact of these people on the landscape. This would be of particular relevance in the Bronze Age, Iron Age and Anglo-Saxon periods, for which there is archaeological evidence for occupation on the site and its environs.

The two overlapping monolith tins (0.50x0.5x0.5m) were hammered into the cleaned section face. The sediments and stratigraphy visible in the section were described and drawn by the excavators on site. The monolith samples were marked on the section drawing and a level, relating to ordnance datum was taken on the top of each tin. Each tin was wrapped in cling film and plastic bags, labelled and temporarily stored in the MoLAS fridge prior to and following assessment.

Methodology

The sediments sampled in each tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

For each profile, every distinct unit was given a separate letter and the nature of the contact between each unit was noted. The units identified during description are related to the contexts described on site in the profile description and where possible the profile is discussed in terms of contexts as opposed to the units identified in the monolith tins.

Quantification

This section gives the results of the monolith assessment. The sequence is described below in the table below, the elevation (in m OD) is given for the contacts between the units and brackets denote the thickness of the individual units.

Provenance

The monolith samples were taken from the lower half of the section. The upper part of the section (which was in total about 2m high) was not sampled due to its loose and flinty nature.

However field descriptions describe the sediment directly above the tins (context [32]) as comprising a flinty lens at the base of about 0.50m of bedded silt and chalky mud with a further 0.30m thick flint-rich silt [7] underlying recent topsoil, which was about 0.30m thick.

The profile exposed might be interpreted as representing 5 main events. In the first, context [10] (unit D) formed. This was possibly as a result of the *in situ* weathering of the chalk bedrock, although it is more likely that this chalky sediment is not actually *in situ*, but has moved downslope by solifluction processes during the periglacial environment of the last cold stage. Fine pellety chalk rubble and chalky mud similar to context [10] have been recorded elsewhere towards the base of dry valley fills in the Kent area and have been attributed to meltwater deposition during the Younger and Older Dryas Stadials (Kerney 1965).

In the second event, a soil appears to have developed in the surface of this weathered chalk material (context [45]: unit C). This unit can be differentiated from the upper part of the context (unit B) by a) its angular, blocky structure; b) its darker colour; c) its finer pellety chalk inclusions and lack of coarser flint and chalk; and d) by its more frequent snail shell inclusions, which are very rare in unit B. The darker colour is probably a result of both the addition of humic material and the leaching out of carbonates, which is likely to occur in a soil. The more rounded nature of the chalk granules in this unit is also probably a result of weathering within a soil. Whilst the fragmented snail shells might indicate that the soil may be redeposited soil material, this may not have moved far. The whole shell of *Pomatias elegans* may be derived from burrowing (as is characteristic of this species: Kerney & Cameron 1979, 53) however, the bands of flint that occur higher in the profile, and the depth of the context would have prevented it burrowing from the present day landsurface. Thus an earlier stable landsurface is implied, either at the surface of unit C or pre-dating the accumulation of [32].

In the third stage, sediment derived from upslope appears to have accumulated above the soil (context [45]: unit B). This is likely to be the result of devegetation and disturbance upslope, but whether this was due to human activity or natural causes such as a change to a harsher climate regime is not known. The diffuse contact between units B and C (from the lower to upper part of context [45]) suggests that the cause was not a sudden catastrophic event, causing severe erosion and sediment movement. Instead a gradual accretion of sediment seems to have taken place, as the stable soil became buried by more poorly sorted material from upslope.

The greater abundance of coarser chalk and flints in the upper part of context [45]: unit B compared to the lower part (unit C) is probably a result of the shallower topsoil developed upslope through time, due to continued erosion. This is very likely to indicate continued agricultural activity upslope (which in itself would dislodge and disturb the chalk subsoil).

This more rubbly series of colluvial deposits context [32] constitutes the fourth event represented by the profile. Severe erosion and downslope movement is represented by the lens of flints and chalk of much larger clast size, found at the base of context [32]. This deposit is likely to represent a debris fan accumulated at the foot of temporary rill or gulley carved into the valley side.

Such fans occur today in valley edge locations on the North Downs where water aided slope processes have taken place, for example after winter storms when open fields are unvegetated. Surface flowing water will carry finer material away, but deposit coarse chalk and gravel at the foot of the slope. The decay of organic debris, accumulated in the hollows and open spaces above and between the flints may have contributed to the darker silt band observed above the flint lens in context [32].

Context [32] is therefore likely to represent an intensification of farming practices on the adjacent slopes. However it is possible that harsher weather conditions and a continuation of pre-existing land-use patterns would have the same effect.

The silty bands, with occasional flints, which form the upper part of [32] are also likely to represent sediment transported downslope, but as a result of less dramatic events, probably gradual soil creep. The chalky mud bands within the silts are probably from hillwash. They suggest that the erosion events responsible for their accumulation were not severe enough to transport coarser material this far (although flinty rubble may have accumulated further upslope). Thus context [32] appears to represent a series of erratic and episodic erosion events, some rapid and high magnitude, others more gradual.

Context [7] is also flinty and would suggest a further, more dramatic, erosion event in this locality. However, rills and gulleys do not always occur in the same place. Debris fans will accumulate at the edge of the valley floor in different places at different times during the same episode of land use upslope.

The topsoil developed at the surface of these deposits implies a stabilisation of the landscape (stage 5). This might be a result of arable farming being replaced by grassland and grazing. But it is quite likely that it is an accretionary soil, developing at the same time as sediment accumulates above it, as from the context descriptions it did not appear to be particularly well developed.

The frequent carbonate precipitations seen throughout context [45] are likely to represent carbonate dissolved by rainwater in the upper horizons of the soil, washed down through the soil profile and precipitated out at the limit of water percolation, especially in association with rooting. This may have occurred as part of the period of recent soil formation, or it may have taken place incrementally as the valley sediment accumulated. It is particularly concentrated in the upper part of context [45] possibly because this zone is directly below the looser (and very permeable) context [32].

But it is also possible that the event that deposited the flint lens at the base of context [45] also eroded a former topsoil. In this case the carbonate translocation may relate to a period of soil formation and landscape stability post-dating the accumulation by soil creep of context [45] and pre-dating the period of more intensive upslope disturbance and erosion represented by context [32]. That is, it might represent an additional stage in the sequence of events described. This would fit in between the more gradual accumulation of the upper part of context [45]: unit B in the monolith tins and the more episodic, erratic and coarser accumulation of colluvium represented by context [32].

The sediments deposited by slope process are likely to be laterally variable. As a result a specific event, such as the erosion of an arable field following a rain storm , might be represented by different sediments in different places along the valley, yet the result of a succeeding event, of similar characteristics to the first, might be to deposit different sediment in each location to that deposited by the first event. It is therefore not possible, without very good dating evidence, to correlate the sequence at any one location to that at another with any high precision. Nor would such correlation mean very much.

However the outline sequence of broad depositional events, as set out above, should be representative of the changing nature of the processes operating within the dry valley as a whole, for the timespan represented by the profile. If dating evidence was recovered from any of the contexts sampled, this sequence might therefore be linked to human activity in and upslope of the dry valley. This information would contribute to a better understanding of the character of the landscape during episodes of human occupation and abandonment. It may also enable inferences to be made regarding the impact of past human activity on the local environment.

An important division was made in the monolith description within context [45]. This was subdivided into an upper unit (B) representing unstable landscape conditions; and a lower unit (C) representing an earlier period of landscape stability and soil formation. Finds evidence is unlikely to be able to differentiate between these two units, as it was all part of context [45]. However the abundant snail shells in unit (C) might be radiocarbon dated and this would give a date for the period of landscape stability and soil formation, preceding the earliest erosion event likely to be caused by human disturbance. It would also suggest whether this soil developed in the late glacial or Holocene period. However there are limitations to the radiocarbon dating of shells.

Conservation

Despite careful storage, some drying out of the monolith samples has occurred. In addition, in order to reliably describe the sequence sampled, much of the sediment within the tins has been disturbed. This was unavoidable given the condition of the samples and was necessary, as accurate sediment description is the most important part of monolith assessment and analysis.

The state of the monolith samples means that soil micromorphology is no longer appropriate for these samples and there are no samples from this site to be set in resin or cut into thin sections. There will therefore be no long-term stable archive record of the sediments sampled.

Although the state of the monolith samples will constrain the techniques possible in any further analysis of the samples, the techniques recommended in Section 7 should enable further information to be extracted. This will enhance the description and interpretations given in this assessment.

As the further analysis suggested is likely to also be destructive, long term storage of these samples as monoliths would also not be appropriate. It is therefore recommended that whatever remains of the monolith samples after the analysis stage should be discarded.

