RADIOCARBON DATES

from samples funded by English Heritage
under the Aggregates Levy Sustainability Fund 2004–7

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Alex Bayliss, Gordon Cook, Christopher Bronk Ramsey,
Johannes van der Plicht and Gerry McCormac

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Introduction

The extraction of aggregate represents over 80% by tonnage of non-fossil fuel minerals extracted in the UK. Following the success of the two-year pilot scheme, the Aggregates Levy Sustainability Fund (ALSF) was extended for three years from April 2004 to provide funds to help address the environmental costs of aggregate extraction. This was based on a proportion of the Aggregates Levy, a tax of £1.60 per tonne on all newly-won aggregates.

Between 2004 and 2007 in England, the ALSF provided grant support for a number of initiatives, including minimising the demand for primary aggregates, promoting more environmentally-friendly extraction and transport, reducing the local effects of aggregates extraction, and addressing the environmental impacts of past quarrying. English Heritage, along with English Nature and the Countryside Agency, continued to be a major distributor on behalf of the Department of Environment, Food and Rural Affairs (DEFRA) for the proportion of the fund set aside for addressing the environmental costs of aggregate extraction.

The English Heritage ALSF scheme aims to reduce the impacts of aggregate extraction on the historic environment, both on land and under the sea (Fig 1). For the scheme in 2004–7, awards were focused on five key objectives:

Fig 1 *Vibro-coring in the southern North Sea (© J Russell, Wessex Archaeology)*

1. developing the capacity to manage aggregate extraction landscapes in the future (Fig 2)

2. disseminating the knowledge of aspects of the historic environment gained through past work in advance of aggregate quarrying to a wide range of audiences

3. reducing the impacts of current extraction where these fall beyond current planning controls

4. addressing the effects of old mineral planning permissions

5. promoting understanding of the conservation issues arising from the impacts of aggregate extraction on the historic environment.

In total, English Heritage funded projects worth over £10.9 million during 2004–7. Further details of this programme can be found at www.english-heritage.org.uk/ALSF, and further details of the wider ALSF programme can be found at www.defra.gov.uk.

Scientific dating

The pilot scheme had demonstrated that an extensive programme of scientific dating would be required to underpin the objectives of the scheme. It was also clear that, once project designs had been agreed and suitable material retrieved for dating, this supporting research would have to be delivered swiftly.

For radiocarbon dating, framework agreements were established with a number of laboratories to enable the programme of radiocarbon research to be completed within the necessary timescale. In total, 647 radiocarbon ages have been reported at a cost of just over £175,000. The central provision of radiocarbon dating for all the projects funded through this scheme has not only enabled the production of this volume, but has also provided economies of scale which have allowed considerable cost savings to be achieved. Streamlining the sample selection and submission process, along with the efficiency and hard work of the staff of our collaborating laboratories, enabled the successful provision of radiocarbon dating within the challenging timescale demanded.

Full details of the radiocarbon dates funded in support of the ALSF research programme between 2004 and 2007 are provided in this volume. For the other scientific dating techniques used in support of this programme, full archive reports have been commissioned for each application. These reports are available from English Heritage, Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth, PO4 9LD (res.reports@english-heritage.org.uk).

Tree-ring dating was undertaken by the Nottingham Tree-Ring Dating Laboratory on a series of bog oaks preserved in palaeochannels of the river Trent at Warren Farm Quarry, Leicestershire (Fig 3). These trees grew in the third

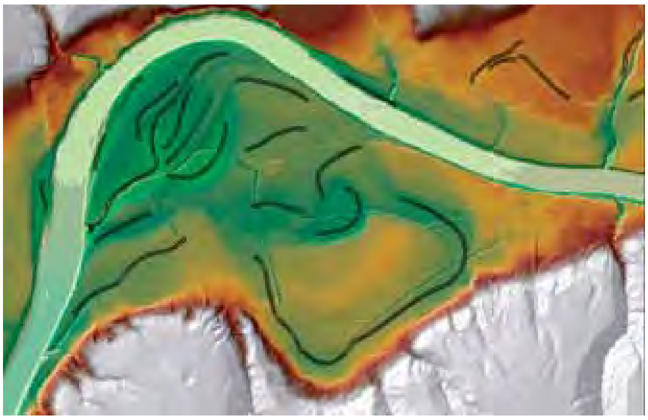

Fig 2 *Palaeochannels at Osbaldeston Hall meander, lower Ribble, Lancashire shown by LiDAR (© Environment Agency)*

Fig 3 *Sampling waterlogged oak for dendrochronology at Warren Farm Quarry, Leicestershire (© Dr A Howard, Birmingham University)*

millennium cal BC (Arnold *et al* 2007), providing valuable information on the chronology of the geomorphic change at the Trent-Soar confluence (p155). This analysis also provides precious reference data for prehistoric dendrochronology in England, which is extremely sparse in this period (Bayliss 1998, fig 11.4).

A second programme of tree-ring analysis was undertaken on waterlogged archaeological timbers from Burlescombe, Devon by Ian Tyers (Tyres 2007). The timber lining of one of the two excavated wells from the site (structure 678) was constructed of timbers felled in the spring of AD 629. This analysis again provides valuable reference data. The dating of a second feature (structure 658) proved more problematic, and it was only the supporting evidence provided by wiggle-matching a series of radiocarbon dates from one of the timbers (p52) that allowed a tree-ring date in the last third of the fifteenth century BC to be accepted.

Large-scale programmes of dating using Optically Stimulated Luminescence (OSL) (Aitken 1998) were funded for a number of projects, at a cost of more than £95,000. This method dates the last time a sediment was exposed to light, and is particularly appropriate for dating sands and gravels. Technical advances in the past few years have improved the precision and accuracy of the method considerably (Duller 2004). This is, however, undoubtedly a swiftly developing discipline and it is essential that these measurements are interpreted in the light of technical information provided in the archive reports, which enables an assessment of the reliability of the dates to be undertaken.

OSL measurements were produced as part of research programmes to provide robust chronological frameworks for terrace development associated with important Palaeolithic archaeological remains in the middle and lower Trent valley (Schwenninger *et al* 2007b), the valleys of the rivers Axe, Exe, Otter, and Doniford in Devon (Toms *et al* 2008a), and from the proto-Medway valley in northeast Kent and southeast Essex (Schwenninger *et al* 2007c). Dating of terrace deposits and landscape evolution was also undertaken from deposits at the confluence of rivers Trent and Soar (Toms *et al* 2008b), and from the Ribble valley in Lancashire (Lang *et al* 2007). All these applications posed considerable technical challenges, although only those in the Ribble valley prevented the calculation of meaningful luminescence ages. From the confluence of the rivers Trent and Soar, single-grain analysis was undertaken on sand-size quartz grains from sediments deposited by fluvial action.

Continuing work begun during the pilot scheme, further luminescence dating was undertaken of deposits relating to the Palaeolithic archaeology of the Sussex/Hampshire coastal corridor (Schwenninger *et al* 2006; 2007a), and from excavations of Mesolithic occupation at North Park Farm, Bletchingley, Surrey (Bailey *et al* 2007; Toms 2005).

Finally, a pilot study was undertaken from Bronze Age deposits at Gwithian, Cornwall to assess the suitability of this material for more extensive analysis in the future (Roberts 2007; Fig 4). This demonstrated that the quartz here has good luminescence properties and produced ages which are in good agreement with stratigraphically related radiocarbon dates (p82; Hamilton *et al* 2007).

Fig 4 *Taking measurements of radiation dose by gamma spectrometry for OSL dating at Gwithian, Cornwall (© Dr H Roberts, Aberystwyth University)*

Following promising results produced by two projects during the pilot scheme (Collins and Penkman 2004a–b), further work was commissioned to enable molluscs recovered from gravel deposits to be dated using Amino Acid Racemization (AAR) (Johnson and Miller 1996; Hare *et al* 1997; McCarroll 2002). A research project assessed the utility of a novel method of AAR analysis, using reverse-phase high pressure liquid chromatography (Kaufman and Manley 1998) and intracrystalline proteins from the calcitic opercula of the gastropod *Bithynia* sp. (Sykes *et al* 1995). This study has shown that the protocol provides tighter clustering of amino acid data than is obtainable from shells composed of aragonite (Penkman 2005), and provides relative age estimates for different aggregate deposits in England which are consistent with the ages of these deposits expected from litho- and bio-stratigraphic evidence (Penkman *et al* 2008).

AAR analysis was also undertaken as part of research programmes aiming to provide robust chronological frameworks for terrace development in three different river systems. In the Swale-Ure washlands, where the sediments had proven unsuitable for luminescence dating (Duller 2007), only relative dating could be suggested for samples from four sites, all of which produced amino acid data consistent with ages within the Holocene (Penkman and Collins 2007). Samples from terraces of the proto-Medway valley in north-east Kent and south-east Essex produced amino acid data consistent with ages in Marine Isotope Stages (MIS) 9 and 11, with one site producing data consistent with an Ipswichian date (MIS 5e) (Penkman *et al* 2007). Samples analysed from the middle and lower Trent valley produced amino acid data consistent with MIS 5e and MIS 7 (Penkman and McGrory 2007).

Radiocarbon dating: sample selection

Almost all the radiocarbon samples processed as part of the ALSF research programme between 2004 and 2007 were dated using Accelerator Mass Spectrometry (AMS) (Fig 5). The proportion of AMS measurements (98%) is slightly higher than the proportion of samples dated by AMS from the other archaeological research programmes funded by English Heritage during this period (91%), and higher than the proportion of samples dated by AMS during the

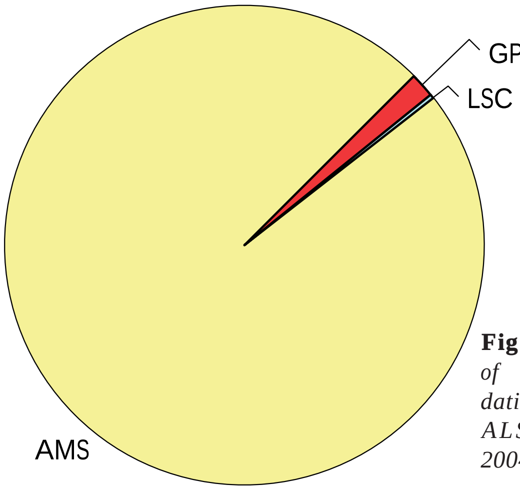

Fig 5 *Techniques of radiocarbon dating used for ALSF samples 2004–7*

pilot scheme (84%)(Bayliss *et al* 2007a, fig 6). The remaining samples were dated by Gas Proportional Counting (GPC) or Liquid Scintillation Spectrometry (LSC). An introduction to these methods of measuring radiocarbon is provided in Bayliss *et al* (2004b).

The proportion of bone and antler samples dated under this ALSF programme is extremely low (Fig 6), 6% compared to 21% for samples dated in support of the other archaeological research programmes funded by English Heritage in 2004–7, but similar to the proportion dated under the pilot scheme (8%). This is undoubtedly caused by the poor survival of bone and antler on many gravel sites. Even where such material is recovered, samples may not be datable because of poor collagen preservation (Hedges and van Klinken 1992b; van Klinken 1999).

Research specifically investigating this problem, which can be a severe impediment to constructing reliable chronologies for archaeological sites on aggregate deposits, has been undertaken by the Oxford Radiocarbon Accelerator Unit (Brock *et al* 2007). A range of pre-screening criteria that can be used on-site, in museums, or in the laboratory was tested to determine which, if any, could be used to identify samples suitable for radiocarbon dating prior to time-consuming and costly collagen extraction. The only consistently reliable predictor of suitability for dating was the percentage of nitrogen in the whole bone. Of samples containing more than 0.76% nitrogen, 84% will contain sufficient protein for reliable radiocarbon analysis.

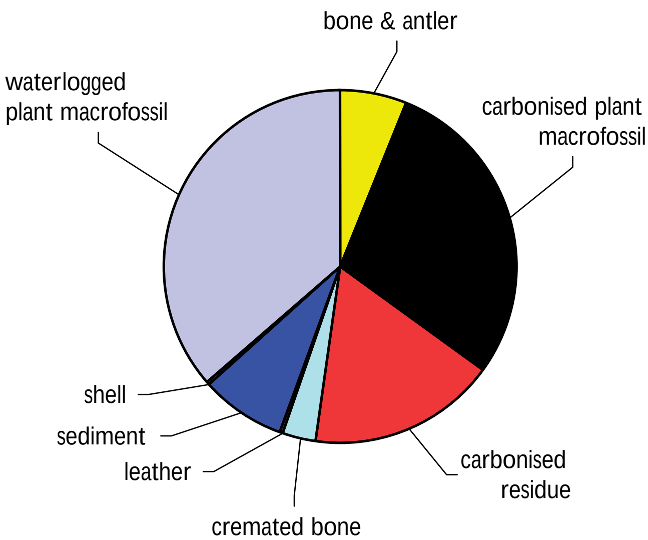

Fig 6 *Types of material dated*

Fig 7 *Cremation F14-1 from barrow 2 at Cossington, Leicestershire (© Leicestershire County Council Heritage Services)*

Cremated bone is far more likely to survive in acid conditions and, if highly calcined, can now be reliably dated (Lanting *et al* 2001; van Strydonck *et al* 2005). When recovered from discrete deposits, which may represent the remains of a particular cremation event (Fig 7), it can be functionally related to the archaeological activity which we wish to date. Calcined bone formed 3% of the radiocarbon samples dated during the course of this research programme.

The relative rarity of adequate bone preservation means that more reliance has to be placed on single-entity samples of charred plant remains (Ashmore 1999; Fig 8). Typically more uncertainty is attached to the taphonomy of such samples, and so more replication is required in the hope that consistent results from the same context suggest that the dated material was deposited as a single event. All carbonised plant remains were confirmed as short-lived species or sapwood before submission for dating (except for OxA-15939 from Burlescombe, Devon, which consisted of bulk fragments of unidentified charcoal). Samples consisted of material from a single plant (eg one cereal grain, one nutshell, one fragment of charcoal) unless otherwise specified. Carbonised plant remains formed 29% of the radiocarbon samples dated.

Carbonised residues adhering to the internal surfaces of ceramics provide another large group of samples suitable for dating from aggregate sites (Fig 6), forming 17% of the radiocarbon samples dated. In this case, refitting sherds may suggest that a sample is close in age to the deposit from which it was recovered. Even when fragments do not refit, the degree of abrasion of the sherds, and the fragility of much of the pottery concerned, may suggest that it was freshly deposited. In any case, even if the context of a sample is unknown or the sherd is residual, dates on carbonised residues provide direct dates for the use of the ceramic types represented.

Fig 8 *Excavation of a charcoal pit at Bestwall Quarry, Dorset (© Bestwall Quarry Archaeology Project)*

Internal residues are interpreted as carbonised food remains from the use of vessels. External residues are avoided as these may represent sooting from fires which may introduce an age offset if heartwood or peat was used as fuel (Bowman 1990, 15). Most carbonised residues are, however, poorly characterised chemically, and technical problems with their dating remain (Hedges *et al* 1992a; *see* below). Although the first steps have been taken to enable the dating of absorbed fatty residues from pottery (Stott *et al* 2003), this technique is not yet routine and was not used as part of this research programme.

As part of the landscape characterisation which formed a core objective of many ALSF projects, a large number of organic deposits were dated. Wherever possible, single fragments of waterlogged plant material were submitted for dating, although in some cases these were too small even for AMS dating and a number of items had to be combined to form a viable sample. This sampling strategy is based on the principle that dates on plant macrofossils are generally more reliable than those on “bulk” samples of the sediment matrix, as the source of carbon in the former is known and macrofossils are not made up of heterogenous material that could be of different ages (Walker *et al* 2001; Lowe and Walker 2000).

In all cases, these plant macrofossils were identified as short-lived material of terrestrial origin. Aquatic species were not selected for dating to avoid the possibility of hard water error (Bowman 1990, 25–6). Owing to a regrettable oversight, OxA-16358, OxA-16410, and SUERC-10656, from the Ribble valley, were not identified before dating. OxA-15934, from the Geoarchaeology of the Trent tributaries, was too soft to thin section and so could not be identified. Given the late Glacial ages produced by samples SUERC-9080 and SUERC-9081, it is possible that the identification of the dated wood samples as alder was erroneous.

The reliability of these samples for dating the deposits from which they were recovered was assessed by the consistency of the results in relation to the relative dating of the deposits provided by stratigraphy, and by the consistency of results on duplicate macrofossils from the same level. On these grounds, the dating of the sediment sequences presented here from both the Nene Valley project (pp92–8) and the Suffolk Rivers project (pp136–45) must be treated with considerable caution. Inconsistencies in the dates produced for the Trent/Soar rivers confluence were also observed, where some modern macrofossils were dated. These appear to have been introduced by the use of open-chambered augers for sampling. Waterlogged plant macrofossils formed 37% of the dated samples.

Unfortunately, in many instances suitable plant material could not be recovered from the organic deposits selected for dating, as they were too humified. In these cases, bulk organic material had to be dated. This is a hazardous proceeding, and a number of safeguards were adopted to assess the reliability of the dates obtained. Firstly, material was submitted from stratigraphically related deposits so that the agreement between the stratigraphic information and the radiocarbon results could be assessed. Multiple measurements on different chemical fractions of the same sample were also obtained. In cases where these measurements are statistically consistent, more confidence can be placed in the estimated date of the

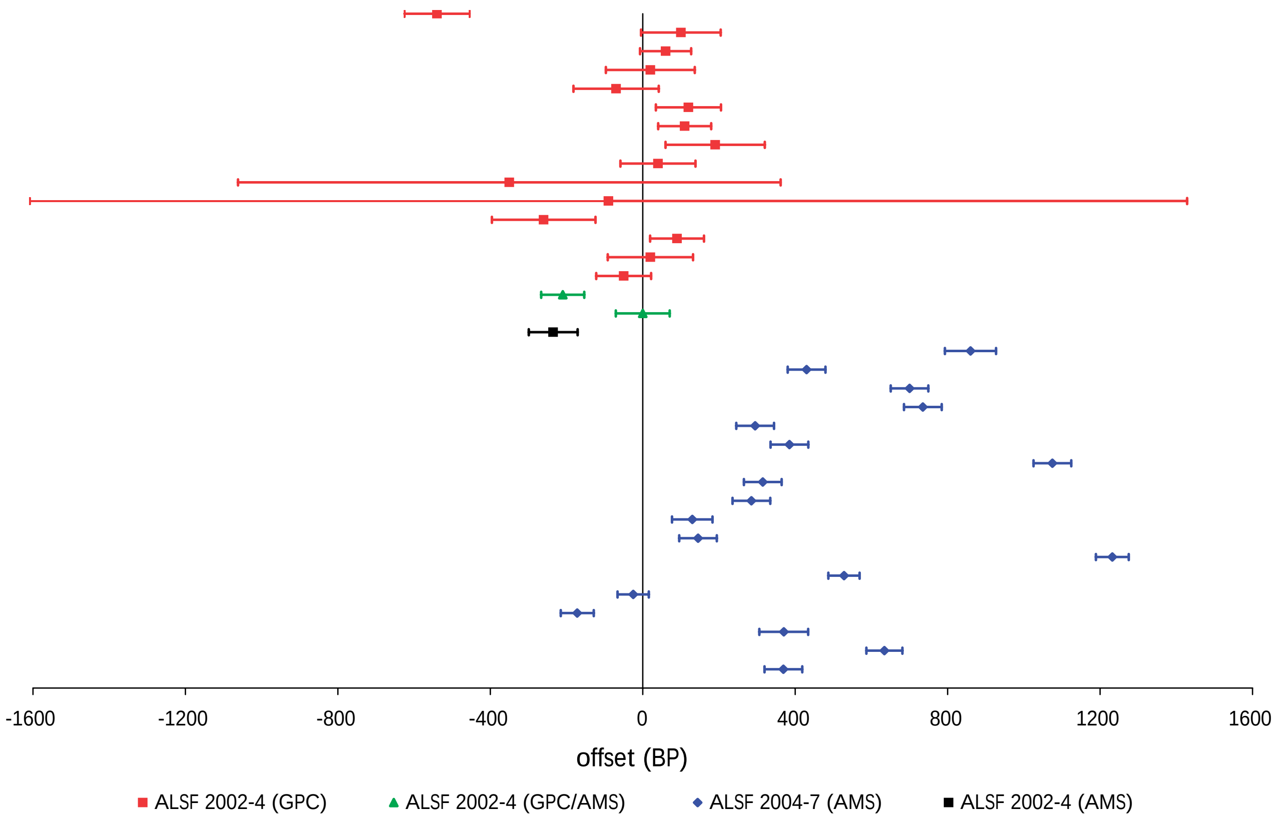

Fig 9 *Offsets between radiocarbon measurements on the humic acid and humin fractions of bulk sediment samples (error bars are those for 68% confidence)*

deposit concerned. When these replicate measurements do not agree, then caution is indicated. Overall, fractions of sediment provide 8% of the measurements undertaken.

Given these concerns, the results produced on replicate fractions of bulk sediment from the pilot stage of the ALSF were surprisingly reproducible, with 15 of the 19 replicate pairs of measurements being statistically consistent (Fig 9; Bayliss *et al* 2007a, x). Most of the sediment samples dated under this programme were large, weighing 100–200g, and so were suitable for conventional dating. Unfortunately, samples of this size were not forthcoming from the sequences dated during the extended ALSF programme, and so samples of bulk sediment weighing only a few grammes were dated by AMS. Eighteen replicate pairs of measurements on the alkali and acid soluble ("humic acid") and alkali and acid insoluble ("humin") fractions were undertaken.

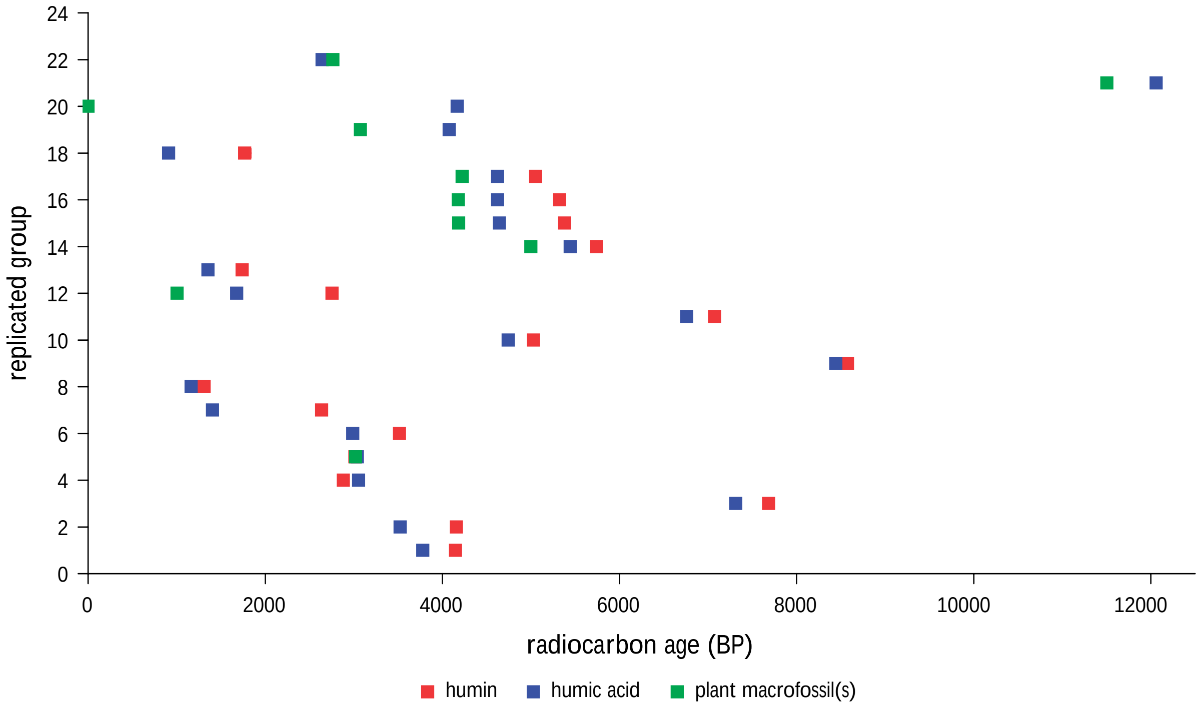

Fig 10 *Replicate* ^{14}C *determinations on humic acid and humin bulk fractions and waterlogged plant material from sediment samples*

All but one of these pairs of measurements are statistically inconsistent, and in almost all cases the humic acid fractions produce a younger age (Fig 9).

In six cases, measurements on waterlogged plant macrofossils are available from levels where replicate bulk fractions have also been dated, and in another four cases results on plant macrofossils have been made on sediments from which the bulk humic acid fraction has been dated. In nine out of the ten instances, the results on the humic acid fraction and waterlogged plant material are statistically significantly different. In eight cases, the macrofossils are even younger than the alkali-soluble fraction (Fig 10).

These results highlight the difficulties of dating organic sediments from within river floodplains. In some circumstances, accurate dating can be achieved, but it is necessary to carefully consider the context, geomorphology, and stratigraphic relationships between replicate measurements in order to construct such chronologies and identify inaccurate results. Owing to the likelihood of anomalous results, a higher degree of replication is essential when attempting to date such sequences. Strenuous efforts should be made to obtain uncontaminated waterlogged plant material for dating (samples should not be dated from open-chamber corers). If identifiable plant macrofossils do not exist within the sediment, it is advisable to sample another equivalent site. If macrofossils are still not preserved, then it will be difficult and expensive to obtain a reliable chronology for the sequence. In these circumstance digging a test-pit and sampling for radiometric dating from an open section is greatly to be preferred.

Further discussion of the difficulties of dating organic deposits can be found in Shore *et al* (1995), Cook *et al* (1998), and Walker *et al* (2001).

Finally, a single sample of leather was dated from a shoe from Burlescombe, Devon, and two samples of marine shell were dated from the coastal waters off Great Yarmouth, Norfolk.

Radiocarbon ages and calibrated dates

The conventions for quoting radiocarbon dates and supporting information used here conform to the international standard known as the Trondheim Convention (Stuiver and Kra 1986).

The uncalibrated results are given as radiocarbon years before present (BP) where present has been fixed at AD 1950. These results are conventional radiocarbon ages (Stuiver and Polach 1977). Some material dates to after AD 1950. The radiocarbon content of these samples is expressed as a fraction of modern carbon (Mook and van der Plicht 1999).

Results which are, or may be, of the same actual radiocarbon age have been tested for statistical consistency using methods described by Ward and Wilson (1978).

These results, of course, are not true calendar ages, but have to be converted to calendar time by using a calibration curve made up of radiocarbon measurements on samples of wood whose age is known through dendrochronology (Pearson 1987). The calibrated date ranges provided in the datelist have been calculated using the maximum intercept method at a resolution of one year (Stuiver and Reimer 1986), OxCal v4.0 (Bronk Ramsey 2008), and the currently internationally agreed dataset for terrestrial samples from the northern hemisphere published by Reimer *et al* (2004). Date ranges are quoted in the form recommended by Mook (1986) with the end points rounded outwards to 10 years (or five years when error terms are less than ±25 BP). Ranges in the datelist itself are quoted at 68% and 95% confidence; the calibrated date ranges referred to in the commentaries are those for 95% confidence unless otherwise specified.

Whilst it is hoped that readers will find the calibrations provided helpful, it is necessary to recognise their limitations. Firstly, the intercept method itself is best regarded as a ‘quick and simple’ way of providing an indication of the calendar date of a sample. The full complexity of the calendar age is only apparent from the probability distribution of the calibrated date. This can be illustrated by considering the calibration of OxA-16783, a measurement on a carbonised residue on pottery from Beckford, Worcestershire (see below p8). This measurement (2398 ±30 BP) calibrates to 730–390 cal BC (at 95% confidence) and 520–400 cal BC (at 68% confidence) using the maximum intercept method. The calibration of this sample using the probability method (Stuiver and Reimer 1993) is shown in Fig 11. It can be seen that some parts of the calibrated range—particularly when this is cited at 95% confidence—are much more probable than others. It is not so much that the intercept calibration is wrong, but it does not necessarily convey the full complexity of the scientific information available.

The second limitation of the calibrated dates provided in this volume is that they are not definitive. Radiocarbon calibration is continually being refined, with updated and internationally agreed calibration curves being issued periodically (eg Stuiver and Pearson 1986; Pearson and Stuiver 1986; Stuiver *et al* 1998; and currently Reimer *et al* 2004). It is thus certain that the calibrated dates quoted here will become outdated, and that the measurements listed here will need to be recalibrated. It is one of the major objectives of this datelist to provide easy access to the information needed for such recalibration so that these data can be used in future research. It is for this reason that it is so important that users cite both the unique laboratory identifier for each measurement and the uncalibrated radiocarbon age when using the results listed in this volume – this is a courtesy and convenience to the readers of your publications who will themselves need to recalibrate the results in due course!

Results older than *c* 21,380 BP fall beyond the limit of the presently internationally agreed calibration data (26,000 cal BP; van der Plicht *et al* 2004), and have not been calibrated. This is an area of active research, however, and this situation is likely to change in the next few years. Measurements more recent than AD 1950 have been

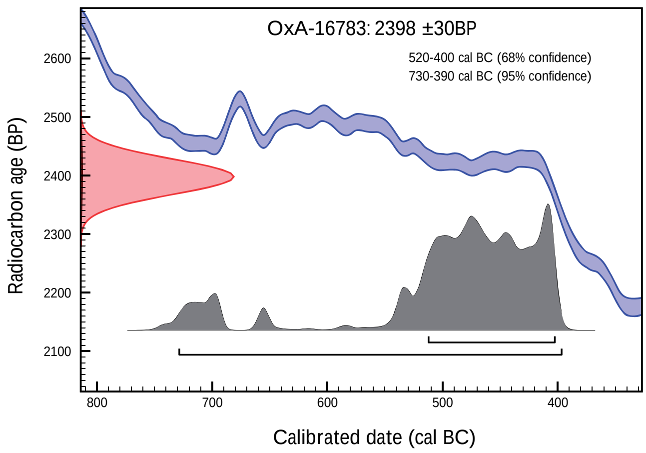

Fig 11 *Calibrated radiocarbon date for OxA-16783*

calibrated using the atmospheric data of Kueppers *et al* (2004), and rounded outwards to the nearest year. The calibrated date ranges for radiocarbon ages which fall in the post-medieval period, but may show some influence of bomb carbon from nuclear testing in the AD 1950s, have been rounded outwards to cal AD 1955*.

Radiocarbon dating: laboratory methods

Fig 12 shows the types of samples processed by each collaborating facility. Full details of the methods used for the preparation and radiocarbon dating of these samples are provided in the references cited in this section. It is important

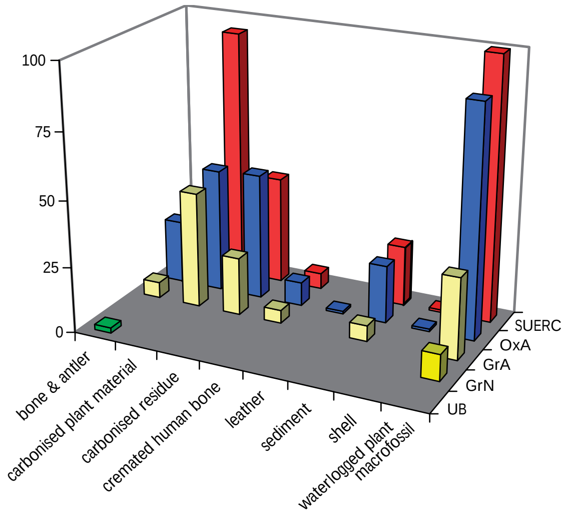

Fig 12 *Types of sample material processed by each collaborating facility*

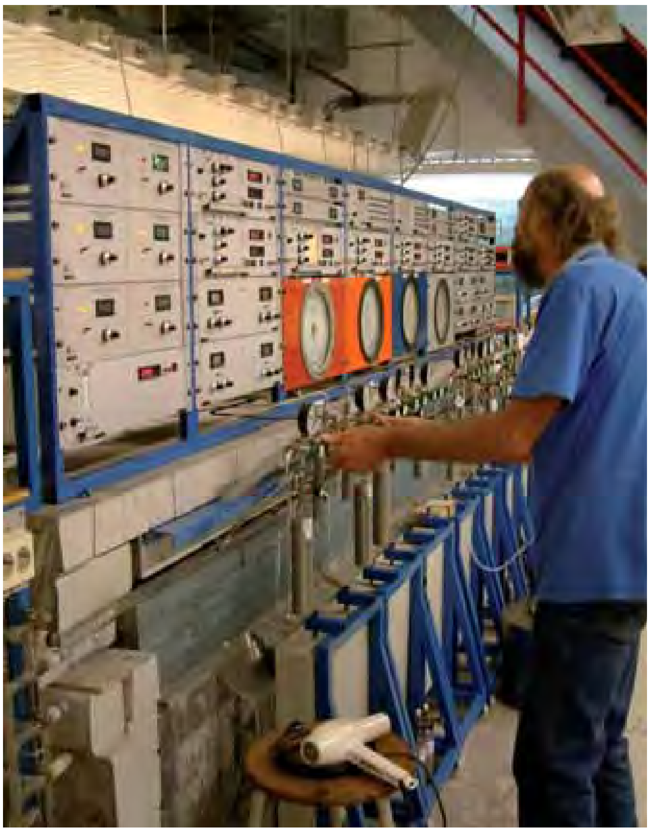

Fig 13 *Checking the gas proportional counters at Groningen (© English Heritage)*

that these technical details can be traced for each measurement as scientific methods are continuously evolving. For example, a method for reliably dating an entirely new type of material (cremated bone) became available as recently as 2001 (Lanting *et al* 2001). This information will be valuable in assessing the reliability of these measurements in the future.

Samples of charred and waterlogged plant remains, carbonised residues, and marine shell processed at the Oxford Radiocarbon Accelerator Unit were prepared using methods outlined in Hedges *et al* (1989); cremated bones were processed as described by Lanting *et al* (2001); other bones were processed using the revised gelatinisation protocol described by Bronk Ramsey *et al* (2004a). Leather and wood, including some waterlogged twigs, were pre-treated using the acid/alkali/acid protocol (Mook and Waterbolk 1985), followed by bleaching using sodium hypochlorite. Samples were combusted, graphitised, and dated by Accelerator Mass Spectrometry as described by Bronk Ramsey *et al* (2004b). Measurements provided by ORAU are identified by the laboratory code OxA (Fig 15).

Most samples dated at the Rijksuniversiteit, Groningen were processed using the acid/alkali/acid protocol of Mook and Waterbolk (1985); samples of cremated bone were prepared as described by Lanting *et al* (2001); samples of unburnt bone were prepared as described by Longin (1971); carbonised residues on pottery sherds were pretreated by using the acid/alkali/acid method on the entire sherd and selecting the alkali-soluble fraction for dating (Mook and Streurman 1983). The samples were then combusted to carbon dioxide and graphitised as described by Aerts-Bijma *et al* (1997; 2001) and dated by Accelerator Mass Spectrometry (van der Plicht *et al* 2000). Measurements made at Groningen by AMS are identified by the laboratory code GrA.

A series of wood samples from Burlescombe, Devon were dated at Groningen using Gas Proportional Counting of carbon dioxide (Fig 13). These samples were prepared using the acid/alkali/acid method (Mook and Waterbolk 1985) and dated as described by Mook and Streurman (1983). Measurements made at Groningen using Gas Proportional Counting are identified by the laboratory code GrN.