Comparative material

Much geo-archaeological research has been undertaken on the slope deposits in the dry valleys of south-east England. This has focussed on identifying periods of instability (sediment accumulation) and stability (soil formation) and attempting to correlate these events with evidence for human activity (Burleigh & Kerney 1982; Bell 1983).

Landsnail and micromorphological analysis of colluvial sediments have been able to link periods of woodland clearance for agriculture with erosion events (Macphail *et al* 1990). Examination of deeply stratified colluvial profiles have shown that, as a result of accelerated soil erosion, the deep brown earth soils that developed in the early Holocene below woodland have been removed, to be replaced by the thin and less well-developed rendzina soils typical of chalk downland today (Bell and Boardman 1992). In a few cases, where the colluvial deposits have been well dated (mostly by pottery inclusions or the burial of dated features) the periods of accelerated erosion and stability have been directly correlated with episodes of human occupation and activity upslope (Bell & Walker 1992, 193).

The colluvial and soliflucted sediments infilling dry valleys have also been investigated by Quaternary Scientists, with the aim of reconstructing Late Glacial environments. Evidence for buried interstadial soils have sometimes been found within the chalky rubble and silt sediments that were deposited by solifluction processes in a periglacial environment towards the end of the late Glacial period (Preece 1994). Of particular importance to the present site is the work done at Upper Halling (Kerney 1963; Preece 1998). Here landsnail assemblages from the buried rendzina soil and from the chalky meltwater muds above and below it were used to reconstruct the changing climate during the Late Glacial.

Valley sediments of both the Holocene hillwash type (as in contexts [45] and [32]) and the lower periglacial soliflucted chalky rubble and silt (as context [10]) have been recorded and sampled from several of the CTRL sites (assessment currently in progress). As such they record sequences and chronologies for periods of landscape stability and instability that might be compared with each other and to other evidence for human settlement and activity across a transect of the North Downs landscape.

Potential for further work

The data from the monolith samples has potential to address the following landscape zone and fieldwork aim:

Farming communities (2000 BC-100 BC)
Provide information on Iron Age landuse, environment and economy

Information on the impact on the landscape caused by occupation on the site in the prehistoric and historic periods, particularly the Iron Age might be inferred. This will be particularly useful when compared to mollusc evidence for changing prehistoric habitats and environments (as obtained from bulk samples from cut features and snail column samples) and to ceramic evidence for the type and intensity of Iron Age occupation.

In addition the episodes of colluviation on the site might be related to other CTRL sites. In particular those where colluvial events have been interstratified with direct evidence of human occupation and activity (eg: White Horse Stone).

Episodes of landscape stability and instability are represented in the profile by evidence for soil formation and sedimentation respectively. However, in order to reconstruct this information it is necessary to date the sediments sampled.

Although no ceramic dating evidence was found in contexts ([45] and [32]) the sequence of events might be placed within a chronological framework by AMS dating of snail shells from these contexts.

The frequent snail shells in the lower part of context [45] are likely to relate to a period of soil formation, prior to the accumulation of the upper part of the context. These could be dated by AMS (on shell protein) to provide a date for this period of landscape stability, prior to the initial onset of colluviation. This would allow inferences to be made regarding the onset of colluviation: whether it was triggered by the Bronze or Iron Age activity in the area – or whether it had already begun by that time.

However, it should be noted that, owing to the fragmentary nature of the snail shells there is a strong possibility that this dating will not be possible, but without a good dating framework the techniques suggested will also be less meaningful.

The existence of soil formed in the lower part of context [45] might be tested by carrying out loss-on-ignition and (pot sensor) magnetic susceptibility determinations at regular (30mm) intervals through the profile. Together these techniques have the potential to identify trends in weathering, organic composition and carbonate content through the profile. This, combined with the descriptions already done should allow possible zones of stability, weathering and soil formation to be identified with more precision than this assessment has allowed.

Further Work

Further work should include:

Radiocarbon (AMS) dating of the snail shells from context [45]
Loss on ignition and magnetic susceptibility determinations at 30mm intervals through profile (30 sub-samples)
Comparison of the sequence and chronology of events at ARC CXT 97/ARC CXT 98 with the archaeological evidence on-site and with valley sediment profiles from other CTRL sites and from the published literature for the area.

Task	**time requirement**
Radiocarbon (AMS) dating of the snail shells from context (45: unit C)	2 months Beta-analytic
Loss on ignition and magnetic susceptibility determinations at 30mm intervals through profile (30 sub-samples)	Geoarchaeologist
Comparison of the sequence and chronology of events at ARC-CXT97 with the archaeological evidence on-site and with valley sediment profiles from other CTRL sites and from the published literature for the area.	Geoarchaeologist

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Table 37: Assessment of Geo-Archaeology

Context	Unit	Elevation of contact (m OD)	Description and contacts	tin
		14.40	Top of sequence sampled	
32	A	[0.10m thick]	Loose, yellowish brown 10YR5/6 slightly sandy clay-silt. Frequent flint (<60mm) and some SA/SR chalk (<20mm) gravel. No visible bedding or clast orientation. Contact marked by increased compaction to:	1
45	B	[0.50m thick]	Compact, yellowish brown 10YR5/6 slightly sandy clay-silt. Frequent flint (<50mm) and some SA/SR chalk (<20mm) gravel. No visible bedding or clast orientation. Matrix has holey, porous structure. Frequent thread-like carbonate precipitations follow root voids in haphazard orientation, especially in upper 0.20m of unit; they become fainter and less frequent towards unit base.	1 + 2
		c.13.90	Diffuse contact over 0.10m, marked by a darkening of colour downwards.	2
45	C	[c.0.30m thick]	Compact, 10YR5/3 brown, slightly sandy clay-silt. Frequent mainly sub-rounded but also sub-angular chalk granules (<5mm: pea-grit-like or pelletty). Very occasional flint pebbles (<30mm). Frequent snail shells – mostly fragmented, but occasionally whole (*Pomatias elegans* observed). Fine angular blocky ped structure. Ped surfaces are coated by carbonate precipitations.	2
		13.58	Distinct, but irregular	
10	D	[0.08m thick]	Compact, greyish brown 10YR4/6 chalky, carbonate rich clay-silt matrix with frequent SA/SR chalk granules and fine gravel (<10mm).	2
		13.50	Base of profile sampled	

PS: PARSONAGE FARM

APPENDIX 10: ASSESSMENT OF CHARRED AND WATERLOGGED PLANT REMAINS, & CHARCOAL

Anne Davis

Introduction

Thirty seven bulk samples were recovered during the excavation, for environmental analysis. Sample sizes ranged from 10 to 30 litres.

The study of botanical material from this site will assist two of the fieldwork event aims:

to investigate patterns of natural resource exploitation.
to determine the landscape setting of the site, its interaction with the contemporary local environment, and recover palaeo-economic indicators from features including ditches and the moat.

Methodology

The samples were processed by flotation, using a Siraf flotation tank, with meshes of 0.25mm and 1.0mm to catch the flot and residue respectively. Flots which appeared to contain organic material, were stored in industrial methylated spirits, while the remaining flots, and all residues, were dried. The residues were fully sorted by eye for artefacts and biological material, except in a few cases, where substantial numbers of charred seeds and grains remained in the residue after processing. In these samples, the larger residue fraction (>2mm) was fully sorted, and the smaller retained for sorting at the post-assessment stage of the project. The flots were briefly scanned using a low-powered microscope, and the abundance, and general nature of plant macrofossils and any faunal remains were recorded, using the following scale for the number of charred items per sample:

+ = 1-10, ++ = 11-50, +++ = 51-100, ++++ = 101-1000, 1000+ = >1000.
Waterlogged plant remains were recorded as follows:
+ = present (0-5 items), ++ some (6-10 items), +++ many (11+).

Results were recorded on the MoLAS ORACLE CTRL botany database. Assessment data for the more productive samples is shown below.

Most flots were less than 100ml in volume, but where they exceeded this, 100ml sub-samples were assessed. All processed samples were included in the assessment, including four which had been assessed at the earlier evaluation stage.

Quantification

Charred material was recovered from most of the assessed samples. Charcoal was present in the majority, usually in the form of small fragments, although pieces large enough for species identification were recovered from six samples.

Charred cereal grains were also widespread, but in most cases there were fewer than ten grains per sample. In seven samples (from contexts [101], [166], [236], [237], [426], [589], and [601]) larger quantities, ranging from approximately 60 to over 500 grains, were found.

Wheat (*Triticum* sp.), barley (*Hordeum sativum*), rye (*Secale cereale*) and oat (*Avena* sp.) grains were all seen, but wheat generally seemed to be the most abundant cereal.

Cereal chaff was very rare, although a few rachis fragments were seen in two samples. Relatively few charred weed seeds were seen in most samples, but all those with abundant grain also contained seeds of leguminous plants (Fabaceae), some of which were comparable to cultivated peas (*Pisum sativum*) and beans (*Vicia faba*), while others were smaller, and more likely to be wild vetches or vetchlings (*Vicia/Lathyrus* spp.). Several small weed seeds were also present in most of these samples. Occasional fragments of hazelnut shell were also preserved by charring.

Waterlogged preservation of plant remains was rare, but three samples (from contexts [191], [210], and [242]) included many seeds preserved in this way, as well as abundant remains of roots, bark, moss, bud scales, and in some cases alder (*Alnus glutinosa*) catkins and complete hazelnuts (*Corylus avellana*). The majority of seeds from these samples were from wetland plants such as alder, sedges (*Carex* spp.), (*Potamogeton* sp.), (*Ranunculus* subgenus *Batrachium*), and *Polygonum hydropiper*, although a few taxa from drier, disturbed ground were also present. One more sample (from [1050]) had quite abundant seeds, but their condition was poor, and a further three contained occasional waterlogged seeds and other plant remains.

The majority of samples included variable amounts of rootlets, presumably of modern origin, and the waterlogged assemblages contained occasional seeds, and in one case wheat rachis, of obviously recent vintage. It is therefore quite likely that some of the uncharred plant remains, and possibly also some of the charred material, are in fact intrusive. Further investigations into the relevant stratigraphy is necessary to assess the integrity of these deposits.

Provenance

Nearly half the samples came from pitfills, mostly of medieval date. The remaining samples were from a variety of features, including ditch and drain fills, hearths and ovens, and dumped deposits. Of those with spot-dating available, the majority of deposits were of 12th to 13th century date, with two peat layers dated to the mid 1st century, and an external dump dated to the 19th or 20th century. The seven best assemblages of charred material came exclusively from pitfills dating to the 12th to 13th centuries (groups 43, 64, 65, 96, and 216). The three samples with well-preserved waterlogged assemblages were recovered from a peat layer and two channel fills in the western part of the site (groups 52 and 53), while less well preserved remains came from a ditch fill and modern moat fill (groups 101 and 102). Other samples, from a variety of features contained too few surviving plant remains to contribute to the research objectives.

The condition of the charred material was generally poor, with many of the cereal grains distorted and/or fragmented. It may not be possible to identify all grains to species, but in the richer assemblages there should be sufficiently large numbers of identifiable grains. Charcoal was generally broken into fragments too small for species identification, but larger pieces were retrieved from a few samples. Waterlogged preservation was very poor in the majority of samples, but good in the three peat and channel samples mentioned above, and moderate in the ditch and moat fills. There is however, as mentioned above, a potential problem with distinguishing contemporary plant remains from intrusive material.

Conservation

The dried flots, and plant material from the residues, have no particular conservation requirements, but the flots stored in Industrial Methylated Spirit will need regular inspection and topping up of the fluid.

Comparative material

Medieval charred grain assemblages from the London area, for example those from St Mary Clerkenwell (Davis forthcoming) and 1 Poultry (Davis in prep), tend to be similar to those recovered at Parsonage Farm. Grains of free-threshing wheat were common on these sites, along with smaller quantities of barley, oats and rye. Charred seeds of wild and cultivated leguminous plants are also commonly found in this period, when they were grown for animal fodder as well as food for humans. Comparative examples from sites in Kent may also include assemblages from Darenth, Fawkham, Otford, Old Soar and Wilmington Manor.

Potential for further work

Despite the rather limited range of plant materials recovered from this site, there is potential for several of the project aims to be addressed. The seven large charred assemblages (identified in 4.1) of cereal grains, cultivated pulses, occasional other food plant remains, and weed seeds, will provide evidence on the diet of the medieval inhabitants. The very low incidence of cereal chaff in these samples suggests that this was a consumer site, importing cereals grown and processed elsewhere. This aspect of the economy can be investigated more thoroughly with full analysis of the samples. Identification of the arable weeds from these samples, and study of their habitat requirements and preferences, may provide evidence for the type of soils on which the cereals were grown, enabling suggestions to be made about their area of origin. Study of the spatial distribution of charred cereals, along with other artefactual and faunal waste materials, will contribute information on the organisation of the site.

The three samples with good waterlogged preservation will provide information about the palaeo-environment. This material has very little potential to contribute to questions on the economy of the site.

All the samples which produced identifiable charcoal were from medieval pitfills, and it is not thought that their identification would contribute to the research aims of the site.

Flots from the samples selected for analysis of charred remains will be sorted, and macrofossils from flots and residues identified and counted, using a low-powered microscope. Large flots will be sub-sampled, and sufficient sub-samples sorted to produce approximately 500 grains. The remaining flot will then be rapidly scanned for any new species not seen in the sub-samples. Where partially sorted residues containing charred remains have been retained, these too will be sub-sampled if necessary, and the same proportions of flot and residue sorted. Analysis of the results will include calculating the relative abundance of each cereal, and of grains, chaff and weed seeds, in each sample and within features and areas. The environmental preferences and soil requirements of weed species will also be investigated. Waterlogged seeds will also be grouped according to habitat preference.

The resources required to complete the recording and analysis of the ten selected samples, and preparation of a publication report, are as follows:

Sorting and identification of charred remains from 7 flots and retained residues
sorting and identification of waterlogged remains from 3 samples

data entry
analysis of the assemblages, including comparison of wild and cultivated taxa within and between the samples, and interpretation of the assemblages with reference to the project aims.
preparation of publication report.

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Table 38: Assessment of Charred and Uncharred Plant Remains, & Charcoal

Sample details				**flot and residue details**							**residue**	
Con-text	Con-text type	Samp no.	samp size (l)	flot size (ml)	grain	chaff	Charred seeds	Un-charred seeds	Charcoal	Comments	Size (ml)	% checked
101	Pit	1	20	100	++++	+	+++		1000+	Grain mostly wheat. Pulses + weeds. Some unsorted residue. Rootlets	1000ml	70%
166	Pit	8	20	10	+++		+++	+	1000+	Grain mostly wheat. Pulses + weeds. Few rootlets.	200ml	100%
183	Marsh deposit	11	30	250				++		Flot in IMS. Mostly rootlets. Many fine indet frags.	500ml	100%
184	Structural cut	4	20	350				+		Many roots, wood. Few hazelnut, alder catkins, weed seeds.	1000ml	100%
191	Ditch	5	15	400				+++		Flot & residue mainly plant material. Roots, moss etc. Some modern e.g. wheat rachis.	1500ml	100%
210	Ditch	6	20	200				+++		Flot & residue mainly plant material. Roots, moss etc. Some unsorted residue.	500ml	60%
236	Pit	16	20	30	++++		++	+	++++	Grain mostly wheat. Pulses + a few weeds. Some unsorted res. Rootlets, moss etc.	300ml	60%
237	Pit	13	30	50	+++	+	+++		++++	Grain mostly wheat. Pulses + a weeds. Few rootlets.	1000ml	100%
242	Marsh deposit	9	20	200				+++		Flot in IMS. Flot & residue mainly plant material. Roots, moss etc. Some unsorted res.	800ml	70%
253	Pit	23	30	20	++		+		1000+	c.10 grains, few pulses. Few rootlets.	1000ml	100%

sample details				**flot and residue details**							**residue**	
426	Pit	15	30	20	++++		++		1000+	Grain mostly wheat. Pulses + a few other weeds. Few rootlets.	200ml	100%
589	Pit	22	30	20	++++		+++		1000+	Grain mostly wheat. Pulses + a few other weeds. Few rootlets.	500ml	100%
601	Pit	24	30	20	+++		++		1000+	c.60 grains. Pulses + a few other weeds. Few rootlets.	2500ml	100%
1049	Ditch	40	10	30	+			++	++	Flot mostly rootlets. Some uncharred weed seeds.	500ml	100%
1050	Ditch	41	20	50				+++		Flot in IMS. Poor condition (mould). Weed seeds, many rootlets.	700ml	80%

APPENDIX 11: ASSESSMENT OF SHELL
Jackie Keily
Conservation by Liz Barham

Introduction

A single shell artefact was recovered by hand excavation from the excavation works.

The artefact may be of use in answering the following fieldwork event aims:
to determine the function and economic basis of the site

Methodology

The shell object has been examined and given an individual accession number, and the data was recorded on an accession card and on the Oracle database.

Quantification

Table 39: Assessment of shell

Context	Special Number	Material	Count	Period	Comments (Description)
585	65	Shell	1	MD	Oyster shell palette with traces of a bright red pigment – vermilion?

Provenance

The shell palette was recovered from context [585] (the fill of a structural cut, possibly associated with a wall), Group 198, sub-group 116, which also produced pottery dating to *c* 1175-1250.