Two bone samples were dated by high-precision Liquid Scintillation Spectrometry at the Queen's University, Belfast Radiocarbon Dating Laboratory (Fig 14). These samples were pretreated using a method based on that of Longin (1971), combusted and converted to benzene as described by Pearson (1980), and dated by Liquid Scintillation Spectrometry

Fig 14 *Converting a sample to benzene at the Queen's University, Belfast (© English Heritage)*

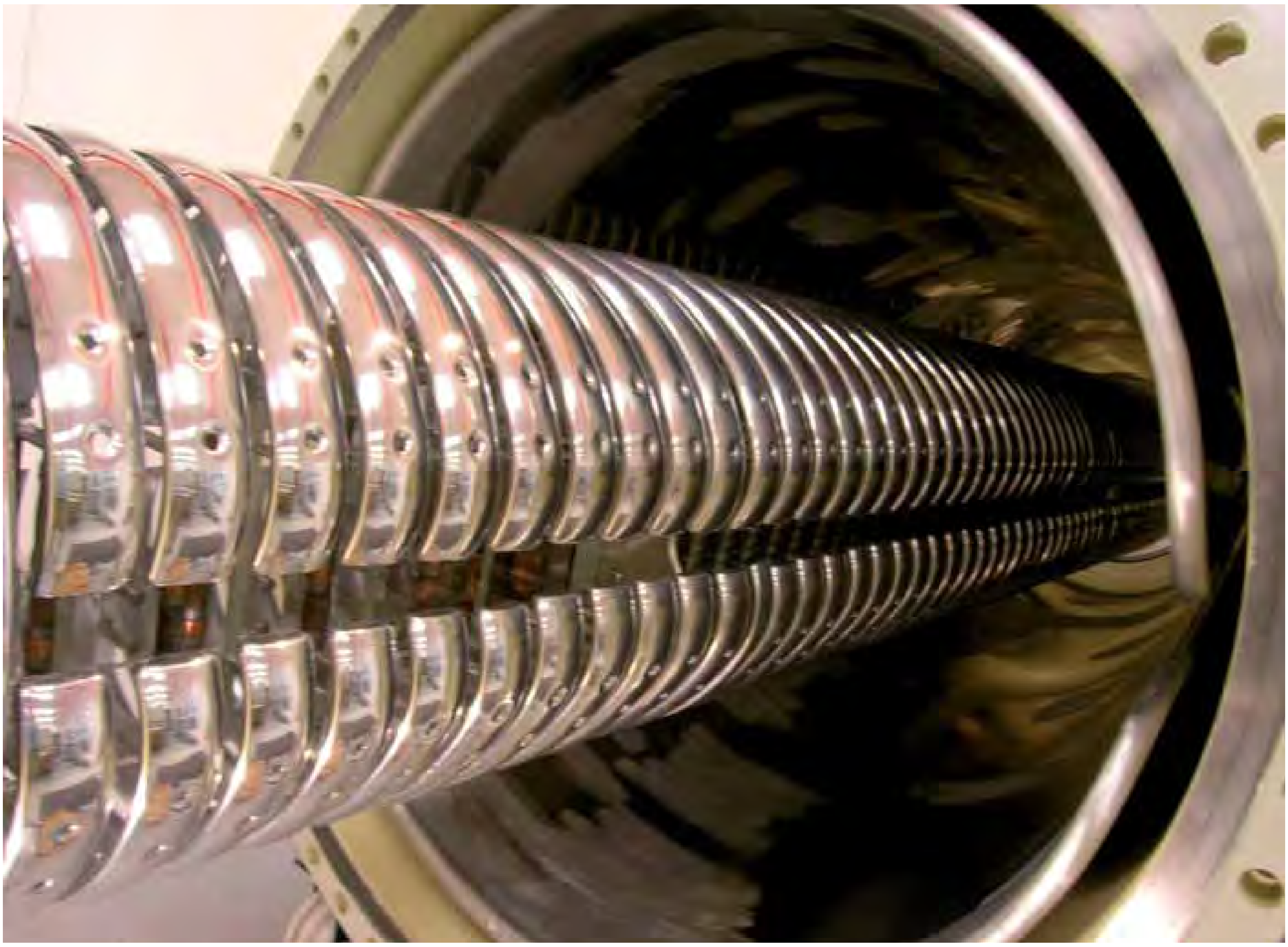

Fig 15 *The power supply of the 2.5MV accelerator at Oxford open for maintenance in May 2007 (© ORAU)*

(McCormac 1992; McCormac *et al* 1993). Measurements made at Belfast are identified by the laboratory code UB.

Samples of carbonised or waterlogged plant remains and sediment dated at the Scottish Universities Environmental Research Centre were pretreated by the acid-base-acid protocol (Stenhouse and Baxter 1983). The acid and alkali insoluble fraction was dated, except for sediment samples where the acid insoluble/alkali soluble fraction (humic acid fraction) could also be dated (as specified in the datelist). Samples of bone and antler were pre-treated using the method described by Longin (1971), and cremated bone was prepared as described by Lanting *et al* (2001). The samples were converted to carbon dioxide in pre-cleaned sealed quartz tubes (Vandeputte *et al* 1996), graphitised as described by Slota *et al* (1987), and measured by Accelerator Mass Spectrometry (Xu *et al* 2004). Results produced by the Scottish Universities Environmental Research Centre by AMS have the code SUERC.

Radiocarbon dating: quality assurance

All four laboratories maintained continual programmes of quality assurance procedures at the time when these measurements were made. No offsets were observed. In addition, all the laboratories participated in international inter-comparison exercises during the time when the samples were measured (Scott 2003). These tests indicate no laboratory bias and demonstrate the validity of the precision quoted.

As part of these quality control protocols, 24 single-entity samples were measured in duplicate (Fig 16). These replicate measurements were undertaken on samples of unburnt bone and antler, cremated bone, carbonised plant remains, and carbonised residues on ceramic sherds. In four cases, the measurements are statistically significantly different (Ward and Wilson 1978).

Two measurements on a red deer antler for a palaeochannel at Cossington, Leicestershire (OxA-16053, SUERC-11278; pp71–2) are inconsistent, as is a new measurement undertaken from a burial at Berinsfield Mount Farm, Oxfordshire (OxA-15748; p22) in comparison with the original measurement undertaken in 1981 (HAR-4673). Although in both cases either measurement could be a statistical outlier, in the latter case improvements in bone pre-treatment (eg Bronk Ramsey *et al* 2004a) mean that the new measurement is more likely to be accurate.

Two more samples which produced statistically inconsistent measurements were charred residues on ceramic sherds. Of the two results on a sherd of ceramic phase B Iron Age pottery from Beckford, Worcestershire (GrA-35086, OxA-16730; p6), on archaeological grounds it is judged likely that GrA-35086 provides a more reliable indication of the date when the sherd was used. Both results on a rimsherd of diagnostic middle or late Bronze Age pottery from Gwithian, Cornwall (OxA-14525, SUERC-6162; pp85 and 87) produced dates which are archaeologically plausible.

Ten bulk samples of waterlogged plant material were also dated in replicate (Fig 16). In three cases these groups of

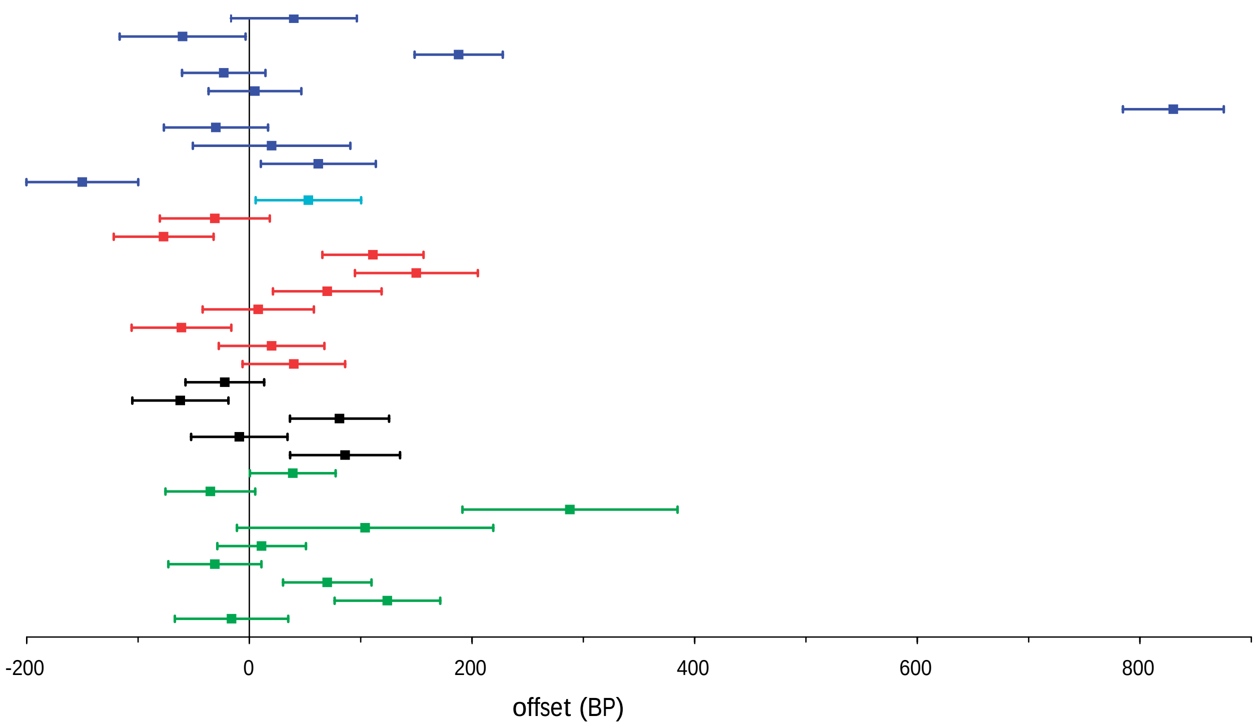

Fig 16 *Offsets between replicate radiocarbon measurements on the same material (error bars are those for 68% confidence)*

measurements were not statistically consistent. GrA-31468 and OxA-15897 are from 0–0.1m of a pollen column at Willington Quarry, Derbyshire (pp184–5), but consisted of identifiable seeds and twigs and so the discrepancy between the results probably results from inhomogeneity in the dated material. Three measurements are available from 0.23–0.25m of a pollen core taken from a palaeochannel at Cossington, Leicestershire (p69). One of these measurements (OxA-16055) is a thousand years older than the other two (OxA-16056–7). It is likely that such divergent ages arise from heterogeneity in the composition of the dated material, rather than a measurement problem. Two measurements from a buried peat beneath alluvial fan 7 at the Cam Beck and Oughtershaw Beck interfluve in the Ribble-Wharfe interfluve zone, North Yorkshire (p103), also produced inconsistent ages.

The final quality assurance measure adopted for the 2004–7 ALSF radiocarbon research programme was the wiggle-matching of a series of tree-ring chronologies. Two undated master sequences were sampled for dating from Ripon Cathedral as part of the quality assurance procedures adopted by English Heritage for its overall radiocarbon research programme (p129; Fig 17; Arnold *et al* 2005; Bayliss *et al* forthcoming), and the floating tree-ring series of plank 475 within pit 658 at Burlescombe, Devon was also sampled to provide dating for this feature (p52).

Wiggle-matching is the process of fitting a series of radiocarbon dates which are separated by a known number of years to the shape of the radiocarbon calibration curve. At its simplest, this can be done visually, although statistical methods are usually employed. Floating tree-ring sequences are particularly suited to this approach as the calendar age separation of different blocks of wood submitted for dating is known precisely by counting the rings in the timber. Thus, the radiocarbon dates should be consistent with the relative dating between samples provided by these tree-ring counts. In the case of the Ripon Cathedral and Burlescombe sequences, we have the additional information that these chronologies also provided tentative tree-ring matches consistent with dates of AD 1868 and 1433 BC for the final ring in the respective sequences.

A Bayesian approach to wiggle-matching was adopted for this analysis (*see* below). This method is described by Christen

Fig 17 *Dendrochronology cores used for wiggle-matching timbers from the nave of Ripon Cathedral, Yorkshire (© R Howard)*

and Litton (1995) and Bronk Ramsey *et al* (2001). The technique used is a form of numerical integration, and has been applied using the program OxCal v3.10 (Bronk Ramsey 1995; 1998; 2001). For all three tree-ring sequences, the radiocarbon dates are in good agreement with both the relative dating provided by the tree-ring counts and with the absolute dates suggested tentatively by dendrochronology.

An excellent summary of the history and variety of approaches employed for wiggle-matching is provided by Galimberti *et al* (2004).

Stable isotope measurements

All radiocarbon ages reported in this datelist have been corrected for fractionation as described in Stuiver and Polach (1977). The δ^{13}C values quoted were measured from sub-samples of carbon dioxide taken after combustion of the radiocarbon sample and measured by conventional mass spectrometry. These values have been used in the calculation of the radiocarbon ages reported by the Scottish Universities Environmental Research Centre, the Queen's University, Belfast, and by the Groningen laboratory for radiocarbon ages produced by GPC. At Oxford and Groningen δ^{13}C values for each sample were also measured by AMS, and it is these (unreported) values which have been used to calculate the reported ages (Bronk Ramsey *et al* 2004b; van der Plicht *et al* 2000).

For collagen samples from bone and antler, δ^{15}N values from sub-samples of the same gas have also been reported by Oxford and Groningen. At the Scottish Universities Environmental Research Centre sub-samples of the dated collagen have their isotopic values measured by continuous flow isotope ratio mass spectrometry. These are the δ^{13}C (diet) and δ^{15}N (diet) values reported in the datelist. For the two samples dated by LSC at Belfast, gelatin was prepared from bone sub-samples by the Rafter Radiocarbon laboratory as outlined in Beavan-Athfield *et al* (2001) and analysed at Isotrace New Zealand for nitrogen and carbon (δ^{15}N, δ^{13}C, %N and %C) using the elemental analyser isotope ratio mass spectrometry (EA-IRMS) technique. Laboratory methods, standards, equipment, and calculation of total analytical error were as described by Beavan-Athfield and Mays (forthcoming). The dating laboratories did not measure δ^{15}N values for the inhumations from Wasperton Anglo-Saxon cemetery as, following the pilot study, these values had been obtained by the Rafter Radiocarbon Laboratory as part of the preservation assessment which preceded sampling for dating.

Radiocarbon ages for cremated bone have been corrected for fractionation in the usual way. The δ^{13}C values are not reported, however, as they do not relate to the natural isotopic composition of the bone (Lanting *et al* 2001).

Chronological modelling

Although the simple calibrated date ranges of radiocarbon measurements (such as those provided in this volume) are accurate estimates of the dates of the samples, this is usually not what we really wish to know as archaeologists. It is the dates of the archaeological events represented by those samples which are of interest, or the dates of phases of archaeological activity made up of those events. Fortunately, explicit statistical methodology is now available which allows us to combine the results of the radiocarbon analyses with other information such as stratigraphy, to produce realistic estimates of these dates of archaeological interest.

This methodology is known as the Bayesian approach to the interpretation of archaeological data (Buck *et al* 1996), and is becoming widely used in English archaeology (Bayliss and Bronk Ramsey 2004). Lindley (1985) provides a user-friendly introduction to the principles of Bayesian statistics, and Bayliss *et al* (2007b) provide an introduction to the practice of chronological modelling for archaeological problems.

Many of the dates produced as part of the ALSF research programme between 2004 and 2007 have been interpreted within a Bayesian framework. This modelling has been undertaken by Peter Marshall and staff of the Scientific Dating Section of English Heritage (Alex Bayliss, Derek Hamilton, and John Meadows), in partnership with the project teams. Models have been implemented using the program OxCal (v3.5–3.10 and 4.0) (Bronk Ramsey 1995; 1998; 2001), which uses a mixture of the Metropolis-Hastings algorithm and the more specific Gibbs sampler (Gilks *et al* 1996; Gelfand and Smith 1990). Full details of the algorithms employed by this program are available from the on-line manual, and fully worked examples are given in a series of papers by Buck *et al* (1991; 1992; 1994a–b).

The chronological models produced as part of this ALSF research programme are discussed in the relevant project publications or reports, (cited in the datelist entries). The value of this approach is demonstrated by the example shown in Figs 18 and 19.

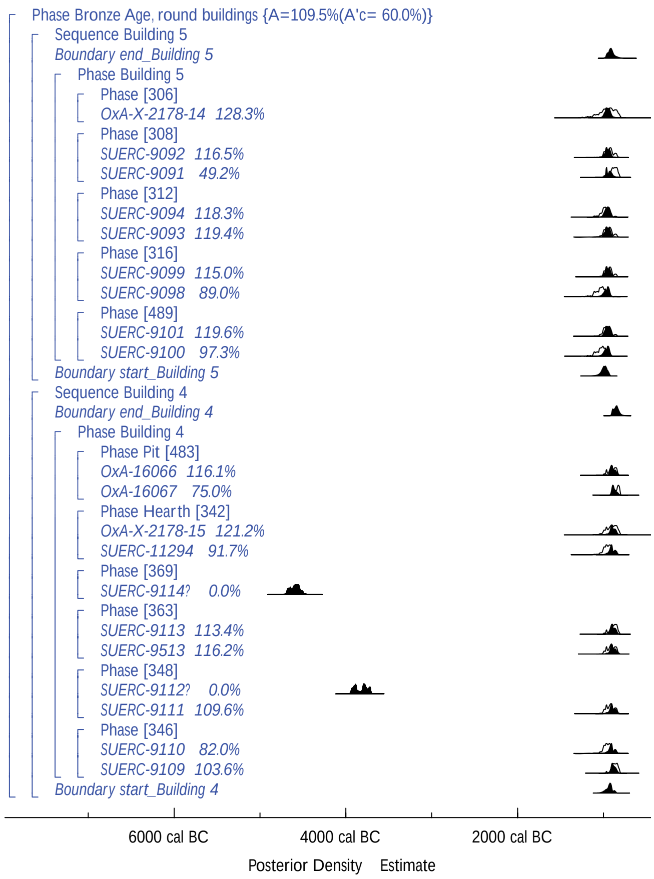

Fig 18 *Probability distributions of dates from Buildings 4 and 5 at Cheviot Quarry, Northumberland. The large square brackets down the left-hand side of along with the OxCal keywords define the overall model exactly*.

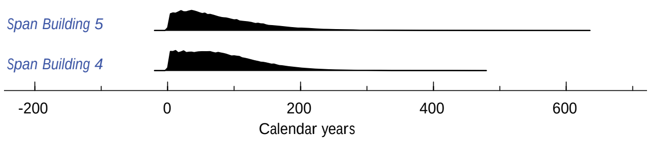

Fig 19 *Probability distributions of the number of years during which the circular buildings from Cheviot Quarry were in use, derived from the model shown in Fig 18.*

This model estimates the dates of two circular structures from Cheviot Quarry, Northumberland (Johnson and Waddington in press). In Figure 18 each distribution represents the relative probability that an event occurred at a particular time. For each of the dates two distributions have been plotted, one in outline which is the result produced by the scientific evidence alone (the calibrated radiocarbon date), and a solid one which is based on the chronological model used. The other distributions correspond to aspects of the model. For example, the distribution '*start_Building 4*' is the estimated date when Building 4 was constructed. The model suggests that this occurred in *1020–850 cal BC* (*95% probability*; *start_Building 4)*, probably in *970–890 cal BC (68% probability)*.

Perhaps as importantly, by comparing our formal estimates for the dates when Building 4 was constructed (*start_Building 4*; Fig 18) and demolished (*end_Building 4*), it is possible to estimate the duration of the use of the structure. This suggests that Building 4 was in use for *1–200 years* (*95% probability; Span Building 4*; Fig 19), and probably *1–110 years* (*68% probability*).

The actual dates of archaeological sites and their periods of use are not necessarily apparent from examination of the simple calibrated radiocarbon dates (shown in white in Fig 18). The dangers of interpreting suites of radiocarbon dates by visual inspection of the graphs of calibrated dates is discussed further in Bayliss *et al* (2007b) and Bayliss (2007).