The shell is in a reasonable condition with traces of pigment attached to its inner surface.

Conservation

Analysis & preparation for archive deposition.

Please refer to the metalwork assessment for details of the aims of conservation work on finds from this site. The pigment on [585]<65> will require analysis by the conservation department to identify it. Some consolidation of the shell and secure re-packaging are also required for long term stability.

Comparative material

Comparison should be made with other sites in the area such as Old Soar, Plaxtol to see if shell palettes are common and whether they have been found on other rural sites. A number have been found on sites in London, some with vermilion and comparison may also be made with these.

Potential for further work

The only fieldwork event aim that this find may apply to is:

to determine the function and economic basis of the site

The shell palette probably dates to the early medieval period, possibly the 12th to 13th centuries. It is an extremely interesting find on this site as it indicates the possible existence of painted walls in the building. The pigment is possibly vermilion, whose use increased during the 12th century, although it would still have been an expensive commodity (Pritchard 1991, 71). Shell palettes are more usually found associated with important buildings (the Guildhall in London and Clarendon Palace, Wiltshire) or churches (Boyton Parish church, Wiltshire). Therefore, the discovery of one associated with a rural moated site in Kent is of great interest, in terms of what it potentially infers about the appearance and use of the building, as well as the wealth and status of those who lived and worked there.

The only Landscape Zone aim that the palette can be applied to is:

towns and their rural landscapes (100 BC-AD 1700)

Comparison should be made with assemblages from other moated sites to see if any have produced shell palettes and did any produced evidence for painted plaster or stonework.

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APPENDIX 12: ASSESSMENT OF GEO-ARCHAEOLOGY

Jane Corcoran & Jim Collins

Introduction

Monolith samples were taken from five features on the site:

through peat deposits associated with Iron Age or Roman timber and brushwood, within a relict western stream channel
from the ditch that was sealed by make up deposit for the moated site.
from the eastern moat arm (first phase moat fill/mound extension)
from the northern moat arm
from the eastern stream deposits

The aim of the monolith assessment was to determine the potential of the samples to reconstruct the changing environment and landscape, especially in relation to agricultural activities and the clearance of the 'Wealden Wild Wood'. It also aimed to examine the potential for studying the impact of the Medieval occupation and abandonment of the moated site on the surrounding landscape and the nature of the moat and its landscape setting when the site was in use.

The monolith tins (each 50x50x500mm) were hammered into cleaned section faces. The sediments and stratigraphy visible in section were described and drawn by the excavators on site. The monolith samples were marked on the section drawing and a level, relating to ordnance datum was taken on the top of each tin. Each tin was wrapped in cling film and plastic bags, labelled and stored in the MoLAS fridge prior to assessment.

Methodology

The sediments sampled in each tin were cleaned and described using standard sedimentary criteria. This attempts to characterise the visible properties of each deposit, in particular relating to its colour, compaction, texture, structure, bedding, inclusions, clast-size and dip.

For each profile, every distinct unit was given a separate number and the nature of the contact between each unit was noted. Where several units appeared to belong to the same depositional episode or event they were grouped together into a zone, designated by a letter. The characteristics of the units identified during monolith description are set out below. These tables also relate the geo-archaeological sequence to the contexts described on site and to any environmental samples taken from them. Where possible, the discussion in section 4 refers to the deposits by their context numbers, to allow comparison with the data from other specialist appendices.

With the exception of sample <54> the monoliths are well preserved and any pollen or diatom remains that exist within them are likely to survive.

Quantification

Western relict stream channel

Monolith sample <1> section 5 and monolith sample <2> section 7.

These samples were taken from the north-west part of the site, in the valley of the western stream. They were taken from different profiles, but together characterise the sequence of deposits associated with the timber, brushwood and peat of contexts [227 and 247].

Eastern stream channel

Samples <38 & 39>: two monoliths from section 11; pre to post medieval levels

Ditch or water mill race

This feature was parallel to the eastern stream and pre-dated the moated site. Samples <53 & 54>: two monoliths from section 25.

These samples were taken about 1m apart through the fills of the possible mill-race or ditch. It was not possible within the time constraints of the assessment to securely relate these samples to their precise location within the sequence of recuts and deposits that are associated with this feature. This must be done before any further work is carried out on the monolith samples.

Eastern moat arm (first phase moat fill/mound extension)

Sample <43>: two monoliths through deposits on the eastern side of the mound. These deposits are probably associated with the filling of a primary moat cut (associated with medieval Building 1) in advance of the construction of medieval Building 2.

Medieval moat – northern arm

Sample <42> one monolith through primary fill of moat in the northern arm, section 23.

Provenance

Western relict stream channel (Figure 6): Dated prehistoric to medieval
Samples <1> and <2>

Table 40: Assessment of Geo-Archaeology: relict stream channel <1> and <2>

Context	Zone & unit	Elevation of contact (m OD)	Description and contacts	Tin	Assoc. enviro samples
		58.92	Top of sequence sampled		
292	A1	[0.16m thick]	Brown 10YR4/3 very compact and hard sandy silt. The unit coarsens upwards to a medium sand at the top, from a silty fine sand at the base. Frequent iron staining of the matrix in the upper part of the unit. Occasional flint pebbles, also towards the top. Distinct irregular contact to:	1	

Context	Zone & unit	Elevation of contact (m OD)	Description and contacts	Tin	Assoc. enviro samples
183	A2	0.08m thick]	Dark brown 10YR3/3 compact and moderately hard sandy humic silt. Occasional flint and charcoal granules. Possible increase in sand content downwards.	1	<11>
		58.68	Distinct horizontal contact		
227	B1	[c.0.08m thick]	Greyish brown 10YR5/2 loose humic sand with frequent twigs and inclusions of humic silt and peat. Diffuse contact (less sand downwards) to:	1	
	B2	[c.0.10m thick]	Very dark brown 10YR2/2 soft moderately sandy peat. Well humified, with frequent twiggy plant remains and fine roots. Occasional pebbles. Clear contact to	1	
	B3	[c.0.08m thick]	Greyish brown 10YR5/2 loose humic sand with frequent twigs, wood and inclusions of humic silt and peat (ie: similar to B1).	1	
		58.42	In monolith 1, slightly further downstream than monolith 2, context [227) overlies fine gravel (mostly granule-sized) which may be part of [270] ie: correspond with unit C.		
?227	B1-3	[>0.20m thick]	In monolith 2, context [227] is more compact with slightly less sand than B3 and a more reddish colour (Very dark brown 7.5YR3/1) with more wood fragments. Clear sloping contact to:	2	
?242	B4	[0.09m thick]	Black, 7.5YR2.5/1 soft, very slightly sandy peat. Very well humified: matrix is almost a humic silt. Frequent wood and plant remains.	2	<9>
?247	B5	[0.06m thick]	Very dark brown mottled with greyish brown 2.5Y5/2 and dark yellowish brown 10YR4/6 humic silty sand. Frequent wood and plant remains. Frequent flint granules and occasional pebbles.	2	
		c.58.15	Distinct, irregular contact		
270	C		Greyish brown 2.5YR5/2 slightly silty sand. Frequent iron-stained root channels and occasional orange mottling of the matrix. Some channels still contain woody roots, others are humic filled.	2	
		58.41	Base of profile sampled		

The sediments sampled in the palaeochannel, together with the morphology of the contexts, as recorded in the sections, suggests that the western valley floor is likely to have contained a meandering river or stream(s) in the later prehistoric period. These appear to have migrated across the valley floor. This has caused deposits characteristic of flowing-water, standing-water and vegetated, relatively dry land surfaces to be interspersed through the profiles.

The samples can be sub-divided into three main episodes.

Lowest fluvial sand and gravels, dated prehistoric to Late Iron Age

The lowest deposits are fluvial sand and gravels (context [270]). These are of unknown age but are likely to represent fast flowing water carrying a coarse bed-load, derived from the Greensand, Gault Clay and Clay with Flints deposits of the North Downs. The uppermost part of this context appears to be gravelly, implying that a lag deposit exists, from which fines have been winnowed, during an episode of faster water flow. It is therefore likely that during the early part of the sequence this part of the site lay within the channel of the western stream. It is likely that the sand was deposited as sand-banks (in-channel bars or as point bars, on the inside of meander bends).

There is evidence for rooting in the sand and gravel of context [270]. This, together with the humic content and gradual transition to the inter-bedded peat of Zone B (context [247]) implies a stable period of plant growth and a cessation of water flow, at least in this part of the valley floor. This may be because the level of water flow fell and the channel bars became dry surfaces above the water flow. Or it might suggest that the main channel flow migrated away from the monolith location, to another part of the valley floor. This level is associated with the lower cut timbers dated by pottery c 50BC to AD 50.

Peat deposits, dated Late Iron Age to medieval

The overlying peat suggests that the valley floor was damp, or becoming wetter. Lenses of humic clay-silt within the lowest peat deposits (B4: [?242]) indicate that flooding, or pools of standing water, may have existed within a possibly wooded valley floor at this time.

The higher incidence of sandy lenses within the peat in context [227] implies that (possibly in episodic events) water was flowing across the wooded or vegetated valley floor. This may indicate that the main water flow was migrating back towards the sample location, or else that increased water was flowing down the valley at this time. This level is associated with the upper cut timber and appeared to be cut by a medieval wicker-lined ‘drain’.

It is not entirely clear, however whether the peat represents *in-situ* plant growth and decay, or an accumulation of wood, carried to this location by human and water transport. A combination of both is possible, as rooting certainly extended from or through [247] into the underlying sand, but the disturbed nature of the sandy units B1 and B3, within [227] suggest localised water flow possibly in a channel-edge location.

The context descriptions suggest that there is some lateral variation within context [227] and the morphology of the contexts, represented in section, indicate that they merge laterally into one another. These characteristics imply that different deposits were accumulating at the same time in different places as a result of the same event (ie: facies variation). This would be likely to result from slight differences in distance to the main water channel and in elevation. This suggests that [227], [242], [247] and [183] (zone B in the monolith descriptions) all accumulated above a former sand and gravel channel bar.

The cut timber in contexts [247] & [227] appear to correspond to the initial period of plant growth in this sand bar [247] and to a renewed period of water flow across the vegetated sand bar [227]. However, the time period between these two events is not known. They could be almost contemporary, or be separated by decades or centuries. It is also possible that the two timber layers represent the construction [247] and later abandonment [227] of a riverine structure. This, or associated activities may have influenced the pattern of water flow. Dating of these events (ie: the bottom and top of the peaty deposits) perhaps by radiocarbon should be attempted. This could be related to the date of the pottery in context [183] and indicate the timespan during which the peat accumulated and during which the activity in this location occurred.

Context [183] was described as peaty on-site but would appear to be a humic silt. It is likely to represent the gradual inundation of the vegetated peat surface by minerogenic sediment derived either from sluggish floodwater (ie: from the river) or else from surface wash and slope processes, given its valley edge location. This process appears to have subsumed the vegetated surface and buried it by further, increasingly coarse grained sedimentation [292].

Hillwash deposits, dated medieval to post-medieval

The upper part of the profile sampled (zone A) may be interpreted as accumulation from hillwash processes. Slope deposits can be transported by water or gravity and rills and gulleys flowing into the valley might also have eroded the peat and accumulated fans of gravel. The period of this activity can be dated fairly well due to the presence of the underlying medieval wicker drain and overlying topsoil (removed by mechanical excavator). It is likely this hillwash material accumulated as a direct result of tree clearance and agricultural activities on the nearby slopes.

Ditch or water mill race (Figure 4), dated 11th to early 13th century
Samples <53 & 54>

Table 41: Assessment of geo-archaeology: samples <53 & 54>: section 25

Context	**Zone & unit**	**Elevation of contact (m OD)**	**Description and contacts**	**Tin**	**Assoc. enviro samples**
			Sample <53>		
		c.58.5	Top of sequence sampled	53	none
1145	A1	[0.06m thick]	Olive brown 2.5Y4/3 silty sand. Hard and compact. Frequent iron stained root channels. One larger humic stained root channel extends through this unit and to the base of A2. Diffuse contact (becomes finer and darker downwards) to:		

Context	**Zone & unit**	**Elevation of contact (m OD)**	**Description and contacts**	**Tin**	**Assoc. enviro samples**
?1145	A2	[0.12m thick]	Darker olive brown 2.5Y4/3 sandy clay-silt. Hard and compact. Moderately frequent iron stained speckles. A humic stained root channel extends from A1 to the base of this unit. Occasional charcoal flecks. Diffuse contact (marked by more clay and darker colour downwards) to:		
?1137	A3	[0.06m thick]	Still darker olive brownish grey silty clay. Frequent angular and sub-angular granule and pebble sized flint gravel.		
[1136]			Distinct contact		
1139	B		Soft, friable interdigitating lenses of pale brown 10YR6/3 fine sand and dark yellowish brown 10YR4/4 more clayey silty sand.		
		c.58.0	Base of sample <53>		
			Sample <54> This sample had dried out very badly and had become very hard and cracked. This made accurate description very difficult.		
		c.58.75	Top of sample <54>	54	none
1145	A1	[0.16m thick]	Dark greyish brown 2.5Y4/3 compact and hard sandy clay-silt. Moderate iron concretions along fine root channels. Fine angular blocky structure riddled with fine holes <1mm (root holes?). Occasional granular and grit sized flint gravel. Contact appears to follow crack associated with a humic, soil-like lens.		
?1145 ?1158	A2	[0.24m thick]	Dark greyish brown 2.5Y4/3 compact and hard sandy clay-silt. Slightly less sandy than overlying unit. Frequent and larger iron concretions than in A1. Similar fine angular blocky structure riddled with fine holes <1mm (root holes?). Occasional granular and grit sized flint gravel. Possible crushed snail shells.		
		c.58.25	Base of profile sampled		

These samples were taken about 1m apart through the fills of one or several of the (re)cuts of the ditch or mill-race feature. Unfortunately sample <54> had dried out very badly and any surviving pollen and diatom assemblages are unlikely to have remained well preserved. This also prevented accurate description of the sediments.

Both samples <53> and <54> appear to represent the fills of a primary cut, and then fills of a subsequent re-cut

Initial observations suggest that the earliest fill sampled <53: unit B> was the result of episodic water flow through the feature with periods of faster flow and periods of still, standing or draining water. Diatoms assemblages examined from the finer lenses may provide information about the nature of the water flowing through the cut. Pollen from the same lenses may suggest the nature of the local environment at this time and perhaps the source of the water.

The later fills are finer grained and indicate more sluggish flow, or silting up. It would appear that plant growth and soil formation eventually occurred within the damp conditions of the ditch.

Samples for pollen and diatoms from the base and top of sample <53> would provide material with which to examine landscape and environmental change within the catchment of the site from the 11th to 13th centuries. This should be undertaken in conjunction with similar information from the western and eastern stream channels.

Eastern stream channel: samples <38 & 39> two monoliths from section 11 *(Figure 6), dated pre- 13th century to modern*

Table 42: Assessment of Geo-Archaeology: Sample <38 & 39> Section 11

Context	**Zone & unit**	**Elevation of contact (m OD)**	**Description and contacts**	**Tin**	**Assoc. enviro samples**
		57.65	Top of sequence sampled		
716	A1	[0.04m thick]	Hard and compact, light yellowish brown 2.5Y6/3 sandy silt. Diffuse contact (over 30mm) to:	38	
719	A2	[0.10m thick]	Greyer sandy silt with manganese flecks	38	
720	A3	[0.02m thick]	Flint gravel rich band, forms contact of A2 and A4.	38	
741	A4	[0.06m thick]	Greyish brown 10YR5/3 sandy silt. Frequent angular granule and pebble sized flint clasts.	38	
?721	A5	[c.0.04m thick]	Darker greyish brown sandy silt with frequent flint pebbles.	38	
			(There is probably a gradual increase in humic content down the profile through Zone A)		
		57.43	Sharp slanting contact		

Context	Zone & unit	Elevation of contact (m OD)	Description and contacts	Tin	Assoc. enviro samples
830	B		Interbedded yellowish green sand with blue-grey silty clay. Beds / laminations are slanting, sub-parallel and mostly about 10mm thick. The upper 0.20m iv very iron stained, especially along root channels. Iron concretions occur throughout he unit. The sandy beds contain frequent (green) glauconite clasts, probably derived from the Greensand of the Weald. The unit is penetrated by frequent woody roots (> c.10mm diam.) and a larger stake-like wood fragment.	38 / 39	<28>
		56.89	Base of profile sampled		

This sequence was divided into three main zones.

Undated lowest deposits (pre-13th century):

The lowest, zone C (context [830] pre-dates the moat cut [726] and is undated. Context records indicate that it pre-dates all the cut features within the eastern stream valley. It therefore probably accumulated prior to the Saxo-Norman period and may be of prehistoric age.

It probably represents overbank flood events: interspersed episodes of water washing more rapidly from the river during fast flood flow and then standing or draining more slowly away (when the silty clay was deposited) and may have formed a raised levee adjacent to the river channel.

It is expected that there will be good preservation of diatoms and pollen within the silty clay overbank bands, due to their waterlain nature. These microfossils are good indicators of water quality and local ecology and hold potential for various avenues of further research on the site (section 7).