Using the datelist

Radiocarbon determinations are identified by a unique laboratory code. So, for example, SUERC is the code for the Scottish Universities Environmental Research Centre, and SUERC-10688 is the 10,688th measurement produced by the laboratory. This code is the internationally-agreed identifier by which every radiocarbon determination can be traced. SUERC-10668 refers to the age produced on an fragment of willow or poplar wood from sediment from the lower Ribble valley at Osbaldestone Hall (p127) and only to that measurement. An index of these codes is therefore provided to enable further details of dates cited elsewhere to be easily traced.

A more traditional index of key terms is also provided. This enables dates from particular sites, or of particular materials, or with particular archaeological associations to be traced (eg dates relating to the elm decline or Peterborough Ware). Readers are cautioned that the latter entries in particular may be partial or even unreliable! The majority of the information in this datelist was provided on sample submission and revised during post-excavation analysis, which was in many cases on-going at the time this datelist was compiled. In most instances the appearance of this volume precedes the full academic publication of the projects concerned. Alternatively, the results of projects may have been disseminated through archive reports, the internet, or other more appropriate media. Every effort has been made, however, to provide a link to further information about each project which produced dated samples.

Acknowledgements

This datelist has been compiled and edited by Henriette Johansen, on the basis of information provided by the submitters of the samples dated and by the radiocarbon laboratories. Peter Marshall has been instrumental in devising sampling strategies and chronological models for many of the projects included in this volume, and has provided invaluable input into the editing process. Design has been the responsibility of Mark Simmons, and the overall production of the volume has been overseen by David Jones.

The information has been output from the English Heritage Radiocarbon Database thanks to the dedicated and exact programming of Carlton Carver. The database itself has been developed over many years, successively by Paul Cheetham, Sarah Hill, Manuela Lopez, Marcos Guillen, Mike Gratton, David Head, and Carlton Carver.

Radiocarbon dating is a complex and labour-intensive process which takes time. It is a tribute to the effort and efficiency of the staff of our dating laboratories that such numbers of accurate measurements were made in such a small space of time. The logistics of this task fell principally upon Henny Deenen, Derek Hamilton, Tom Higham, and Diane Baker. For the actual preparation and dating of samples we are grateful to Angela Bowles, Fiona Brock, Jane Davies, Peter Ditchfield, Martin Humm, Philip Leach, and Christine Tompkins at the Oxford Radiocarbon Accelerator Unit; Nancy Beavan and Ken Neal of the Rafter Radiocarbon Laboratory; Henk Been, Trea Dijkstra, Fsaha Ghebru, Bert Kers, Harm-Jan Streurman, Stef Wijma and Dicky van Zonneveld at Rijksuniversiteit Groningen; Robert Anderson, Andrew Dougans, Elaine Dunbar, Stuart Freeman, Lesley Garety, Graham Muir, Philip Naysmith, and Sheng Xu of the Scottish Universities Environmental Research Centre; and Jim MacDonald, Stephen Hoper, and Michelle Thompson of the Queen's University, Belfast Radiocarbon Dating Laboratory.

Alex Bayliss
English Heritage, 1 Waterhouse Square,
138–142 Holborn, London, EC1N 2ST

Beckford, Worcestershire

Location: SO 984364
Lat. 52.01.32 N; Long. 02.01.24 W

Project manager: J Wills (Archaeology Service, Gloucestershire County Council), 1972–9

Description: seven seasons of archaeological recording were undertaken at Huntsman's Quarry, Beckford, Worcestershire, between 1972 and 1979, in advance of sand and gravel extraction. From 1972–4 the work was carried out by the Rescue Archaeology Group, directed by William Britnell, under the auspices of the Avon-Severn Valleys Research Committee and later the West Midlands Rescue Archaeology Committee. In 1975 responsibility was taken over by the Archaeology Service of Hereford and Worcester County Council and the excavation was directed by Jan Wills until its completion in 1979. The excavations were funded by the Department of the Environment with contributions from Birmingham City Museum and support from Hereford and Worcester County Council. After initial separate periods of post-excavation by both excavation directors the decision was taken in the 1980s to combine all the Beckford material in a single publication. However, it was not until 2003 and the advent of the Aggregate Levy Sustainability Fund, administered by English Heritage, that resources were finally available to publish the results of the 1970s excavations.

Objectives: the principal aims of the scientific dating programme were: to provide precise estimates for the dates of activity at Beckford, eg when it started, when it finished, and how it continued, to determine the dates of the animal burials, the dates of the human burials, and whether specific practices were contemporary or changed over time; to reread spatial and temporal changes in activity across the site; how it changed and developed, and how long different boundaries were in use; to provide a precise chronological framework for the ceramics sequence; and to provide a chronological framework for the environmental sequence.

Final comment: J Wills and P Marshall (31 October 2007), the results of the scientific dating programme have radically altered our understanding of settlement at Beckford and have provided the framework for writing a much more detailed history of its inhabitants. The revised chronology suggests that the settlement was in use for a much shorter period of time than previously thought, and thus challenges notions of Iron Age activity continuing for hundreds of years with little change. In addition, the use of formal Bayesian statistical methods for deposition modelling have allowed the integration of the off-site pollen record with dates of archaeological activity on-site.

References: Wills forthcoming

Beckford: animal bone, Worcestershire

Location: SO 984364
Lat. 52.01.32 N; Long. 02.01.24 W

Project manager: J Wills (Archaeology Service, Gloucestershire County Council), 1972–9

Archival body: Worcestershire County Museum

Description: an extensive prehistoric and Roman settlement complex excavated in advance of sand and gravel quarrying. The earliest substantial evidence consists of a large Bronze Age linear boundary laid out at right angles to the gravel terrace. Subsequent late Bronze Age/early Iron Age activity comprised a number of small enclosures and scattered features. A large middle Iron Age settlement spread across this part of the gravel terrace. This took the form of large rectilinear enclosures within which were situated areas of roundhouses, other buildings, stone-paved 'yards', and storage pits. In the late Iron Age land-use on the terrace changed again; the settlement was abandoned and replaced by a sequence of complex enclosures, probably agricultural in function. Further reordering of boundaries took place throughout the Roman period. The skeletons were all examples of articulated animal disposals, primarily chosen to contribute to the construction of the overall site chronology.

Objectives: to provide precise dates for the animal skeletons, to help elucidate changes in animal husbandry across the Iron Age/Roman transition, and to contribute to the overall site chronology.

References: Russell forthcoming

OxA–15780 1771 ±30 BP

$\delta^{13}C$: -19.7‰

Sample: 65935B, submitted in March 2006 by J Wills

Material: animal bone (cat) (A Russell 2006)

Initial comment: this partial articulated cat skeleton came from pit 65935B, which was part of structure 218 (boundary ditch). Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the cat burial, and contribute to the construction of the overall site chronology.

Calibrated date: *1σ:* cal AD 230–330
2σ: cal AD 130–350

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected Roman date for the cat.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (15 September 2006), this sample produced very low amounts of pretreated gelatin (less than the 10mg threshold for reliable dating), and caution is therefore advised in the interpretation of this result.

Laboratory comment: English Heritage (31 October 2007), the two measurements (OxA-15918 and OxA-15780) on this bone are statistically consistent (T′=3.1; T′(5%)=3.8; v=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (1732 ±20 BP), which calibrates to cal AD 240–385 (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15781 2009 ±31 BP

$\delta^{13}C$: -21.3‰

Sample: 66114, submitted in March 2006 by J Wills

Material: animal bone (cow) (A Russell 2006)

Initial comment: this foetal/neonatal cow skeleton came from pit 66114, which was cut by S63 (a boundary ditch). Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the cow burial, and contribute to the construction of the overall site chronology.

Calibrated date: 1σ: 50 cal BC–cal AD 50
2σ: 90 cal BC–cal AD 70

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

OxA–15782 1980 ±31 BP

$\delta^{13}C$: -20.8‰

Sample: 75456, submitted in March 2006 by J Wills

Material: animal bone (sheep) (A Russell 2006)

Initial comment: this partial articulated sheep skeleton came from 75456, a circular and shallow posthole forming part of the semi-circular post-built S6. The bone may have been deposited after the abandonment of the building, the hollows left by the removal of posts being used for the deposition of the burials. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the sheep burial and the abandonment of S6, and to contribute to the construction of the overall site chronology.

Calibrated date: 1σ: 40 cal BC–cal AD 70
2σ: 50 cal BC–cal AD 90

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

Laboratory comment: English Heritage (19 November 2007), the two results (OxA-15782 and OxA-15919) from this partial sheep skeleton are statistically consistent (T'=0.1; T'(5%)=3.8; v=1; Ward and Wilson 1978), and so a weighted mean may be taken (1987 ±19 BP), which calibrates to 45 cal BC–cal AD 70 (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15783 2058 ±29 BP

$\delta^{13}C$: -20.3‰

Sample: 65632, submitted in March 2006 by J Wills

Material: animal bone (pig) (A Russell 2006)

Initial comment: this neonatal articulated pig skeleton came from pit 65632 that contained six neonatal pig skeletons, which cut S61 (small enclosure). Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the pig burial, and contribute to the construction of the overall site chronology.

Calibrated date: 1σ: 110–40 cal BC
2σ: 170 cal BC–cal AD 10

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

OxA–15784 2247 ±31 BP

$\delta^{13}C$: -20.8‰

Sample: 65865, submitted in March 2006 by J Wills

Material: animal bone (sheep) (A Russell 2006)

Initial comment: this partial articulated sheep skeleton came from 65865, a small hollow within S56. This structure is a small circular enclosure with a diameter of *c* 11m. The structure was located in an area of the settlement which had been intensively occupied in the middle Iron Age, it cut roundhouses S60 and S62 and was cut by the sunken-floored S55 and oval enclosure S61.

Objectives: to provide a date for the sheep burial and contribute to the construction of the overall site chronology.

Calibrated date: 1σ: 390–210 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (15 September 2006), this sample produced very low amounts of pretreated gelatin (less than the 10mg threshold for reliable dating), and therefore caution is advised in the interpretation of this result.

Laboratory comment: English Heritage (31 October 2007), the two measurements (OxA-15784 and OxA-15920) on this bone are statistically consistent (T'=0.6; T'(5%)=3.8; v=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (2264 ±21 BP), which calibrates to 395–230 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15918 1701 ±26 BP

$\delta^{13}C$: -19.8‰

Sample: 65935B, submitted in March 2006 by J Wills

Material: animal bone (cat) (A Russell 2006)

Initial comment: as OxA-15780

Objectives: as OxA-15780

Calibrated date: 1σ: cal AD 260–400
2σ: cal AD 250–420

Final comment: see OxA-15780

Laboratory comment: English Heritage (2007), *see* replicate measurement OxA-15780

OxA–15919 1991 ±25 BP

$\delta^{13}C$: -20.3‰

Sample: 75456, submitted in March 2006 by J Wills

Material: animal bone (sheep) (A Russell 2006)

Initial comment: as OxA-15782

Objectives: as OxA-15782

Calibrated date: 1σ: 40 cal BC–cal AD 60
2σ: 50 cal BC–cal AD 80

Final comment: see OxA-15782

Laboratory comment: see OxA-15782

OxA–15920 2278 ±28 BP

$\delta^{13}C$: -20.5‰

Sample: 65865B, submitted in March 2006 by J Wills

Material: animal bone (sheep) (A Russell 2006)

Initial comment: replicate of OxA-15784

Objectives: as OxA-15784

Calibrated date: *1σ*: 400–360 cal BC
2σ: 400–230 cal BC

Final comment: see OxA-15784

Laboratory comment: see OxA-15784

OxA–15921 2044 ±27 BP

$\delta^{13}C$: -20.6‰

Sample: 65522, submitted in March 2006 by J Wills

Material: animal bone (cow) (A Russell 2006)

Initial comment: this articulated cow skeleton came from ditch 65522, forming the latest phase of S239 (a boundary ditch and small enclosure). Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the cow burial and contribute to the overall site chronology.

Calibrated date: *1σ*: 90–1 cal BC
2σ: 170 cal BC–cal AD 30

Final comment: J Wills and P Marshall (31 October 2007), the disposal of complete cow carcasses is rare in the Iron Age and could be evidence of ritual activity or the disposal of a diseased animal not fit for consumption.

OxA–15922 2259 ±26 BP

$\delta^{13}C$: -20.2‰

Sample: 75809, submitted in March 2006 by J Wills

Material: animal bone (sheep) (A Russell 2006)

Initial comment: this partial articulated sheep skeleton came from 75809, a hollow or shallow pit within PG6. PG6 lay inside S50 and surmounted S3. Although there was no supporting stratigraphic evidence, this spatial distribution strongly suggests that they were contemporary internal features.

Objectives: to provide a precise date for the sheep burial and PG6, and to contribute to the construction of the overall site chronology.

Calibrated date: *1σ*: 390–230 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

OxA–16173 2259 ±28 BP

$\delta^{13}C$: -20.1‰

Sample: 65614, submitted in March 2006 by J Wills

Material: animal bone (dog) (A Russell 2006)

Initial comment: the articulated dog skeleton was one of five that came from (65614). Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the dog burials, and contribute to the construction of the overall site chronology.

Calibrated date: *1σ*: 390–230 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the context, and suggests control of an unwanted population.

Beckford: ceramic residues, Worcestershire

Location: SO 984364
Lat. 52.01.32 N; Long. 02.01.24 W

Project manager: J Wills (Archaeology Service, Gloucestershire County Council), 1972–9

Archival body: Worcestershire County Museum

Description: an extensive prehistoric and Roman settlement complex excavated in advance of sand and gravel quarrying. The earliest substantial evidence consists of a large Bronze Age linear boundary laid out at right angles to the gravel terrace. Subsequent late Bronze Age/early Iron Age activity comprised a number of small enclosures and scattered features. A large middle Iron Age settlement spread across this part of the gravel terrace. This took the form of large rectilinear enclosures within which were situated areas of roundhouses, other buildings, stone-paved 'yards' and storage pits. In the late Iron Age land-use on the terrace changed again; the settlement was abandoned and replaced by a sequence of complex enclosures, probably agricultural in function. Further reordering of boundaries took place throughout the Roman period. The very large assemblage (approx 45,000 sherds) of late Iron Age and Roman sherds offers a rare opportunity to study ceramic change at this time, and to characterise early Severn Valley ware. This makes Beckford the type site for ceramic phasing in the region. For these reasons an extensive programme of radiocarbon dating was undertaken, using organic residues adhering to the interior of ceramic sherds.

Objectives: to provide a more precise chronology for the ceramic phasing, and to provide a chronological framework for better understanding the development of the site.

References: Wills forthcoming

GrA–33496 2290 ±40 BP

$\delta^{13}C$: -30.0‰

Sample: Beckford-2747, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit [2747], part of PG12. The storage pits of PG11 and PG12 clustered around S118, and may have been contemporary with S118 and adjacent roundhouses. The residue is on a ceramic phase C/D sherd, fabric 10, from four small joining sherds. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase C/D sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–360 cal BC
2σ: 410–210 cal BC

Final comment: J Wills and P Marshall (31 October 2007), reassessment of the sherd was not possible because it had been almost completely destroyed by the pre-treatment process.

Laboratory comment: English Heritage (31 October 2007), the entire sherd, rather than just the carbonised residue, was pre-treated using the acid-alkali-acid protocol (Mook and Waterbolk 1985), with the alkali-soluble fraction selected for dating.

References: Mook and Waterbolk 1985

GrA–33497 2480 ±50 BP

$\delta^{13}C$: -27.9‰

Sample: Beckford-1789, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: From a pit [1789], part of PG12. The storage pits of PG11 and PG12 clustered around S118 and may have been contemporary with S118 and adjacent roundhouses. The residue is on a ceramic phase A sherd, fabric 16, from a ?complete smashed pot. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase A sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 770–420 cal BC
2σ: 800–400 cal BC

Final comment: J Wills and P Marshall (31 October 2007), current methodology for assigning ceramic phases would classify the context from which this vessel came as ceramic phase A/B based upon the 22% regional component. The result is thus in agreement with a date for the ceramic phase.

GrA–33511 2115 ±35 BP

$\delta^{13}C$: -29.4‰

Sample: Beckford-5596, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 5596 formed the west side of a large rectangular enclosure S230 laid out in the late Iron Age and continuing in use until the early Roman period. 5596 contained a dump of partly fired clay and an exceptionally large quantity of pottery. The residue is on a ceramic phase F–G sherd (from a diagnostic pot), fabric 11, form 16.8. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic F–G sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 200–50 cal BC
2σ: 350–40 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is earlier than expected and is probably a result of the “whole” sherd being dated rather than just the residue. It is therefore likely that material present in the fabric of the sherd has resulted in a small amount of contamination.

Laboratory comment: see GrA-33496

GrA–33513 2120 ±35 BP

$\delta^{13}C$: -30.0‰

Sample: Beckford-75816C, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 75816C formed part of S247, phase i an oval enclosure that was recut numerous times. The residue is on a ceramic phase E sherd (from a pot diagnostic of ceramic phase E), fabric 11, form 11.3 with Aha41 combed decoration. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic E sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 200–90 cal BC
2σ: 350–40 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is earlier than expected and is probably a result of the “whole” sherd being dated rather than just the residue. It is therefore likely that material present in the fabric of the sherd has resulted in a small amount of contamination.

Laboratory comment: see GrA-33496

GrA–33514 2320 ±35 BP

$\delta^{13}C$: -30.0‰

Sample: Beckford-4821D, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 4821D formed part of a rectangular enclosure S14. The residue is on a ceramic phase A sherd, fabric 16. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic A sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 410–380 cal BC
2σ: 410–360 cal BC

Final comment: J Wills and P Marshall (31 October 2007), although the pre-treatment was identical to a number of other sherds that seem to have given ?inaccurate results (eg GrA-33511 and GrA-33513) the result is in agreement with the expected date for a ceramic phase A sherd.

Laboratory comment: see GrA-33496

GrA–33515 2235 ±35 BP

$\delta^{13}C$: -25.5‰

Sample: Beckford-3839X B, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from an enclosure ditch 3839X, forming part of a small enclosure (S108/116). The residue is on a ceramic phase A sherd, fabric 16. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase A sherd (form 2.12) and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for a ceramic phase A sherd.

Laboratory comment: English Heritage (31 October 2007), the two measurements on residue from this sherd (OxA-16777 and GrA-33515) are statistically consistent (T′=0.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean can be calculated (2212 ±23 BP), which calibrates to 385–195 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–33518 2225 ±35 BP

δ¹³C: -28.9‰

Sample: Beckford-5628B, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 5728 was one of 137 storage pits forming PG4 to the east of S16, the largest identified group within the middle Iron Age settlement. The residue is on a ceramic phase B sherd, fabric 10. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic B sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 380–200 cal BC
2σ: 400–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for a ceramic phase B vessel.