The iron-staining at the top of the fluvial sediments [830] and especially associated with large root channels suggests that the earlier river sediments were vegetated immediately prior to a clearance episode, probably associated with the manor construction. The lack of bedding in this upper part of context [830] is also indicative of bioturbation and implies that the ground surface was not far above.

Faster flowing water, gravelly deposits, dated medieval to post-medieval:

The gravelly contexts of Zone B (contexts [720], [741] & [721]) may represent a period when shallow faster flowing channels were flowing, eroding the earlier, finer fills.

Upper hillwash deposits, dated post-medieval to modern

Zone A [contexts [716] & [719] appears to represent flood or hillwash events or the dumping of a brickearth type material into the stream channel (perhaps culminating with recent agricultural activity or the bulldozing of parts of the site in the 1960s).

Sample <42> one monolith through fill of northern moat arm, section 23(Figure 6), dated 13th century

Table 43: Assessment of Geo-Archaeology: sample <42> primary fill of moat

Assoc. with context	**Zone & unit**	**Thickness of unit as sampled (m)**	**Description and contacts (Elevations and correlation with the site matrix to be done at analysis stage)**	**Tin**	**Assoc. enviro samples**
1049 +			Top of profile sampled: to obtain from S.23	42	<40+41>
1050	A	0.10	Very dark greyish brown sandy humic clay-silt (loam). Moderately soft, occasional gravel and iron concretions.		
			Clear irregular contact following root channels		
	B1	0.15	Brown 10YR4/3 very sandy clay silt, but becomes less sandy downwards. Occasional iron concretions and staining along root channels. Occasional diffuse, humic stained root channels. Diffuse contact over 0.10m to:		
	B2	0.15	Greyish brown 2.5T5/2 compact, moderately soft silty clay. Strong iron staining within the lowest 20-30mm of unit.		
			Diffuse contact (marked by an increase in sand) to:		
	C	0.10	Dark yellowish brown 10YR3/4 medium to coarse sand. Very iron stained matrix. Friable. Angular flint and ironstone clasts.		
			Base of profile sampled		

The lowest sediment sampled (zone C) was an iron stained gravelly sand. It was probably deposited through erosion of the sandy natural deposits into the moat. The iron staining is likely to be the result of ground water fluctuations and the precipitation of ferric iron at the contact of the permeable sands of the former river channel and the less permeable overlying clay (unit B2) of the moat.

The clayey (B2) sediment is likely to represent still and deep water and is probably the main primary moat fill in this location. The increase in sand within the matrix upwards suggests that water flow became swifter and probably shallower through time (B1). Perhaps the eastern stream was partly re-directed through the moat arm during this period and the arm was starting to silt up.

Zone A represents plant growth and soil formation at the surface of / into the moat sediments. This soil formation and rooting appears to have extended into unit B1, as indicated by the humic and iron-stained root channels in this zone, but not into the lower part of zone B (B2). This shows that the moat arm had ceased to contain flowing, or standing water.

The shallowness of the moat deposits seen in this tin appears to suggest that the silting up and soil formation was a fairly rapid process. Above this level stratigraphic descriptions indicate a collection of brushwood had been dumped into the moat arm.

Sample <43> two monoliths through section 20 at edge of the first moat on the eastern side of the site (Figure 5), dated 13th century

Table 44: Assessment of geo-archaeology: sample <43> section 20 (at edge of moat)

Context	Zone & unit	elevation of contact (m OD)	Description and contacts	Tin	Assoc. enviro samples
		58.76	Top of profile sampled		none
1065	A1	[0.14m thick]	Light olive brown 2.5Y5/4 compact sandy silt. Frequent iron staining as concentrations associated with root channels. Occasional charcoal flecks. Diffuse contact to:	1	
1065	A2	[0.06m thick]	Light olive brown 2.5Y5/4 compact slightly sandy silt. Occasional iron staining and becomes greyer (less oxidised) downwards. This unit is marked by distinctly less sand and more clay-silt than A1 & A3.	1	
1065	A3	[0.12m thick]	Light olive brown 2.5Y5/4 moderately compact sandy silt. Frequent iron staining. Occasional charcoal flecks. Occasional flint gravel.	1/2	
		58.44	Diffuse contact (marked by a decrease in sand downwards)		
1066	A4		Greyish brown 2.5Y5/2 slightly sandy silt. Compact and hard. Occasional iron concretions, possibly associated with root channels.	1/2	
		58.16	Diffuse contact (marked by an increase in sand downwards)		
1093	B1	[0.14m thick]	Brownish grey, compact, silty gravelly sand. Occasional iron staining possibly following moderately large root channels. Occasional charcoal. Distinct contact to:	2	
1093	B2	[0.05m to base of profile]	Pale whitish grey medium to coarse sand occasional flint clasts of granule to pebble size. Non compacted.	2	
		57.97	Base of profile sampled		

These monoliths were taken from the inner side of the first moat cut.

Context [1093] was sub-divided in the monolith sample description into a lower, 'clean' whitish grey gravelly sand (B2) and an upper, 'dirtier' and darker coloured silty gravelly sand (B1). The upper surface of [1093] appeared to be irregular and undulating on the section drawing. It is possible that the upper part of the gravel (B1) represents the reworking of the former stream bed or channel-edge bar during moat construction. However the iron stained root channels within B1 and its greyer more humic appearance and the concentration of gravel at its surface, point towards former plant growth within it. It is therefore possible that [1093] represents an abandoned bedform or gravelly sand bar associated with the earlier stream. It is quite possible that a considerable expanse of sand and gravel accumulated at the confluence of the eastern and western streams. It would appear that, by the time the moat was constructed, this area had been abandoned by the streams and had become vegetated.

As a result of moat construction (and stream channel manipulation) the formerly vegetated confluence zone was flooded. Zone A: contexts [1066] and 1065] are sandy clay-silts. They represent fluctuating water flow within the eastern stream. It is likely that the flow was predominantly slow or sluggish, but sandier lenses (such as A3, within [1065]) indicate that occasional more turbulent episodes occurred.

Pollen and diatom analysis of these sediments should be able to provide information with which the changing medieval landscape can be reconstructed and the role of human activities in accelerating this change.

Evidence of rooting and oxidation at the top of the profile, especially in context ([1065]: zone A1) indicate that the moat sediments have become weathered, aerated and bioturbated in their upper parts. This probably indicates that pollen and diatom preservation will become worse towards the top of the profile, where differential preservation might be expected, with only the more robust species surviving.

Conservation

If thin sections are made of the monolith blocks they will take up less storage space, stand a better chance of long term preservation and be amenable to a similar method of archiving to that for finds and environmental samples. As monoliths the samples are not easily stored, need to be kept in a cool to cold and dark environment and will be likely to deteriorate with time. In addition thin sections are easily available for further research and can be examined frequently without loss of information. Stored monoliths are less accessible and will gradually loose their potential for preserving information, especially as each time they are examined further cleaning will wear away the surface.

In the same way, processed sub-samples taken from the monoliths will be easier to store and less likely to deteriorate than the original soil material.

Long term storage as monolith samples is likely to be costly and is not an efficient use of space or archive material. After analysis, for those monoliths not impregnated with resin and converted to thin sections, what remains of the samples should be discarded. Sample <54> should also be discarded

Comparative material

Valley sediments have been recorded and sampled from several of the CTRL sites. As such they record sequences and chronologies for periods of landscape stability and instability that might be compared with each other and to other evidence for human settlement and activity across the Wealdon landscape. In terms of the present site the main periods of interest focus on Iron Age and Roman activity and medieval expansion and abandonment.

This data should be compared to published research on the impact of human activities and the resulting accumulation of valley sediments, derived from both slope and river processes (Bell & Walker, 1992; Bell & Boardman 1991; Needham & Macklin 1992).

It should also be compared to more local evidence for human impact and abandonment on the environment recorded on other sites in south-east England. In particular, the silting up of the Walbrook in London, in the Iron-Age Roman Also to evidence for prehistoric deforestation and agriculture (Bell 1983). Also comparison might be made to geoarchaeological samples taken by MoLAS during excavation of the moated medieval site at Low Hall, Walthamstow and Finsbury Manor, just north of the City of London.

Potential for further work

The monolith samples have potential to address the following landscape zone and fieldwork aims:

Establish the presence/absence extent and morphology of any moat or other water course
Determine the landscape setting of the site and interaction with the contemporary local environment

As no wells were found on site it is probable that the inhabitants of the moated settlement drew their water from the streams themselves. Diatoms (algae) are sensitive to salinity, nutrient levels and acidity (amongst other things) and are best preserved in silt and clay sediments. It is possible that examination of diatom assemblages from the moat and pre-moat waterlain sediments will provide data with which the changing water quality in the valley can be reconstructed. Changes in the quality of the water supply and the likely effect of occupation on the water passing on downstream might then be investigated.