Laboratory comment: English Heritage (31 October 2007), the two measurements on residues from this sherd (OxA-16731 and GrA-33518) are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean may be calculated (2214 ±24BP), which calibrates to 385–195 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–33519 2235 ±35 BP

δ¹³C: -25.0‰

Sample: Beckford-1844B, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a small sub-circular pit [1844], an internal feature within S118, a D-shaped enclosure in the north-western part of the recorded area. The residue is on a ceramic phase A sherd, form 2.12, fabric 16. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase A sherd (form 2.12) and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for a ceramic phase A sherd.

Laboratory comment: English Heritage (31 October 2007), the two measurements on residues from this sherd (OxA-16776 and GrA-33519) are statistically consistent (T′=1.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean can be calculated (2272 ±22 BP), which calibrates to 400–230 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–33520 2235 ±40 BP

δ¹³C: -26.8‰

Sample: Beckford-1817B, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: [1817] formed part of the ditch of D-shaped enclosure S118. A ceramic phase C sherd, fabric 16, form 3.4R. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase C sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date of a ceramic phase C sherd.

Laboratory comment: English Heritage (31 October 2007), the two measurements on residues from this sherd (OxA-16778 and GrA-33520) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weigthed mean can be calculated (2230 ±24 BP), which calibrates to 390–200 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–33521 2210 ±35 BP

δ¹³C: -26.7‰

Sample: Beckford-5403, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 5403 was one of a small cluster of storage pits. It cut the roundhouse S22. The residue is on a ceramic phase C sherd, fabric 20. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic C sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 370–200 cal BC
2σ: 390–170 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is too early for a ceramic phase C sherd. This could be because the ceramic phase should actually be B or later or because of pre-treatment contamination (*see* GrA-33513).

Laboratory comment: see GrA-33496

GrA–33533 3120 ±35 BP

$\delta^{13}C$: -29.9‰

Sample: Beckford-1717B, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from ditch 1717, forming part of S100, on the stratigraphically earliest feature in this part of the site. The residue is on an important middle Bronze Age vessel. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic early Bronze Age/early Iron Age sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 1440–1380 cal BC
2σ: 1490–1310 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date.

Laboratory comment: English Heritage (31 October 2007), the two measurements on residues from this vessel (OxA-16732 and GrA-33533) are statistically consistent (T′=2.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean can be calculated (3084 ±24BP), which calibrates to 1425–1290 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–35057 2275 ±45 BP

$\delta^{13}C$: -26.9‰

Sample: Beckford-75154B, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 75154B, a deep and narrow ditch with a flat base, formed the west side of S246, an oval enclosure. The residue is on a ceramic phase G sherd (diagnostic pot of ceramic phase G), fabric 38. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic G sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–230 cal BC
2σ: 410–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is earlier than expected and is probably a result of the "whole" sherd being dated rather than just the residue. It is therefore likely that material present in the fabric of the sherd has resulted in a small amount of contamination.

Laboratory comment: see GrA-33496

GrA–35086 2325 ±45 BP

$\delta^{13}C$: -25.9‰

Sample: Beckford-3805B, submitted in November 2007 by J Wills

Material: carbonised residue (internal)

Initial comment: S113 was a stone-paved surface lying towards the eastern edge of the 1972–4 area excavation. Its main components were a stone surface set within a hollow, a system of ditches and gullies extending south from this surface, and a number of postholes and stakeholes. The sample was a ceramic phase B sherd, fabric 17. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase B sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 410–380 cal BC
2σ: 490–250 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date of a ceramic phase B sherd.

Laboratory comment: English Heritage (19 November 2007), the two measurements on residues from this sherd (OxA-16777 and GrA-33515) are not statistically consistent (T′=7.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GrA–35087 2590 ±50 BP

$\delta^{13}C$: -29.5‰

Sample: Beckford-55107A, submitted in November 2006 by J Will

Material: carbonised residue (internal)

Initial comment: 55107A formed part of S26, a boundary ditch that together with S21 formed a roughly square enclosure. The residue is on a ceramic phase C/D sherd, fabric 11. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic C/D sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 810–760 cal BC
2σ: 830–550 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is earlier than expected and is probably a result of the "whole" sherd being dated rather than just the residue. It is therefore likely that material present in the fabric of the sherd has resulted in a small amount of contamination.

Laboratory comment: see GrA-33496

OxA–16730 2175 ±32 BP

$\delta^{13}C$: -23.9‰

Sample: Beckford-3805A, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: replicate of GrA-35086

Objectives: as GrA-35086

Calibrated date: *1σ*: 360–170 cal BC
2σ: 370–110 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is a bit later than would be expected for a ceramic phase B sherd. Given that the measurement is not statistically consistent with GrA-33515 it might simply be a statistical outlier.

Laboratory comment: see GrA-35086

OxA–16731 2205 ±32 BP

δ¹³C: -25.1‰

Sample: Beckford-5628A, submitted in November 2006 by J Will

Material: carbonised residue (internal)

Initial comment: replicate of GrA-33518

Objectives: as GrA-33518

Calibrated date: *1σ*: 370–200 cal BC
2σ: 390–170 cal BC

Final comment: see GrA-33518

Laboratory comment: see GrA-33518

OxA–16732 3050 ±34 BP

δ¹³C: -23.8‰

Sample: Beckford-1717A, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: as GrA-33533

Objectives: as GrA-33533

Calibrated date: *1σ*: 1390–1260 cal BC
2σ: 1420–1210 cal BC

Final comment: see GrA-33533

Laboratory comment: see GrA-33533

OxA–16733 2008 ±32 BP

δ¹³C: -25.8‰

Sample: Beckford-65798A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 65798A formed the east side of a small horseshoe-shaped enclosure and adjacent boundary ditch S239. The residue is on a ceramic phase F sherd (from a pot diagnostic of ceramic phase F), fabric 11, form 10.23 with pattern burnish. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 50 cal BC–cal AD 50
2σ: 90 cal BC–cal AD 70

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for a ceramic phase F vessel.

OxA–16760 1792 ±27 BP

δ¹³C: -27.4‰

Sample: Beckford-75553A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 75553A, a ditch forming part of S234, was a large sub-rectangular enclosure that replaced S230. The residue is on a ceramic phase K sherd (handle or lid) probably contemporary with ceramic phase K even though it was handmade in fabric 10. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase K sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: cal AD 210–260
2σ: cal AD 130–330

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected Roman date for a ceramic phase K vessel.

OxA–16776 2296 ±28 BP

δ¹³C: -24.3‰

Sample: Beckford-1844A, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: replicate of GrA-33519

Objectives: as GrA-33519

Calibrated date: *1σ*: 400–370 cal BC
2σ: 410–250 cal BC

Final comment: see GrA-33519

Laboratory comment: see GrA-33519

OxA–16777 2195 ±30 BP

δ¹³C: -24.8‰

Sample: Beckford-3839X, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: a replicate of GrA-33515

Objectives: as GrA-33515

Calibrated date: *1σ*: 360–190 cal BC
2σ: 380–170 cal BC

Final comment: see GrA-33515

Laboratory comment: see GrA-33515

OxA–16778 2227 ±30 BP

δ¹³C: -24.6‰

Sample: Beckford-1817A, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: a replicate of GrA-33520

Objectives: as GrA-33520

Calibrated date: 1σ: 380–200 cal BC
2σ: 390–190 cal BC

Final comment: see GrA-33520

Laboratory comment: see GrA-33520

OxA–16779 2231 ±29 BP

$\delta^{13}C$: -27.1‰

Sample: Beckford-6327, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a small pit or posthole [6327], an internal feature within S65, a horseshoe-shaped enclosure. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase A sherd, fabric 16 (complete profile D71) and to help in the construction of the overall site chronology.

Calibrated date: 1σ: 380–200 cal BC
2σ: 390–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for a ceramic phase A sherd.

OxA–16780 2181 ±30 BP

$\delta^{13}C$: -27.4‰

Sample: Beckford-74340-04, submitted in February 2007 by J Wills

Material: carbonised residue (internal)

Initial comment: 74340–04 formed part of the wall trench of structure 3, a stone-floored building, the best-preserved middle Iron Age building at Beckford. The residue is on a ceramic phase B sherd. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase B sherd and to help in the construction of the overall site chronology.

Calibrated date: 1σ: 360–190 cal BC
2σ: 370–160 cal BC

Final comment: J Wills and P Marshall (31 October 2007), reassessment suggests the sherd be assigned to ceramic phase B/C. The radiocarbon result is in agreement with the expected date for a ceramic phase B/C sherd.

OxA–16781 2278 ±29 BP

$\delta^{13}C$: -27.7‰

Sample: Beckford-2968, submitted in February 2007 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit 2968, part of PG11. The storage pits of PG11 and PG12 clustered around S118. The residue is on a ceramic phase A sherd, fabric 16. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase A sherd (form 2.12) and to help in the construction of the overall site chronology.

Calibrated date: 1σ: 400–360 cal BC
2σ: 400–210 cal BC

Final comment: J Wills and P Marshall (31 October 2007), reassessment of the ceramics in the context suggest they should be reassigned to ceramic phase A/B. The result is in agreement with the expected date for a ceramic phase A/B sherd.

OxA–16782 2099 ±28 BP

$\delta^{13}C$: -25.7‰

Sample: Beckford-4830, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a penannular ditch 4830 possibly the wall line of a timber building (S11). The residue is on a ceramic phase A sherd, fabric 16, from a number of conjoining sherds. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic A sherd and to help in the construction of the overall site chronology.

Calibrated date: 1σ: 180–50 cal BC
2σ: 200–40 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the measurement is too late for the expected age of a ceramic phase A sherd.

OxA–16783 2398 ±30 BP

$\delta^{13}C$: -26.4‰

Sample: Beckford-5590B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 5590B formed part of a ditch that may have been associated with S26. The residue is on a sherd from a ceramic phase D assemblage.

Objectives: to provide a precise date for the ceramic C/D sherd and to help in the construction of the overall site chronology.

Calibrated date: 1σ: 520–400 cal BC
2σ: 730–390 cal BC

Final comment: J Wills (15 January 2008), the sherd may be a residual form from ceramic phase B. The date is too early.

Final comment: P Marshall (31 October 2007), reassessment suggests that the vessel is a form of ceramic phase B type, in which case the radiocarbon result is just in agreement with the expected date.

Laboratory comment: English Heritage (31 October 2007), the measurement just falls on the end of the main early Iron Age plateau in the calibration curve and therefore gives the impression that the calibrated result is too early.

OxA–16784 1908 ±30 BP

δ¹³C: -24.7‰

Sample: Beckford-75131B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: 75131B was a hollow over some phases of the west side of S246, an oval enclosure, and formed the final silting over this area. The residue is on a ceramic phase H sherd (diagnostic pot of ceramic phase H) form 10.27, fabric 30, with pattern burnish. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic H sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* cal AD 60–130
2σ: cal AD 20–140

Final comment: J Wills and P Marshall (31 October 2007), this result provides a date for the form and ceramic phase, as well as dating an occurrence of a grog-tempered vessel.

OxA–16785 2313 ±30 BP

δ¹³C: -25.8‰

Sample: Beckford-1842, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: the large curved oval pit [1842] was D-shaped and located in the northwest corner of the enclosure (S118) and appeared to be curved to fit into that space. One of 18 ceramic phase B sherds from the pit, fabric 16, associated forms 1.1, 1.3, and 2.1. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase B sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 400–380 cal BC
2σ: 410–360 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the suggested ceramic phase B assigned to the sherd.

OxA–16786 2210 ±30 BP

δ¹³C: -28.0‰

Sample: Beckford-2914, submitted in November 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch forming the western side of enclosure S117. S117 was a small enclosure in the northern part of the 1972–4 excavations and was roughly rectangular in shape. The residue is on a ceramic phase C/D sherd, fabric 10. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the ceramic phase C/D sherd and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 370–200 cal BC
2σ: 390–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for a sherd from ceramic phase C/D.

SUERC–9840 2335 ±35 BP

δ¹³C: -27.4‰

Sample: Beckford-6343, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S65), context 6343. This is one of the few enclosures at Beckford which were thought to date from the late Bronze Age to early Iron Age. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase A, form, and to help in the construction of the overall site chronology. The residue comes from a sherd of a complete vessel D86. This enclosure is of particular importance for the dating of the late Bronze Age to early Iron Age phase at Beckford.

Calibrated date: *1σ:* 410–380 cal BC
2σ: 420–370 cal BC

Final comment: J Wills (15 January 2008), the date is later than anticipated.

Final comment: P Marshall (31 October 2007), the result is in good agreement with the date suggested by the ceramic phasing.

SUERC–9844 2275 ±35 BP

δ¹³C: -28.4‰

Sample: Beckford-6359, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S66), context 6359. S66 is a phase 5 enclosure within Area D of the middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase C/D, and to help in the construction of the overall site chronology. Area D is one of the most well-stratified areas of middle Iron Age settlement, with at least five discernible phases of activity.

Calibrated date: *1σ:* 400–260 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the ceramic phase C/D assignation is appropriate for the context, although reassessment of the pot from which the sample came suggests it is in fact a ceramic phase B vessel. The result is in agreement with the sample being from a redeposited ceramic phase B pot.

SUERC–9845 1905 ±35 BP

δ¹³C: -26.4‰

Sample: Beckford-7324, submitted in February 2006 by J Will

Material: carbonised residue (internal)

Initial comment: from a ditch (S30 – south side), context 7324. S230 is a key structure in the late Iron Age to early Roman sequence at Beckford. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase J, the form, and to help in the construction of the overall site chronology. The residue is on a sherd that forms part of a near complete vessel (D1308).

Calibrated date: *1σ*: cal AD 60–130
2σ: cal AD 20–220

Final comment: J Wills and P Marshall (31 October 2007), the result is in excellent agreement with the expected Roman date for the vessel.

SUERC–9846 2375 ±35 BP

$\delta^{13}C$: -27.4‰

Sample: Beckford-7706, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S8), context 7706. Structure 8 is from phase 2 of the area D middle Iron Age settlement sequence. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), and to help in the construction of the overall site chronology. The residue is from a sherd of a near complete vessel D1364 (ceramic phase A).

Calibrated date: *1σ*: 420–390 cal BC
2σ: 700–390 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the ceramic phase of the context and the sherd was revised to ceramic phase A (ceramic phase B had been based on 2.2 local). The result is in good agreement with the new date suggested by the ceramic phasing.

SUERC–9847 2270 ±35 BP

$\delta^{13}C$: -28.5‰

Sample: Beckford-65021C, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S48), context 65021C. S48 is a settlement enclosure within phase 3 of Area D within the middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase (B) and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–250 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the date suggested by the ceramic phasing.

SUERC–9848 2255 ±35 BP

$\delta^{13}C$: -28.7‰

Sample: Beckford-65024, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S45), context 65024. S45 is a boundary ditch defining an area of settlement within phase 3 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the sherd; fabric type (F16), ceramic phase D, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 390–230 cal BC
2σ: 400–200 cal BC

Final comment: J Wills (15 January 2008), the date is acceptable for a redeposited sherd in fabric 16, but not for the ceramic phase.

Final comment: P Marshall (31 October 2007), reassessment of the context from which the sherd came showed that it contained too few sherds to give it a ceramic phase, other than later than ceramic phase B. The radiocarbon result is in agreement with the revised suggested date.

SUERC–9849 2245 ±35 BP

$\delta^{13}C$: -26.1‰

Sample: Beckford-65056, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S47), context 65056. S47 is a settlement enclosure within phase 2 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase (C*), and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 390–210 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the original ceramic phasing (C*) was based on the percentage of regional fabrics and linear tooling. However, the sample sherd weight of 2g was much lower than the average weight for the group. This sherd is therefore probably redeposited.

SUERC–9850 2045 ±35 BP

$\delta^{13}C$: -26.7‰

Sample: Beckford-65097A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S235), context 65097A. S235 is a small enclosure, forming part of the key late Iron Age to early Roman sequence of activity at Beckford. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase F, and to help in the construction of the overall site chronology. The residue adheres to the inside of rimsherd D382.

Calibrated date: *1σ*: 100 cal BC–cal AD 10
2σ: 170 cal BC–cal AD 50

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the date suggested by the ceramic phasing.

SUERC–9854 2145 ±35 BP

δ¹³C: -28.0‰

Sample: Beckford-65113A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S61), context 65113A. S61 is a small domestic enclosure in phase 3 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase E-F, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 350–110 cal BC
2σ: 360–50 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the small size of the sherd (7g) and small number of sherds of ceramic phase E–F from the context (none with rims) suggested the sherd is redeposited.

SUERC–9855 2310 ±35 BP

δ¹³C: -28.4‰

Sample: Beckford-65134A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S46), context 65134A. S46 is a small domestic enclosure within phase 3 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase D, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–380 cal BC
2σ: 410–250 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the context is clearly ceramic phase D, as it contains 98 sherds, weighing 2,500g, and six different vessels. The small sherd from which the residue was dated is probably therefore redeposited.

SUERC–9856 2425 ±35 BP

δ¹³C: -28.4‰

Sample: Beckford-65448, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S56), context 65448. S56 was a small domestic enclosure within Area D of the middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase B, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 730–400 cal BC
2σ: 760–390 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with other radiocarbon measurements on fabric 16 sherds.

SUERC–9857 2260 ±40 BP

δ¹³C: -27.4‰

Sample: Beckford-65515B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S39), context 65515B. S39 was a small enclosure within the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F22), ceramic phase C, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–230 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), reassessment of the ceramic assemblage from the context (63 sherds, 58% regional) suggests it should be reclassified as ceramic phase B/C. The result would be in agreement if the sherd was from ceramic phase B/C.

SUERC–9858 2315 ±35 BP

δ¹³C: -26.9‰

Sample: Beckford-65543A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S39), context 65543A. S39 was a small enclosure within phase 4 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase C, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 410–380 cal BC
2σ: 410–260 cal BC

Final comment: J Wills and P Marshall (31 October 2007), as the context only contains eight sherds, the ceramic phase C attribution is probably unreliable. The result is therefore in agreement with the sherd which has been dated as Iron Age.

SUERC–9859 2325 ±35 BP

δ¹³C: -26.8‰

Sample: Beckford-65686, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S69), context 65686. The ditch enclosed a stone-floored building, from Area D middle Iron Age settlement phase 3. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), and to help in the construction of the overall site chronology. The residue comes from a sherd (D829) forming part of a vessel from which a high percentage of the profile survived.

Calibrated date: *1σ*: 410–380 cal BC
2σ: 410–360 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the original attribution of the context to ceramic phase B was based on the presence of local 2.2 forms, but reassessment suggests that it should be reclassified as ceramic phase A because of the percentage of regional wares. The result is in good agreement with a ceramic phase A date, although this appears to be too late for the stratigraphic phase.

SUERC–9860 2300 ±35 BP

$\delta^{13}C$: -28.3‰

Sample: Beckford-65775C, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S63), context 65775C. S63 was a boundary ditch within the area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), and to help in the construction of the overall site chronology. The residue comes from sherd (D767), ceramic phase E.

Calibrated date: *1σ*: 400–370 cal BC
2σ: 410–230 cal BC

Final comment: J Wills (15 January 2007), the date is from a sherd that is probably residual.

Final comment: P Marshall (31 October 2007), the sherd seems to have been mis-classified as being from ceramic phase E, when all the evidence suggests it is actually from ceramic phase B. The result is in agreement with a ceramic phase B date.

SUERC–9864 2320 ±35 BP

$\delta^{13}C$: -29.0‰

Sample: Beckford-65792, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S9), context 65792. S9 was a small enclosure within the Area D middle Iron Age settlement, phase 2. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F24), ceramic phase B, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 410–380 cal BC
2σ: 410–360 cal BC

Final comment: J Wills and P Marshall (31 October 2007), this is an excellent result for a ceramic phase B sherd.

SUERC–9865 2295 ±40 BP

$\delta^{13}C$: -28.3‰

Sample: Beckford-65813B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit (PG9), context [65813B]. PG9 was from an early phase of the middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F17), ceramic phase B, and to help in the construction of the overall site chronology. The residue comes from a sherd of a single vessel.

Calibrated date: *1σ*: 400–370 cal BC
2σ: 410–210 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for ceramic phase B sherd.

SUERC–9866 2225 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: Beckford-65987B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (structure 50 – west side), context 65987B. S50 was a large middle Iron Age settlement enclosure in Area D, dating to phases 4 and 5. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase D, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 380–200 cal BC
2σ: 400–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is too early for a ceramic phase D sherd.

SUERC–9867 1830 ±35 BP

$\delta^{13}C$: -26.7‰

Sample: Beckford-66112C, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit or ditch (S239), context 66112C. S239 was a small enclosure, forming a key element of the late Iron Age to early Roman sequence of activity at Beckford. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase F, and to help in the construction of the overall site chronology. The residue comes from a sherd forming a complete vessel (D883).

Calibrated date: *1σ*: cal AD 120–240
2σ: cal AD 80–320

Final comment: J Wills (15 January 2008), the earlier part of the date range is in agreement with the expected date.

Final comment: P Marshall (31 October 2007), the result is in agreement with the expected Roman date, but it stands out as being odd for fabric 11. It might therefore be from a long-lived form.

SUERC–9868 2065 ±35 BP

δ¹³C: -27.6‰

Sample: Beckford-74009A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S247 – north side, phase iii), context 74009A. S247, a small enclosure, was a key part of the late Iron Age to early Roman sequence of activity at Beckford. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase G, and to help in the construction of the overall site chronology. The residue comes from a sherd that forms part of vessel (D1279).

Calibrated date: *1σ*: 160–40 cal BC
2σ: 190 cal BC–cal AD 20

Final comment: J Wills (15 January 2008), the date is too early for ceramic phase G and the vessel may be redeposited.

Final comment: P Marshall (31 October 2007), reassessment of the ceramic phasing suggests this sherd should be assigned to ceramic phase F-H, and that it might be an example of the later reuse of forms (including form 10.5) in fabric 11.

SUERC–9869 2040 ±35 BP

δ¹³C: -26.8‰

Sample: Beckford-74077B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S247 – north side, phase iii), context 74077B. S247 is a small enclosure within the key late Iron Age to early Roman sequence of activity at Beckford. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase G, and to help in the construction of the overall site chronology. The residue comes from a sherd that forms part of vessel (D1309).

Calibrated date: *1σ*: 90 cal BC–cal AD 10
2σ: 170 cal BC–cal AD 60

Final comment: J Wills (15 January 2008), the later part of the date range is consistent with ceramic phase G.

Final comment: P Marshall (31 October 2007), reassessment of the ceramic phasing suggests this sherd should be assigned to ceramic phasing F-H, and that it might be an example of the later reuse of forms in fabric 11.

SUERC–9870 2005 ±35 BP

δ¹³C: -28.9‰

Sample: Beckford-74086, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a deposit (S247 – south west side), context 74086. S247 is a small enclosure that forms a key part of the late Iron Age to early Roman sequence at Beckford. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase F, and to help in the construction of the overall site chronology. The residue comes from a sherd that forms part of a vessel of which a high percentage was present (D1263).

Calibrated date: *1σ*: 50 cal BC–cal AD 60
2σ: 100 cal BC–cal AD 80

Final comment: J Wills and P Marshall (31 October 2007), the result is consistent with the expected date for a ceramic phase F vessel.

SUERC–9874 2250 ±50 BP

δ¹³C: -27.5‰

Sample: Beckford-74310-16, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from an occupation layer (S3 – phase iiid), context 74310. S3 was a very well-preserved stone-floored roundhouse of multiple phases. Contemporary with S50, PG6, and part of phases 4 and 5 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase B*, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–200 cal BC
2σ: 410–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for a ceramic phase B* sherd, but is early for this stratigraphic phase.

SUERC–9875 2185 ±35 BP

δ¹³C: -26.9‰

Sample: Beckford-74171A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit (PG6), context 74171A. PG6 was a large pit group associated with roundhouse structure 3 and enclosure structure 50. Phase 4 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase B, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 360–190 cal BC
2σ: 380–120 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for a ceramic phase B sherd.

SUERC–9876 2060 ±35 BP

$\delta^{13}C$: -26.6‰

Sample: Beckford-74314A-14, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a storage pit associated with S3, context 74314A. S3 was a very well-preserved stone-floored roundhouse of multiple phases. Contemporary with S50, PG6, and part of phases 4 and 5 of the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase C, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 160–1 cal BC
2σ: 180 cal BC–cal AD 30

Final comment: J Wills and P Marshall (31 October 2007), an excellent result for a ceramic phase C sherd.

SUERC–9877 2275 ±35 BP

$\delta^{13}C$: -26.4‰

Sample: Beckford-74355D, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit containing a dump of oven material (PG6), context 74355D. Adjacent to roundhouse S3 and perhaps containing the dismantled remains of the superstructure of its oven. Area D, phases 4 and 5. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase C/D, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–260 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the 24% regional component in the ceramic assemblage would indicate this should be classified as ceramic phase A/B and not ceramic phase C/D. The forms are consistent with the interpretation of ceramic phase A/B and the result is in agreement with this.

SUERC–9878 2195 ±35 BP

$\delta^{13}C$: -27.1‰

Sample: Beckford-74596A, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit (PG6), context 74596A. PG6 was a pit group contemporary with S3 and S50, Area D, phase 4 and 5, of the middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase D, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 360–190 cal BC
2σ: 390–160 cal BC

Final comment: J Wills (15 January 2008), the sample was probably a redeposited sherd.

Final comment: P Marshall (31 October 2007), the ceramic assemblage from this context includes form 2.23 in fabric 11 which could be of the date suggested by the radiocarbon measurement.

SUERC–9879 2100 ±35 BP

$\delta^{13}C$: -30.0‰

Sample: Beckford-75536C, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S50 – west side), context 75536C. S50 was one of the main settlement enclosures within the middle Iron Age settlement, well-stratified and with important links to other enclosures. Area D, phases 4, 5 and possibly later. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase K, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 180–50 cal BC
2σ: 340–40 cal BC

Final comment: J Wills and P Marshall (31 October 2007), reassessment of the sherd suggested it was undiagnostic and therefore probably residual in its context.

SUERC–9880 2265 ±50 BP

$\delta^{13}C$: -27.5‰

Sample: Beckford-75550D, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit (PG6), context 75550D. PG6 was a large pit group, contemporary with structure 3 and 50, Area D, phases 4 and 5. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase E, and to help in the construction of the overall site chronology.

Calibrated date: *1σ*: 400–210 cal BC
2σ: 410–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), given the sherd is made from fabric 16 it is almost certainly redeposited and thus unlikely to be from ceramic phase E. The result is therefore in agreement with the sherd being middle Iron Age in date.

SUERC–9884 2200 ±35 BP

δ¹³C: -27.3‰

Sample: Beckford-75567C, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit (PG6), context 75567C. PG6 was a large pit group, contemporary with structures 3 and 50, Area D, phases 4 and 5. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase F, and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 370–190 cal BC
2σ: 390–170 cal BC

Final comment: J Wills and P Marshall (31 October 2007), given the sherd is made from fabric 16 it is almost certainly redeposited and thus unlikely to be from ceramic phase F. The result is therefore in agreement with the sherd being middle Iron Age in date.

SUERC–9885 2235 ±35 BP

δ¹³C: -28.3‰

Sample: Beckford-75726, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a hollow (S2 – internal), context 75726. S2 was a posthole building, adjacent to and possibily contemporary with the roundhouse S3. This context is an internal feature within the building. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F16), ceramic phase A, and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 390–200 cal BC
2σ: 400–190 cal BC

Final comment: J Wills and P Marshall (31 October 2007), as the context only has two sherds, the ceramic phase A classification is unreliable. The result therefore is in agreement with the sherd being assigned an Iron Age date.

SUERC–9886 2210 ±35 BP

δ¹³C: -26.3‰

Sample: Beckford-75955B, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a pit (PGb), context 75955B. PG6 was a large pit group, contemporary with S3 and S50, area D, of the middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase C/D, and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 370–200 cal BC
2σ: 390–170 cal BC

Final comment: J Wills and P Marshall (31 October 2007), based on the revised methodology for assigning ceramic phases the sherd would be classified as belonging to ceramic phase B. The result is in agreement with the date suggested for ceramic phase B.

SUERC–9887 2025 ±35 BP

δ¹³C: -26.9‰

Sample: Beckford-75962C, submitted in February 2006 by J Wills

Material: carbonised residue (internal)

Initial comment: from a ditch (S247 – north side phase i), context 75962C. S247 was a late Iron Age enclosure, very well-stratified within a long sequence of middle to late Iron Age to Roman settlement. It is a key structure in establishing the Beckford ceramic sequence with a very good assemblage of pottery. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F11), ceramic phase D, the form, and to thus help in the construction of the overall site chronology. The residue is from a sherd of vessel D1228.

Calibrated date: *1σ:* 60 cal BC–cal AD 30
2σ: 160 cal BC–cal AD 60

Final comment: J Wills and P Marshall (31 October 2007), reassessment suggests the ceramic phase could also be ceramic phase E or F (the *terminus post quem* is based on the distinction between form 3.9 and form 10). The result would be in more agreement with ceramic phase E or F rather than D.

SUERC–9888 1990 ±35 BP

δ¹³C: -27.8‰

Sample: Beckford-65144FP, submitted in February 2006 by J Will

Material: carbonised residue (internal)

Initial comment: from a ditch (S46), context 65144. S46 is a small domestic enclosure within the Area D middle Iron Age settlement. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the fabric type (F10), ceramic phase F, and to help in the construction of the overall site chronology.

Calibrated date: *1σ:* 50 cal BC–cal AD 60
2σ: 60 cal BC–cal AD 80

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the date suggested by the ceramic phasing.

Beckford: human inhumations, Worcestershire

Location: SO 984364
Lat. 52.01.32 N; Long. 02.01.24 W

Project manager: J Wills (Archaeology Service, Gloucestershire County Council), 1972–9

Archival body: Worcestershire County Museum

Description: an extensive prehistoric and Roman settlement complex excavated in advance of sand and gravel quarrying. The earliest substantial evidence consists of a large Bronze Age linear boundary laid out at right angles to the gravel terrace. Subsequent late Bronze Age/early Iron Age activity comprised a number of small enclosures and scattered features. A large middle Iron Age settlement spread across this part of the gravel terrace. This took the form of large rectilinear enclosures within which were situated areas of roundhouses, other buildings, stone-paved 'yards', and storage pits. In the late Iron Age land-use on the terrace changed again; the settlement was abandoned and replaced by a sequence of complex enclosures, probably agricultural in function. Further reordering of boundaries took place throughout the Roman period. The 13 inhumations (1123, 5533, 75646, HWCM 5006, 65538A, 1207, 1109, 178420, 272205, 65785, 65168, 5539, and 1108) represent a sample of the 49 complete inhumations from the site. They have been chosen as they represent a sample of the range of burial practices taking place on the site from the middle Iron Age to Roman period.

Objectives: to test bone collagen survival on-site; to provide precise dates for the inhumations; and to provide a chronological framework for better understanding the development of the site.

Final comment: J Wills and P Marshall (31 October 2007), as the site was located on a gravel terrace it was expected, in common with sites in similar geological settings, that many of the bones will have undergone severe chemical/physical degradation, which can result in up to 90% of the original collagen content being lost (Brock *et al* 2007). Thus six human bone samples were submitted to the Queen's University, Belfast, in 2005 as part of a pilot study to investigate the feasibility of radiocarbon dating bone from Beckford. The samples submitted to Belfast were processed according to methods outlined in Longin (1971), but due to the poor collagen yield of four of them (5539, 1108, 178420, and 272205), only two of the samples produced sufficient benzene for liquid scintillation counting; 65785 (UB-5212) and 65168 (UB-5213). Stable isotope measurements on the six samples submitted to the Queen's University, Belfast were carried out at the Rafter Radiocarbon Laboratory, New Zealand as described by Beavan-Athfield *et al* (2001). These results showed that the collagen was well-preserved. In summary therefore the pilot study suggested that although the human bones did not all contain enough collagen for high-precision radiocarbon dating, the collagen that was present was well-preserved. It was thus decided to resample the same six skeletons and an additional seven, and submit samples for Accelerator Mass Spectrometry (AMS) dating at the Scottish Universities Environmental Research Centre (SUERC), East Kilbride, in 2006.

References: Beavan-Athfield *et al* 2001
Brock *et al* 2007
Longin 1971
Wills forthcoming

GrA–33529 1890 ±35 BP

$\delta^{13}C$: -19.8 ±0.2‰
$\delta^{15}N$ (diet): +10.5 ±0.2‰
C/N ratio: 2.9

Sample: Beckford-1123, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: one of seven inhumations from a small cemetery. All of the burials were salvage recorded and the bone was fragmentary. This is an extended adult inhumation lying on its back with the head removed and placed adjacent to the feet. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the inhumation and ascertain whether all the burials in the cemetery are of the same age.

Calibrated date: *1σ:* cal AD 70–140
2σ: cal AD 20–230

Final comment: J Wills and P Marshall (31 October 2007), although these graves could not be dated precisely, a combination of ceramic and stratigraphic evidence indicated that burials were taking place from the early second century cal AD onwards. The radiocarbon result is in agreement with this interpretation.

GrA–33530 1855 ±35 BP

$\delta^{13}C$: -19.7 ±0.2‰
$\delta^{15}N$ (diet): +10.3 ±0.2‰
C/N ratio: 2.7

Sample: Beckford-5533, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: a small cluster of burials (5532, 5533, 5534, and 5539), placed in sub-rectangular graves, located just inside the north-western entrance to the enclosure structure 230. Stratigraphic and ceramic evidence indicates that these burials were of late Iron Age to early Roman date, and the type of burial (certainly in the case of 5539, and probably the whole group) represents a method completely different to that of earlier phases. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a date for the inhumations (5532, 5533, and 5534) and ascertain whether all the burials in the group are the same age.

Calibrated date: *1σ:* cal AD 80–230
2σ: cal AD 70–250

Final comment: J Wills and P Marshall (31 October 2007), stratigraphic and ceramic evidence indicates that these burials were of late Iron Age to early Roman date, and the type of burial (certainly in the case of 5539, and probably the whole group) represents a method completely different to that of earlier phases. 5533, on the basis of its radiocarbon age, seems to be an early example of this new type of burial.

GrA–33531 2175 ±35 BP

$\delta^{13}C$: -18.8 ±0.2‰
$\delta^{15}N$ (diet): +11.5 ±0.2‰
C/N ratio: 2.5

Sample: Beckford-75646, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: a neonate burial in the primary fill of boundary ditch structure 31 phase iii. One of four neonate burials concentrated within the fill of structure 31, within a 20m length of the ditch. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for this inhumation and ascertain when ditch structure 31 was constructed.

Calibrated date: *1σ*: 360–170 cal BC
2σ: 370–110 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected date for construction of the boundary ditch.

OxA–16761 2241 ±27 BP

$\delta^{13}C$: -20.5 ±0.3‰
$\delta^{15}N$ (diet): +10.4 ±0.3‰
C/N ratio: 3.1

Sample: Beckford-HWCM 5006, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: during excavations on the flood plain an adult inhumation, probably female, was found in a grave sealed beneath peat deposits. The skeleton was in a crouched position, with the head to the east, facing south. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for this inhumation and a *terminus post quem* for the overlying peat sequence.

Calibrated date: *1σ*: 390–210 cal BC
2σ: 400–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is much later than expected, given its stratigraphic position below the peat deposit (basal date HAR-3954; 3750 ±110 BP; 2480-1880 cal BC; Reimer *et al* 2004). However, analysis suggests that HAR-3954 is inaccurate and that the radiocarbon age of the skeleton is accurate (Marshall *et al* forthcoming).

References: Marshall *et al* forthcoming
Reimer *et al* 2004

OxA–16762 2227 ±28 BP

$\delta^{13}C$: -20.2 ±0.3‰
$\delta^{15}N$ (diet): +12.0 ±0.3‰
C/N ratio: 3.1

Sample: Beckford-65538A, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: a neonate burial in the final silting of boundary ditch structure 31 phase i. One of four neonate burials concentrated within the upper fill of structure 31 within a 20m length of the ditch. There were no examples of neonate burials within storage pits. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for this inhumation and ascertain when this phase of structure 31 went out of use.

Calibrated date: *1σ*: 380–200 cal BC
2σ: 390–200 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected age, and provides a date for when the ditch finally went out of use.

OxA–16763 1969 ±27 BP

$\delta^{13}C$: -19.6 ±0.3‰
$\delta^{15}N$ (diet): +11.4 ±0.3‰
C/N ratio: 3.2

Sample: Beckford-1207, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: one of seven inhumations from a small cemetery. All of the burials were salvage recorded and the bone was fragmentary. This is an extended adult inhumation lying on its left side with its head in the normal position. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for the inhumation and ascertain whether all the burials in the cemetery are the same age.