The recommendations for further work are outlined below, with respect to the feature they relate to.

Western relict stream channel

These monoliths have potential to provide information with which the impact of prehistoric and early historic human activity on the surrounding landscape might be reconstructed. Pottery from [183] together with radiocarbon dating of the peat sequence would enable these activities to be placed within a more secure chronological framework for the site and the region.

Thin sections for soil micromorphology will enable the interpretation of the sediment sequence discussed in section 4 to be tested. This technique should also be able to determine the process by which context [183] & [292] accumulated (fluvial or colluvial) and suggest whether agricultural activity on the slopes may have been responsible (Macphail *et al* 1990, Macphail 1992). Or whether this disturbance was taking place within the stream catchment but not on the site itself.

Pollen analysis through the fine-grained organic sediments of contexts [247], [242], [227], [183] should enable the nature of the surrounding landscape to be reconstructed. It may suggest the extent to which the woodland had been cleared by this time and indicate the role of human activities subsequent to clearance (ie: whether for arable or grazing).

Further work on the monoliths from the palaeochannel would therefore have potential to determine the landscape setting of the site and human interaction with the contemporary local environment.

Ditch or water mill race

Samples for pollen and diatoms from the base and top of sample <53>, especially as these contexts are roughly dateable (almost certainly the latest fills are soon before the construction of the medieval manor in the 13th century), would provide material with which to examine landscape and environmental change within the catchment of the site prior to development. This should be undertaken in conjunction with similar information from the stratigraphically later moat and eastern channel fills.

Medieval moat: northern and eastern arms, eastern stream channel

The monoliths from the moat have very good potential for the reconstruction of:

the changing landscape and environment during the medieval period
the possible role of human activities in this change

changes in the quality of water supply as a result of human activities during the medieval period and also (together with samples from the palaeochannel and mill race) throughout the prehistoric and historic period of site occupation.

The data on which to base these reconstructions might be obtained from pollen, diatom and limited sedimentological and soil micromorphological analysis of the samples.

Initial assessment indicated that the samples were taken through both pre-moat construction fluvial deposits (eastern arm and eastern stream channel) and also through overlying moat fills. It is initially thought that sample <43> pre-dates sample <42> by perhaps half a century and the comparison between the pollen and diatom remains could reveal differing environmental indicators.

Recommendations for further work:

Western relict stream channel
Radiocarbon Radiocarbon dates from the top and bottom of the peat
Pollen Analysis of 16 pollen sub samples
Soil micromorphology
a) Supporting sedimentary techniques: Carry out x-ray and loop sensor magnetic susceptibility determination on the monolith inserts. Sub-sample the 2 monoliths at 2cm intervals for LOI / particle size / phosphates prior to stage (b) and carry out this analysis as appropriate (in discussion with the soil micromorphologist) Provide data (but not report text) for stage (c).
b) thin section preparation Set what remains of the 2 monoliths in resin Manufacture 4 thin sections to cover the 292/183; 183/227; 227/242/247 and 247/270 interfaces.
c) *Description and interpretation of 4 thin sections* Use supporting data obtained in (a) as required Prepare report text
Geoarchaeological synthesis Integrate the results of the dating, pollen and sedimentary / soil micromorphological techniques in the light of data obtained from the stratigraphic record and other specialist reports, to attempt to reconstruct the sequence of events represented by the palaeochannel sediments; and the likely impact of human activity on landscape change.

Ditch or water mill race
Pollen Analysis of 12 samples from <53> at c.40mm intervals
Diatoms Analysis of 12 samples from <53> at c.40mm intervals
Geoarchaeological synthesis Integrate the results of the pollen, diatoms, monolith assessment and stratigraphic data from the mill-race samples with similar evidence from the relict channel and moat in order to reconstruct changes in the quality of water supply and environmental change, for the period of site occupation.

Medieval moat: northern and eastern arms, eastern channel

Pollen

Subsamples to be taken from the monoliths before they are set in resin!

Analysis of 24 pollen sub samples (at c.40mm intervals):
4 from the 'primary fill' <42>
12 from <43>
4 from the upper part of <38>
and 4 from the clayey laminations of the pre-moat deposit <39>

Diatoms

Subsamples to be taken from the monoliths before they are set in resin!

Analysis of 24 diatom sub-samples from (at c.40mm intervals):
4 from the 'primary fill' <42>
12 from <43>
4 from the upper part of <38>
and 4 from the clayey laminations of the pre-moat deposit <39>

Soil micromorphology

a) Supporting sedimentary techniques:

Carry out x-ray and loop sensor magnetic susceptibility determination on the monolith inserts of samples <42, 43, 38+39> (6 monoliths).
Sub-sample monoliths:
<38>: top half (8)
<39>: selected sand & silt laminae from top / middle / base (6) <42>: lower 0.30m (15)
<43>: entire 0.80m profile (40)
(Total: 69 sub-samples)
at 20mm intervals for LOI / particle size / phosphates prior to stage (b) and carry out this analysis only as appropriate (in discussion with the soil micromorphologist and see (b) below.
Provide data (but not report text) for stage (c).

b) thin section preparation

Set all monoliths in resin
Manufacture the following thin sections (c.40mm x 100mm):
<38>: top half (2)
<39>: (1)
<42>: unit C, lower B, B/C contact (3)
<43>: A1/A2 contact, A3/A4 contact, A4/B1 contact, B1/B2 contact (4)
Total thin sections manufactured: 10
The samples will be stored as thin sections as this is likely to be the best way of preserving the geoarchaeological record of these deposits.

c)*Description and interpretation of 10 thin sections*

Use supporting data obtained in (a) as required
Prepare report text

Geoarchaeological synthesis

Integrate the results of the dating, pollen and sedimentary / soil micromorphological techniques to attempt to reconstruct the sequence of events and geoarchaeological implications of the moat sediments; and the likely impact of local medieval activity on landscape change.

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APPENDIX 13: DOCUMENTARY ASSESSMENT
Mary Adams

Introduction

Whilst moated medieval manors are fairly common in Kent, very few have been excavated, and of those almost none have been so fully excavated to modern standards. It was known that there was a quantity of documentary evidence for medieval Westwell and Parsonage Farm as a brief research exercise was undertaken during the time of the archaeological excavations. This initial work has been followed up with the documentary assessment 3.6.

Historical background.

Westwell, known in medieval times as Welles, is a parish of some 5,200 acres extending from the crest of the North Downs down to a region of level ground on the edge of the Weald. It is bounded on the south by the manor of Ripple, and there are a number of small independent holdings or manors also in the parish. An ancient track-way, known now as the Pilgrim's Way, runs along close to the foot of the escarpment.

The site of the archaeological exploration is on land now part of Parsonage Farm, once called the Old Rectory. Parsonage Farm itself is situated to the east of Station Road, opposite the site of the old manor. This 'Rectoria' is mentioned in documents of the early 15th century[1] and it is, therefore, the history of this rectory and its relation to Westwell Manor that needs to be studied.

Westwell is a pre-conquest settlement. In Domesday Book there is reference to a mill (worth 30 pence) and a church is mentioned in Domesday Monachorum. The manor and church were confirmed to Christ Church Priory in Canterbury in 1070 for the use of the priory table, but subsequently the ownership of the manor was called into question.

It appears that the manor and church of Westwell were 'sold' into lay hands and were occupied by a family calling themselves 'de Welle' through whom it came into the possession 'at farm' of a Peter de Bending, a member of a leading Kentish family. Peter, having fallen into financial straits, sold it back to Christ Church.[2] Following an appeal from his widow, who claimed the manor as her property in gavelkind, it was confirmed to Christ Church again in 1240. It seems likely that it was prior to this date that the church living became the gift of a lay rector, for the church was not appropriated to Christ Church again until 1397 and, in 1237, the rector was a Henry de Welle.

It is after Christ Church resumed possession of the manor that various developments took place. Around 1250 (according to architectural dating) a new church was built in what is now the village of Westwell. There is no sign of the earlier church, but as it was probably of timber construction, this cannot confirm or deny that this was the site of the Saxon building. A small part of Court Lodge, which stands just south of the church, is built of materials similar to that of the church and appears to have been built at the same time. Since mason's engaged on church building usually erected a dwelling for themselves it must be possible that this is the remains of the mason's house although rather more substantial than usual.

Henry Eastry became Prior of Christ Church in 1285 and set himself the task of reorganising and improving the buildings and working of the demesne farms. Westwell was the scene of

[1] *Bedel Roll Nos 41,50 and 59 also MA6*
[2] Archaeologia Cantiana Vol 6 p. 305

major alterations. Probably it was under his auspices that a tile factory was established [3]and was making great numbers of tiles for both local building work and for sale to other manors. Lime burning was also carried out.