Calibrated date: *1σ*: cal AD 1–70
2σ: 50 cal BC–cal AD 90

Final comment: J Wills and P Marshall (31 October 2007), stratigraphic and ceramic evidence indicates that these burials were of later Roman date, and the type of burial (certainly in the case of 5539, and probably the whole group) represents a method completely different to that of earlier phases. 1207, on the basis of its radiocarbon age, seems to be an early example of this new type of burial.

OxA–16764 1797 ±27 BP

$\delta^{13}C$: -19.0 ±0.3‰
$\delta^{15}N$ (diet): +11.7 ±0.3‰
C/N ratio: 3.2

Sample: Beckford-1109, submitted in August 2005 by J Wills

Material: human bone (A Grieve 2006)

Initial comment: one of seven inhumations from a small cemetery. All of the burials were salvage recorded and the bone was fragmentary. This is an extended adult inhumation with the head removed and placed between the knees. Glacial sands and gravels underlie the archaeological deposits.

Objectives: to provide a precise date for this inhumation and ascertain whether all the burials in the cemetery are the same age.

Calibrated date: *1σ*: cal AD 180–260
2σ: cal AD 130–330

Final comment: J Wills and P Marshall (31 October 2007), although these graves could not be dated precisely, a combination of ceramic and stratigraphic evidence indicated that burials were taking place from the early second century cal AD onwards. The radiocarbon result is in agreement with this interpretation.

SUERC–9082 1765 ±35 BP

$\delta^{13}C$: -19.6 ±0.1‰
$\delta^{15}N$ (diet): +10.2 ±0.3‰
C/N ratio: 3.4

Sample: Beckford-5539, submitted in August 2005 by J Wills

Material: human bone (right femur) (A Grieve 2006)

Initial comment: an extended decapitated adult male inhumation from a small cluster (four in total) placed in sub-rectangular graves located just inside the north-western entrance to the late Iron Age to early Roman enclosure structure 230. Glacial sands and gravels underlie the archaeological deposits. This burial was situated in the middle of the gravel terrace and sealed by less than 1.5m of later deposits.

Objectives: to provide a precise date for the decapitated burial. This feature is also well-related to the important late Iron Age to early Roman sequence of activity at Beckford and it will therefore make a contribution to the dating of the main stratigraphic sequence.

Calibrated date: *1σ:* cal AD 230–340
2σ: cal AD 130–390

Final comment: J Wills and P Marshall (31 October 2007), stratigraphic and ceramic evidence indicates that these burials were of late Iron Age to early Roman date, and the type of burial (certainly in the case of 5539, and probably the whole group) represents a method completely different to that of earlier phases. The result is thus slightly later than might have been expected.

Laboratory comment: English Heritage (December 2007), replicate measurements on the stable isotopes were carried out at the Rafter Radiocarbon Laboratory, New Zealand and the measurements for R-29050-1 were as follows : $\delta^{13}C$ was -19.7 ±0.3‰; $\delta^{15}N$ was +10.9 ±0.25‰; and the C/N ratio was 3.2. The two $\delta^{13}C$ measurements on this skeleton (SUERC-9082 and R-29050-1) are statistically consistent (T'=0.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-19.6 ±0.1‰; Reimer *et al* 2004). The two $\delta^{15}N$ measurements on the same skeleton are also statistically consistent (T'=3.2; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (+10.6 ±0.2‰; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–9083 1720 ±35 BP

$\delta^{13}C$: -19.7 ±0.1‰
$\delta^{15}N$ (diet): +7.7 ±0.3‰
C/N ratio: 3.4

Sample: Beckford-1108, submitted in August 2005 by J Wills

Material: human bone (unidentified longbone shaft) (A Grieve 2006)

Initial comment: an extended adult burial from a small Roman cemetery of seven inhumations near to the south-western edge of the excavation. Glacial sands and gravels underlie the archaeological deposits. The burial was situated about 50m from the junction of the gravel terrace and flood plain. It was sealed by colluvial or alluvial deposits.

Objectives: to provide a precise date for the inhumation and for the cemetery which is set within the Roman field system.

Calibrated date: *1σ:* cal AD 250–390
2σ: cal AD 230–420

Final comment: J Wills and P Marshall (31 October 2007), although these graves could not be dated precisely, a combination of ceramic and stratigraphic evidence indicated that burials were taking place from the early second century cal AD onwards. The radiocarbon result is in good agreement with this interpretation.

Laboratory comment: English Heritage (December 2007), replicate measurements on the stable isotopes were carried out at the Rafter Radiocarbon Laboratory, New Zealand and the measurements for R-29050-2 were as follows: $\delta^{13}C$ was -19.5 ±0.3‰; $\delta^{15}N$ was +8.1 ±0.25‰; and the C/N ratio was 3.3. The two $\delta^{13}C$ measurements on this skeleton (SUERC-9083 and R-29050-2) are statistically consistent (T'=0.4; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-19.7 ±0.1‰; Reimer *et al* 2004). The two $\delta^{15}N$ measurements on the same skeleton are also statistically consistent (T'=1.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (+7.9 ±0.2‰; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–9084 2610 ±35 BP

$\delta^{13}C$: -20.4 ±0.1‰
$\delta^{15}N$ (diet): +8.3 ±0.3‰
C/N ratio: 3.7

Sample: Beckford-178420, submitted in August 2005 by J Wills

Material: human bone (right femur) (A Grieve 2006)

Initial comment: crouched female inhumation (25–35 years old) from an oval grave in the base of a storage pit (PG 12). Well stratified within the middle Iron Age sequence in this part of the site. Glacial sands and gravels underlie the archaeological deposits. This burial was situated near to the northern edge of the gravel terrace, and sealed by less than 2m of pit fill.

Objectives: to provide a precise date for the burial within the storage pit and to contribute to the dating of the middle Iron Age stratigraphic sequence in this part of the site.

Calibrated date: *1σ:* 810–780 cal BC
2σ: 830–760 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is much earlier than expected, given its stratigraphic position.

Laboratory comment: SUERC Radiocarbon Dating Laboratory (AMS) (December 2007), *see* laboratory comment by Rafter Radiocarbon Laboratory.

Laboratory comment: Rafter Radiocarbon Laboratory (December 2007), there is an inconsistency in the $\delta^{15}N$ values for three samples (NZA-29050-3/SUERC-9084; NZA-29050-5/SUERC-9088; and NZA-29050-4/SUERC-9090) from Beckford from the two laboratories. There is no indication from internal standards run, to suggest that the inconsistency was due to analytical problems. Repeat analysis was not available by time of publication to test the inconsistency.

Laboratory comment: English Heritage (December 2007), the C:N ratio is outside the range usually quoted as an indicator of good quality collagen preservation (2.9–3.6) (De Niro 1985), but discussion with G Cook (SUERC) suggests the range is rather conservative, and the laboratory is confident that this measurement is accurate. Replicate measurements on the stable isotopes were carried out at Rafter Laboratory, New Zealand and the measurements for R-29050-3 were as follows: $\delta^{13}C$ was -20.3 ±0.3‰; $\delta^{15}N$ was +9.7 ±0.25‰; and the C/N ratio was 3.2. The two $\delta^{13}C$ measurements on this skeleton (SUERC-9084 and R-29050-3) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-20.4 ±0.1‰; Reimer *et al* 2004). The two $\delta^{15}N$ measurements on the same skeleton are, however, not statistically consistent (T′=12.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: DeNiro 1985
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–9088 1980 ±35 BP

$\delta^{13}C$: -20.3 ±0.1‰
$\delta^{15}N$ (diet): +11.9 ±0.3‰
C/N ratio: 3.3

Sample: Beckford-65168, submitted in August 2005 by J Wills

Material: human bone (right tibia) (A Grieve 2006)

Initial comment: tightly crouched female inhumation (34–45 years) from the upper layers of ditch (structure 235). The very tightly crouched position of the burial suggests the body may have been bound. Structure 235, a small enclosure, is well-stratified and an important part of the key middle to late Iron Age to early Roman sequence at Beckford. Glacial sands and gravels underlie the archaeological deposits. This burial was situated in the middle of the gravel terrace. It was inserted into a backfilled ditch and sealed by less than 0.5m of other deposits.

Objectives: to provide a precise date for the tightly crouched (bound) burial within the upper layers of the ditch. Structure 235 is an important element in the middle to late Iron Age sequence in this part of the site.

Calibrated date: *1σ*: 40 cal BC–cal AD 70
2σ: 50 cal BC–cal AD 90

Final comment: J Wills and P Marshall (31 October 2007), the result is in good agreement with the expected late Iron Age date of the burial.

Laboratory comment: English Heritage (December 2007), replicate measurements on the stable isotopes were carried out at Rafter Laboratory, New Zealand and the measurements for R-29050-5 were as follows: $\delta^{13}C$ was -20.4 ±0.3‰; $\delta^{15}N$ was +10.2 ±0.25‰; and the C/N ratio was 3.2. The two $\delta^{13}C$ measurements on this skeleton (SUERC-9088 and R-29050-5) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-20.3 ±0.1‰; Reimer *et al* 2004). The two $\delta^{15}N$ measurements on the same skeleton are, however, not statistically consistent (T′=19.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). *See* UB-5213.

Laboratory comment: SUERC Radiocarbon Dating Laboratory (AMS) (15 December 2007), *see* laboratory comment by Rafter Radiocarbon Laboratory under SUERC-9084.

Laboratory comment: Rafter Radiocarbon Laboratory (15 December 2007), *see* laboratory comment by Rafter Radiocarbon Laboratory under SUERC-9084.

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–9089 2210 ±35 BP

$\delta^{13}C$: -20.4 ±0.1‰
$\delta^{15}N$ (diet): +10.7 ±0.3‰
C/N ratio: 3.4

Sample: Beckford-272205, submitted in August 2005 by J Wills

Material: human bone (right tibia) (A Grieve 2006)

Initial comment: glacial sands and gravels underlie the archaeological deposits. This burial was situated close to the northern edge of the gravel terrace. It was sealed by less than 0.50m of other deposits.

Objectives: crouched elderly male inhumation from a shallow oval grave within a roundhouse. The location of the grave in relation to the area of domestic occupation is particularly interesting. The date will contribute to the establishment of the overall middle Iron Age sequence on the site.

Calibrated date: *1σ*: 370–200 cal BC
2σ: 390–170 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the radiocarbon result is in good agreement with the expected date of the inhumation.

Laboratory comment: English Heritage (December 2007), replicate measurements on the stable isotopes were carried out at Rafter Laboratory, New Zealand and the measurements for R-29050-6 were as follows: $\delta^{13}C$ was -20.4 ±0.3‰; $\delta^{15}N$ was +11.2 ±0.25‰; and the C/N ratio was 3.3. The two $\delta^{13}C$ measurements on this skeleton (SUERC-9089 and R-29050-6) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-20.4 ±0.1‰; Reimer *et al* 2004). The two $\delta^{15}N$ measurements on the same skeleton are also statistically consistent (T′=1.6; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (+11.10 ±0.2‰; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–9090 2215 ±35 BP

$\delta^{13}C$: -20.1 ±0.1‰
$\delta^{15}N$ (diet): +9.6 ±0.3‰
C/N ratio: 3.3

Sample: Beckford-65785, submitted in August 2005 by J Wills

Material: human bone (left tibia) (A Grieve 2006)

Initial comment: semi-crouched male inhumation (17–25 years) from the upper layers of a storage pit (PG5). This pit group is well-stratified within the middle Iron Age occupation sequence. Glacial sands and gravels underlie the archaeological deposits. This burial was situated towards the northern edge of the gravel terrace, sealed by less than 0.5m of other deposits.

Objectives: to provide a precise date for the burial within the upper layers of the storage pit and to contribute to the dating of the middle Iron Age stratigraphic sequence.

Calibrated date: *1σ:* 380–200 cal BC
2σ: 390–170 cal BC

Final comment: J Wills and P Marshall (31 October 2007), the result is in excellent agreement with its position in a middle Iron Age dated feature.

Laboratory comment: English Heritage (December 2007), replicate measurements on the stable isotopes were carried out at Rafter Laboratory, New Zealand and the measurements for R-29050-4 were as follows: $\delta^{13}C$ was -20.2 ±0.3‰; $\delta^{15}N$ was +12.2 ±0.25‰; and the C/N ratio was 3.2. The two $\delta^{13}C$ measurements on this skeleton (SUERC-9090 and R-29050-4) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-20.1 ±0.1‰; Reimer *et al* 2004). The two $\delta^{15}N$ measurements on the same skeleton are, however, not statistically consistent (T′=44.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). *See* UB-5212.

Laboratory comment: SUERC Radiocarbon Dating Laboratory (AMS) (15 December 2007), *see* laboratory comment by Rafter Radiocarbon Laboratory under SUERC-9084.

Laboratory comment: Rafter Radiocarbon Laboratory (15 December 2007), *see* laboratory comment by Rafter Radiocarbon Laboratory under SUERC-9084.

References: Reimer *et al* 2004
Ward and Wilson 1978

UB–5212 2176 ±16 BP

$\delta^{13}C$: -20.6 ±0.2‰
$\delta^{13}C$ (diet): -20.1 ±0.1‰
$\delta^{15}N$ (diet): +9.6 ±0.3‰
C/N ratio: 3.3

Sample: Beckford-65785, submitted in August 2005 by J Wills

Material: human bone (310g) (right femur and tibia) (A Grieve 2006)

Initial comment: replicate of SUERC-9090

Objectives: as SUERC-9090

Calibrated date: *1σ:* 350–195 cal BC
2σ: 355–170 cal BC

Final comment: see SUERC-9090

Laboratory comment: English Heritage (31 October 2007), the two measurements on this skeleton (SUERC-9090 and UB-5215) are statistically consistent (T′=1.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (2183 ±15 BP), which calibrates to 360–175 cal BC (Reimer *et al* 2004). *See* SUERC-9090 for laboratory comment on the stable isotopes measurements.

References: Reimer *et al* 2004
Ward and Wilson 1978

UB–5213 2015 ±20 BP

$\delta^{13}C$: -20.7 ±0.2‰
$\delta^{13}C$ (diet): -20.3 ±0.1‰
$\delta^{15}N$ (diet): +11.9 ±0.3‰
C/N ratio: 3.3

Sample: Beckford-65168, submitted in August 2005 by J Wills

Material: human bone (300g) (left femure and tibia) (A Grieve 2006)

Initial comment: replicate of SUERC-9088

Objectives: as SUERC-9088

Calibrated date: *1σ:* 45 cal BC–cal AD 20
2σ: 55 cal BC–cal AD 55

Final comment: see SUERC-9088

Laboratory comment: English Heritage (31 October 2007), the two measurements (SUERC-9088 and UB-5213) on this skeleton are statistically consistent (T′=0.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (2007 ±17 BP), which calibrates to 50 cal BC–cal AD 55 (Reimer *et al* 2004). *See* SUERC-9088 for laboratory comment on the stable istopes measurements.

References: Reimer *et al* 2004
Ward and Wilson 1978

Beckford: pollen core, Worcestershire

Location: SO 984364
Lat. 52.01.34 N; Long. 02.01.29 W

Project manager: J Wills (Archaeology Service, Gloucestershire County Council)

Archival body: Worcestershire County Museum

Description: a peat deposit beside the Carrant Brook. The top and bottom have previously been dated. The section is *c* 1m deep and there are results from pollen, seeds, and beetles that show the development of the landscape of the vale of Evesham since the Bronze Age.

Objectives: the top and bottom have already been dated using bulk sediment. The aim is to fill in the gaps with AMS dates and to test the original dates (HAR-3624; 1000 ±70 BP; cal AD 890–1210; Reimer *et al* 2004) and HAR-3954; 3750 ±110 BP; 2480–1880 cal BC; Reimer *et al* 2004).

References: Greig and Colledge forthcoming
Reimer *et al* 2004

OxA–14939 1606 ±31 BP

$\delta^{13}C$: -28.3‰

Sample: BD1 0.85m, submitted in February 2006 by J Greig

Material: waterlogged plant macrofossils: *Carex* subgen *Carex*; *Apium* cf *nodiflorum*; *Prunus/Crataegus* sp., thorn; *Urtica dioica*; *Ranunculus flammula*, *Ranunculus* sect. *Ranunculus*, *Chenopodium* sp., *Rorippa* sp. (waterlogged seeds), *Rosa/Rubus* thorn (J Greig 2005)

Initial comment: layers of peaty sediment at a depth of 0.85m from the ground surface. Material may be calcareous; samples were kept in a cold store in monolith tins sealed in polythene bags for 29 years after excavation.

Objectives: the three samples submitted, together with the two dates already obtained, aim to date the pollen profile at even intervals. This should allow a time/depth graph to be plotted. The pollen results can then hopefully be compared with those from the excavation of the adjacent area.

Calibrated date: *1σ:* cal AD 410–540
2σ: cal AD 390–550

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

OxA–14940 1821 ±32 BP

$\delta^{13}C$: -25.1‰

Sample: BD1 1m (A), submitted in February 2006 by J Greig

Material: waterlogged plant macrofossils (0.01g): *Carex* subgen *Carex*, *Cirisum* cf *palustre*, one seed; *Ranunculus sceleratus*, two seeds; *Apium* cf *nodiflorum*, *Ranunculus* sect. *Ranunculus,* seven seeds*; Chenopodium* sp., *Conium maculatum*, one seed; *Rorippa* sp., *Rosa/Rubus* one thorn (J Greig 2005)

Initial comment: the material may be calcareous. The main sample is of plant material.

Objectives: as OxA-14939

Calibrated date: *1σ:* cal AD 130–250
2σ: cal AD 80–320

Final comment: J Wills and P Marshall (31 October 2007), the result is in agreement with the expected date for the sample.

OxA–14941 2083 ±33 BP

$\delta^{13}C$: -25.1‰

Sample: BD1 1.15m, submitted in February 2006 by J Greig

Material: waterlogged plant macrofossil: *Carex* subgen *Carex*, seven seeds; *Eleocharis* sp., two seeds; *Urtica dioica*, one seed; *Ranunculus sceleratus*, two seeds; *Ranunculus* sect. *Ranunculus*, seven seeds*; Potentilla anserine,* one seed; *Aphanes* sp., one seed; Lamiaceae, one seed (J Greig 2005)

Initial comment: layer of peaty sediment.

Objectives: as OxA-14939

Calibrated date: *1σ:* 170–40 cal BC
2σ: 200 cal BC–cal AD 1

Final comment: J Wills and P Marshall (31 October 2007), the result is slightly earlier than might have been expected, given the pollen spectra.