It is the 1291-1292 bedel roll that gives the most detailed account of work here.[4] This year both the cider mill and a stable were removed and set up in a new place. A great barn was taken down and rebuilt on a new 'barton' or farm - clearly present-day Westwell. A new ox-house was also built here; but an old ox-house and an old barn were de-roofed and taken down completely – presumably on the site from which the Great Barn was removed. Prior Eastry's memorandum Book records a lot of work at Westwell at this time, including the building of a new water mill.[5] There were also a number of small new buildings being erected at various places including the park, which was enlarged.[6] This was a deer park[7] undoubtedly designed to provide venison for the monks 'table' at Canterbury. It was situated just north of the moated manor site. There are also references to a 'vinarium' in the park and a later document mentions land called the 'Vyneyarde'.

There is an inescapable impression that the demesne farm, or manor, was being moved from its original site to a more suitable site close to the new church. The interesting question is from where was the barn, stable and cider mill being moved?

The archaeological investigation shows that the moated manor was abandoned as a dwelling at some time during the 13th century, and that buildings were taken down and moved from the site, possibly between 1300 and 1350. This agrees pretty well with the documentary evidence so that it would, at least, seem possible that this was the original Westwell manor site. The finding of 11th century pottery suggests that it was an early settlement; the ditch, which has been identified as a probable mill leet, could belong to the mill recorded in the Domesday Book.

Until the appropriation of the church and rectory by Christ Church in 1397[8], there are few references to the rector, although the 1328 visitation states that the rector is not resident in the village. It is after the appropriation that the bedel rolls refer to Westwell Rectory. In 1402-1403 thirty-four cart loads of old timber were carried from the Rectory to the manor and 11,000 tiles were bought for repairing the rectory buildings.[9] There is no mention of an 'aula' or hall. Subsequent to this the Rectory and Manor were sometimes leased out as separate holdings, sometimes leased to the same farmer.[10] Parsonage farm house was built very close to the site of the moated manor, and appears to be of 16th century construction. A barn and other buildings were also built near to the farm house.

Following the Dissolution, the manor and rectory were settled briefly on the Archbishop of Canterbury, but were taken under royal patronage again by Queen Elizabeth.[11] With the abolition of the Priory there was no longer a demand for food from Westwell and the park became Park Farm - an ordinary manor farm. The manor was leased out to various tenants for a number of years, during which time Park Farm, the Manor or Court Lodge, and the Rectory were recognised as separate holdings. The manor went to the Earl of Thanet in 1665.[12]

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[3] *Arch Cant. Vol 116 p.35*
[4] *Bedel Roll No 2*
[5] *Prior Eastry's Memorandum Book*
[6] *Ibid*
[7] *Hasted History and Topographical Survey of the County of Kent Vol 7*
[8] *The Church of St Mary, Westwell. A Short History and Guide also Hasted' history etc*
[9] *Bedel Roll No 41*
[10] *MA 6*
[11] *U455 T 68 and T69*
[12] *U455 T 68*

Since then Westwell has been a quiet backwater used for the mixed farming common in this part of Kent. After the war, as became common, Parsonage farmhouse came into purely residential use, the associated land being let to a farmer. The moat was then filled.

In 1884 the London, Chatham and Dover Railway built a line running just north of Parsonage Farm with a small station called Hothfield Halt on land adjoining Parsonage Wood.[13] A century later the M20 motorway was constructed north of this railway track, work beginning on this development in 1989. Between these two thoroughfares Tarmac Roadstone set up a large depot which is still in use today.

Glossary
Bedel roll: The accounts kept by the 'serviente' or sergeant, who served as farm manager, were recorded twice yearly when Monk Wardens from Christ Church Priory visited the demesne farms. A 'visus' was taken in the spring, and the final accounts were written up at Michaelmas and it is these that form most of the bedel rolls.
At farm: medieval term meaning the holding was rented.
Gavelkind: a form of land tenure common in Kent, whereby land was partible in equal portions among sons and/or daughters, after allowance for a widow's dower of half the property, when the owner died intestate.
Rector: Incumbent of a parish with an entitlement to the tithe.

Methodology

The following sources were consulted or referenced in preparing the documentary assessment summary. It has been shown that a considerable body of evidence exists for Westwell and some of this can be related to the site at Parsonage Farm.

Not all the sources were actually read, but they were scanned and are known to contain references.

Quantifications

The Church of St Mary, Westwell [1988] *History and Guide*
Domesday Book
Domesday Monachorum
Victoria County History [1932 Vol. 3]
Hasted: [1797-1801] *The History and Topographical Survey of the County of Kent [Vol: 7]*
Furley: [1874] *The History of the Weald of Kent [Vol: 2]*
Igglesden: [1920] *A Saunter through Kent with Pen and Pencil [Vol: 14]*
Arthur Mee: [1936] *Kent*
Pevsner: [1969] North East and East Kent
Harris: [1719] History of Kent

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Vol: 6 - 1866,
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[13] *Vic Mitchell and Keith Smith Ashford's Main Line – Swanley to Ashford.*

Vol: 14 – 1882
Vol: 29 – 1911
Vol: 93 – 1977
Vol: 116 - 1996
FRH Du Boulay [1966] *The Lordship of Canterbury*
Vic Mitchell and Keith Smith [1990] *Ashford's Main Line - Swanley to Ashford*

Sources at Canterbury Cathedral Archives

Archbishop's Registers:
John Pechan [(1) p159 & 194 (2) p17]
Robert Winchelsey [(2) p923-925]
Sudbury [(2) p65 & 94]
Morton [(1) p139 & 152]
Archbishop Simon Langton *Acta* [Vol 50 p99]
Literae Cantuariensis [(3) p1117 & 121]

Manuscript Sources
Prior Eastry's Memorandum Book
Westwell Bedel Rolls
No 2 - 1290-1291
No 41 – 1402-1403
No 59 – 1464-1465

Miscellaneous Accounts:
Westwell:
1348-1365 – MA20
1432-1433 – MA 136
1434-1435 – MA 138
1439-1440 – MA 139
1448-1449 – MA 143
1452-1453 – MA 147
1471-1472 – MA 159
1478-1485 – Ma 169
Westwell Rectory:
1443-1444 – MA 140
1449-1450 – MA 144
Westwell , bedel
1422-1424
1485-1492
MA: 7, 9, 10, 11, 30, 14, 15, 16
Westwell Manor:
1478-1483 – MA 6
1490-1494 – MA 8
1519-1522 – MA 13
Westwell Rectory 1207-1822
1478-1483 – MA 6
1490-1494 – MA 8
1519-1522 – MA13
Manuscript *DCC Prior 2*
Ditto *DCC RegK f225*

Sources at the Centre for Kentish Studies, Maidstone
Census Returns

Manuscript Sources
U991 E27A Improvements to Court Lodge
U991 T99 land near parsonage and church [with plan] 1884 Purchase of Rectory and farm by Lord Hothfield from Ecclesiastical Commissioners
U455 T44 68-70 Indentures regarding leases of Westwell Manor 1546 – 1670
U455 T44 58-59, 61-62 includes Westwell Manor 1356 – 1540
U455 M19-20 Survey of Manor of Westwell
U47/22 T157 includes Parsonage House 1697, 1795
U991 T104 Rent on Westwell Manor and two Watermills 1919
TR2804/1 Sale Particulars for Rectory, glebe and farm 1832
BX 88106471 Sale Particulars for Park House Farm and plan 1969

Maps
Extract from Phil Symonson's Map of Kent 1596
Extract from Map of the Hundreds of Calehill, Chart, and Longbridge taken from Hasted's History of Kent [this map was probably based on Andrew's and Drury's '*Atlas of Kent*' 1769]
Plan from U991 T99
Extracts from First Edition Ordnance Survey map of 1871
Extract from Ordnance Survey map of 1908 showing site of moat on parsonage Farm.
Extract from Ordnance Survey map of 1914
Extract from Tithe Map 1840
Extract from Altered tithe apportionment map 1931
Plan from BX 88106471

Illustrations
Photographs of Hothfield Halt beside Parsonage Wood.

Potential

There appears to be a considerable quantity of material containing references to Westwell and Westwell manor. Further research into the actual contents of these documents should be undertaken to ascertain the detail contents and find any further specific references to the site.

Further work may identify the detail history of the site, potentially with references to building types and uses, dates and further names of the occupants. It may also allow the actual moated site to be located within its setting/estate, as there are already references to Parsonage Wood, a deer park and a vineyard. The connection with Christ Church, Canterbury is important and further research would help to expand on the knowledge of the workings and organisation of this extremely important land owner and religious centre.