Berinsfield: Mount Farm, Oxfordshire

Location: SU 584968
Lat. 51.39.59 N; Long. 01.09.20 W

Project manager: G Lambrick (Oxford Archaeology), 1977–8

Archival body: The Ashmolean Museum, Oxford

Description: the site was first recognised as a series of crop marks (barrow ditch, gullies, pits, and ditched enclosures) in the 1930s and partially excavated by Myres in 1933 (Myres 1937). The Oxford Archaeological Unit excavated the site on a much larger scale in advance of gravel extraction in 1977–8 (financed by Amey Roadstone Corporation, the Manpower Services Commission, and the Department of the Environment). The excavations revealed a multi-period site that spans the Neolithic to Saxon periods. Neolithic activity is represented by pit deposits, a scatter of lithic material, and a middle Neolithic oval barrow with a burial accompanied by a group of flint blades. This barrow contained a secondary Beaker burial. Probably also of Neolithic date is a timber post-ring, although much smaller than site 3, to the south (Whittle *et al* 1992). Bronze Age activity is concentrated around a round barrow. No central grave was found, although the barrow contained a series of secondary burials comprising inhumations and Deverel-Rimbury cremations. Later Bronze Age activity is represented by a field system aligned on the barrow, a waterhole cut through the silted barrow ditch, and a burnt mound deposit. A late Bronze Age ploughsoil, stratified within the barrow ditch and cut by a middle Iron Age gully, seals the waterhole.

The conversion of the land to arable was followed by the development of an early Iron Age settlement comprising a pit scatter. The storage pits had been reused for the disposal of rubbish and some contained placed deposits of articulated animal bone and human burials. In the middle Iron Age, a house enclosure and yard defined by ditches were constructed adjacent to the earlier pit scatter. Associated with this phase are a series of curvilinear gullies, the beginnings of a rectilinear field or paddock system, and a series of waterholes. This field system and excavation of further waterholes appear to have continued into the Roman period. Traces of early Saxon domestic activity including wells, may indicate more extensive settlement in the area possibly associated with the contemporary cemetery at Wally Corner 1km to the south. The four samples of human bone and a boar's tusk were submitted for dating to add further precision to two radiocarbon measurements obtained in 1981, and to take advantage of the smaller sample size required by Accelerator Mass Spectrometry (AMS).

Objectives: to further refine the absolute chronology provided by a series of radiocarbon measurments obtained in 1981 (HAR-4673 and HAR-4792; *see* below).

Final comment: P Marshall (8 November 2007), the results show that the measurements obtained in 1981 were accurate, and contribute to a fuller understanding of the chronological use of the site.

References: Lambrick forthcoming
Myres 1937
Whittle *et al* 1992

OxA–15747 3814 ±34 BP

$\delta^{13}C$: -20.9 ±0.3‰
$\delta^{15}N$ (diet): +11.0 ±0.3‰
C/N ratio: 3.2

Sample: BERMF618 (1), submitted on 21 March 2005 by A Barclay

Material: human bone (right tibia) (C Boston 2005)

Initial comment: single articulated inhumation (adult female) in a grave cut. Secondary burial within an oval barrow, found with a Beaker and two perforated boar tusks. The grave was cut into natural free-draining gravel (second terrace).

Objectives: to establish the date of the burial. A previous date obtained for this burial 2470–1770 cal BC (HAR-4792; 3710 ±110 BP) is broadly as expected but has a large error term. The second date should be more precise and allow for a more exact placement of the burial and its associated grave goods within the regional sequence of Beaker graves. A date within the period 2250–1950 cal BC is most likely.

Calibrated date: *1σ*: 2300–2200 cal BC
2σ: 2440–2140 cal BC

Final comment: P Marshall (8 November 2007), the result is as expected.

Laboratory comment: English Heritage (8 November 2007), the two measurements on the human bone (OxA-15747 and HAR-4792) are statistically consistent (T′=0.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and so a weighted mean may be calculated (3805 ±32 BP), which calibrates to 2350–2130 cal BC (Reimer *et al* 2004).

Laboratory comment: Oxford Radiocarbon Accelerator Unit (20 July 2006), this sample produced a low yield (8.0mg from 800mg starting weight). This is below our threshold of 1% weight collagen usually accepted for accurate dating.

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15748 4738 ±35 BP

$\delta^{13}C$: -20.9 ±0.3‰
$\delta^{15}N$ (diet): +11.5 ±0.3‰
C/N ratio: 3.2

Sample: BERFM602, submitted on 31 March 2005 by A Barclay

Material: human bone (left femoral shaft fragment) (C Boston 2005)

Initial comment: single articulated inhumation (adult male) within a grave near the centre of an oval barrow. Found with a group of flint blades. The grave was cut into natural free draining gravel (second terrace).

Objectives: to confirm the middle Neolithic date of this burial and provide a date for the primary use of the oval barrow. A previous date of 3500–2880 cal BC (HAR-4673; 4450±100 BP) has been obtained for this burial and a second determination should provide a more precise date.

Calibrated date: *1σ*: 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: P Marshall (8 November 2007), the result provides a date in line with what would be expected for a primary inhumation in an oval barrow.

Laboratory comment: English Heritage (8 November 2007), two measurements were made on bone from burial 602 (OxA-15748 and HAR-4673). These two dates are not statistically consistent (T′=7.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978). Although either measurement could be a statistical outlier, improvements in pre-treatment of bone (Bronk Ramsey *et al* 2004a) means that the measurement from the Oxford laboratory is more likely to be accurate.

References: Bronk Ramsey *et al* 2004a
Ward and Wilson 1978

OxA–15785 3372 ±38 BP

$\delta^{13}C$: -21.0 ±0.3‰
$\delta^{15}N$ (diet): +12.0 ±0.3‰
C/N ratio: 3.2

Sample: BERMF178, submitted on 21 March 2005 by A Barclay

Material: human bone (C Boston 2005)

Initial comment: secondary infant (neonatal) burial within round barrow, which was found with a miniature Deverel-Rimbury style urn. The burial is within a grave cut and forms part of a cemetery group that should belong to the middle Bronze Age. The grave was cut into natural free-draining gravel (second terrace).

Objectives: to establish the date of the burial. It is likely that the burial belongs to a phase of secondary burial within the barrow that is thought to have taken place during the middle Bronze Age.

Calibrated date: *1σ*: 1740–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: P Marshall (8 November 2007), this result is a little earlier than might be expected.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (20 July 2006), this sample produced a low yield of gelatin (8.1mg from 520mg bone) and is therefore beneath our threshold of 10mg gelatin. In addition, it had a low target current on the AMS, which is why its standard error is slightly higher than usual.

OxA–15786 3359 ±32 BP

$\delta^{13}C$: -19.8‰
$\delta^{15}N$ (diet): +9.8 ±0.3‰
C/N ratio: 3.1

Sample: BERMF177, submitted on 21 March 2005 by A Barclay

Material: human bone (left tibia) (C Boston 2005)

Initial comment: this sample came from a secondary burial of an eight-year-old child, within the round barrow. The burial is within a grave cut. The burial is one of a group that should belong to the middle Bronze Age. The grave was cut into natural free-draining gravel (second terrace).

Objectives: to establish the date of the burial. It is likely that the burial belongs to a phase of secondary burial within the barrow that is thought to have taken place during the middle Bronze Age. However, the burial could belong with the Neolithic features (pit 160 and post rings) that were enclosed by the barrow ditch.

Calibrated date: *1σ*: 1690–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: P Marshall (8 November 2007), the result confirms the date of the secondary phase of burial activity associated with the barrow.

OxA–15787 3835 ±32 BP

$\delta^{13}C$: -20.6 ±0.3‰
$\delta^{15}N$ (diet): +8.6 ±0.3‰
C/N ratio: 3.1

Sample: BERMF618(2), submitted on 21 March 2005 by A Barclay

Material: animal bone (boar's tusk) (C Boston and A Barclay 2005)

Initial comment: one of a pair of perforated and possibly polished boar tusks found as placed grave goods with an articulated inhumation within a grave cut. The grave was cut into natural free-draining gravel (second terrace).

Objectives: the tusks are likely to be the same date as or older than (curated items) the burial. A radiocarbon date on one of the tusks will establish this. Curated items (artefacts and human bone) are a feature of some Beaker/early Bronze Age graves and a date for this artefact will allow comparison with the date of the burial. The result will aid the understanding of Beaker/early Bronze Age ritual-funerary practices.

Calibrated date: *1σ*: 2350–2200 cal BC
2σ: 2460–2150 cal BC

Final comment: P Marshall (8 November 2007), the result suggests that the boar tusk is probably contemporary with the inhumation.

Laboratory comment: English Heritage (8 November 2007), three measurements were made on human bone (replicates OxA-15747 and HAR-4792) and a boar tusk (OxA-15787) from this grave. All three dates are statistically consistent (T'=1.2; T'(5%)=6.0; ν=2; Ward and Wilson 1978) and therefore the human burial and boar tusk could be of the same actual age.

References: Ward and Wilson 1978

Bestwall Quarry, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Description: excavations at this 55ha gravel quarry have uncovered a multiperiod landscape during a 13-year 'rescue' archaeology project. Features date from the early Mesolithic to the post-medieval period and comprise field systems, droveways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best represented periods are middle Bronze Age, late Bronze Age, Roman, and Saxon.

Objectives: the scientific dating programme was designed to answer a series of fundamental questions regarding human activity at Bestwall. It was hoped to date the construction, use, and abandonment of the field/enclosure systems and to determine whether the structural remains within those field systems were contemporary, or otherwise, with their use. In addition, it was hoped to date the sequence and construction of a series of middle and late Bronze Age houses and their associated occupation. It was hoped to date the deposition and accumulation of a peat deposit in order to understand the development of the associated landscape and to correlate the environmental data with the archaeological evidence. A further objective of the dating programme was to date a henge complex where cultural material spanned the early Neolithic to the middle Bronze Age. Archaeobotanical samples were submitted to determine the period of cultivation of oats. A major objective was to confirm the period of use of the charcoal pits and metalworking activity and to provide absolute dating for this.

Final comment: L Ladle (20 September 2007), the absolute dating evidence for the chronology of the field systems was based on the artefactual evidence deposited in the ditches after their abandonment. It was possible to reconstruct their periods of use and to confirm that an early system was laid out in the sixteenth century cal BC and a second series of ditches were laid out in the later sixteenth century cal BC. The ditches were abandoned by the beginning of the fifteenth century cal BC. It was possible to date the series of middle and Bronze Age roundhouses and their associated activities across the site. The dating of the pollen sequence from the peat deposit has demonstrated that major environmental change involving extensive woodland clearance and the intensification of cereal cultivation was contemporary with the establishment of field systems and could be correlated with change rate of sedimentation within the peat deposit. The earliest dated feature on the site was a pit containing early Neolithic pottery. A segmented ditch belonging to a henge-type monument overlay this pit, but unfortunately no suitable dating material was available to date either this or its associated timber building. The cultivation of oats in the thirteenth century cal BC is confirmed. The dates of the charcoal pits and ironworking were found to be contemporary and took place from the end of the fifth century cal AD up until the ninth century cal AD.

Laboratory comment: English Heritage (8 December 2007), further radiocarbon dates from Bestwall Quarry are reported by Bayliss *et al* (2007a, 1–32).

References: Bayliss *et al* 2007a
Ladle and Woodward in press
Ladle forthcoming

Bestwall Quarry: central peat sequence, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project)

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multiperiod landscape during a 13-year 'rescue' archaeology project. Features date from the early Mesolithic to the post-medieval period and comprise field systems, droveways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best represented periods are middle Bronze Age, late Bronze Age, Roman, and Saxon. The peat deposit is approximately 20m wide and at least 50m long, with a depth of 2.7m, and was located in the central-south area of the site. The deposit is cut into the natural gravels. The samples in this series come from a long sequence in the central/deepest part of the deposit (2.32m deep).

Objectives: to understand the origins of the peat-filled depression and its subsequent vegetational history and local palaeo-environments. To examine and establish the rate of peat accumulation and the time depth of each pollen zone/vegetational layer.

References: Birks *et al* 1975
Scaife 2005
Scaife and Jones 1988

SUERC–7550 2780 ±40 BP

δ¹³C: -28.2‰

Sample: BQ 05 K central column (1.10–1m), submitted on 7 July 2005 by R Scaife

Material: waterlogged plant macrofossil (-1.07 – -0.97m OD *Crataegus* cf. *laevigata* (fruit stone)) (R Gale 2005)

Initial comment: the sample was obtained from a monolith column in the peat deposit at a depth of between 1.00–1.10m below the stripped surface. There was no evidence for disturbance or intrusion. The local geology was valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Eighteenth- to nineteenth-century field drains had been laid on top of the peat deposit. Approximately 0.5m of topsoil had been removed.

Objectives: the assessment of the pollen content of the peat deposit (Scaife 2005), and the inferred vegetational sequence, indicated a possible prehistoric date. At a different location the base of this deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP). The dated samples will help to determine the overall chronological range of the sediments and so help to confirm dating of the archaeological activity.

Calibrated date: *1σ:* 980–890 cal BC
2σ: 1020–820 cal BC

Final comment: L Ladle (20 September 2007), the determination fell into the late Bronze Age at the beginning of the phase for peak cereal production, but the pollen evidence showed a bias towards pastoral activity. This would accord with the sequence of late Bronze Age houses.

References: Reimer *et al* 2004
Scaife 2005

SUERC–7551 2575 ±35 BP

δ¹³C: -26.7‰

Sample: BQ 05 K central column (1.04m), submitted on 7 July 2005 by R Scaife

Material: waterlogged plant macrofossil (-1.01m OD): *Phragmites* (R Gale 2005)

Initial comment: the sample was obtained from a monolith column in the peat deposit at a depth of 1.04m (base of peat). The sample comprised sedge peat containing macrofossils. There was no evidence for disturbance or intrusion. The local geology was valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Eighteenth to nineteenth-century field drains had been laid on top of the peat deposit. Approximately 0.5m of topsoil had been removed.

Objectives: as SUERC-7550

Calibrated date: *1σ:* 800–760 cal BC
2σ: 810–590 cal BC

Final comment: see SUERC-7550

SUERC–7552 3395 ±35 BP

δ¹³C: -27.7‰

Sample: BQ 05 K central column (1.5m), submitted on 7 July 2005 by R Scaife

Material: waterlogged wood (-1.47m OD): *Alnus glutinosa*, single fragment (R Gale 2005)

Initial comment: the sample was obtained from a monolith column in the peat deposit at a depth of 1.50m below the stripped surface. There was no evidence for disturbance or intrusion. The local geology was valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Eighteenth to nineteenth-century field drains had been laid on top of the peat deposit. Approximately 0.5m of topsoil had been removed.

Objectives: the assessment of the pollen content of the peat deposit (Scaife 2005), and the inferred vegetational sequence, indicated a possible prehistoric date for laying down of the peat. Approximately 2m away from this sample, the base of the original core was dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The dated samples will help determine the overall chronological range and help confirm the dating of the archaeological activity. In addition, the peat sequence will help clarify the pollen sequence.

Calibrated date: *1σ:* 1750–1630 cal BC
2σ: 1770–1610 cal BC

Final comment: L Ladle (20 September 2007), this sample from the boundary of pollen zones 3 and 4 dates the change in sedimentation rate for the infill of the peat deposit.

References: Reimer *et al* 2004
Scaife 2005

SUERC–7553 3780 ±40 BP

δ¹³C: -27.5‰

Sample: BQ 05 K central column (2m), submitted on 7 July 2005 by R Scaife

Material: waterlogged wood (-1.97m OD): *Alnus glutinosa*, single fragment (R Gale 2005)

Initial comment: the sample was obtained from a monolith column in the peat deposit at a depth of 2m below the stripped surface. There was no evidence for disturbance or intrusion. The local geology was valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Eighteenth to nineteenth-century field drains had been laid on top of the peat deposit. Approximately 0.5m of topsoil had been removed.

Objectives: as SUERC-7552

Calibrated date: *1σ:* 2290–2130 cal BC
2σ: 2340–2040 cal BC

Final comment: L Ladle (20 September 2007), the determination of the sample from pollen zone 2 places it in the late Neolithic/early Bronze Age periods when woodland was dominant but with evidence for probable human interference resulting in minor clearances. This phase equates with the construction of the ditched enclosure and associated mortuary structure.

References: Scaife 2005

SUERC–7554 3885 ±35 BP

$\delta^{13}C$: -29.5‰

Sample: BQ 05 K central column (2.38m a), submitted on 7 July 2005 by L Ladle

Material: waterlogged wood (-2.35m OD): Pomoideae, *Sorbus* group, single fragment (R Gale 2005)

Initial comment: the sample was obtained from a monolith column in the peat deposit at a depth of 2.38m (base of peat). The sample comprised sedge peat containing macrofossils. There was no evidence for disturbance or intrusion. The local geology is valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Eighteenth- to nineteenth-century field drains had been laid on top of the peat deposit. Approximately 0.5m of topsoil had been removed.

Objectives: as SUERC-7552

Calibrated date: 1σ: 2470–2290 cal BC
2σ: 2480–2200 cal BC

Final comment: L Ladle (20 September 2007), the determinations secured the dating of the inception of the peat deposition to the late Neolithic period. The results also date the start of pollen zone 1. The vegetation consisted of woodland with small-leaved lime, ash, oak, and hazel.

Laboratory comment: English Heritage (2007), the two measurements from this level are statistically consistent (SUERC-7554–5; $T' = 3.3$; $T'(5\%) = 3.8$; $\nu = 1$; Ward and Wilson 1978); the weighted mean (3840 ±25 BP; 2460–2200 cal BC; Reimer *et al* 2004) is the best estimate of the radiocarbon age of the level in the peat column.

References: Birks *et al* 1975
Birks 1989
Godwin 1975
Greig 1982
Moore 1977
Reimer *et al* 2004
Scaife 1980
Scaife 2005
Sidell *et al* 2000
Ward and Wilson 1978

SUERC–7555 3795 ±35 BP

$\delta^{13}C$: -28.1‰

Sample: BW 05 K central column (2.38m B), submitted on 7 July 2005 by R Scaife

Material: waterlogged wood (-2.35m OD): *Alnus glutinosa*, single fragment (R Gale 2005)

Initial comment: as SUERC-7554

Objectives: as SUERC-7554

Calibrated date: 1σ: 2290–2140 cal BC
2σ: 2350–2130 cal BC

Final comment: L Ladle (20 September 2007), this sample came from the base of the peat deposit and belonged to, and dated, the earliest sediments as well as the pollen sequence.

SUERC–8158 2500 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: BQ 05 K 609 (0.90–1m), submitted on 20 September 2005 by L Ladle

Material: waterlogged plant macrofossil (-0.87 – -0.97m OD): *Phragmites*, horizontally-bedded leaf (R Gale 2005)

Initial comment: the sample comes from a depth of 0.90–1m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP). The sample will date the top sequence of peat.

Calibrated date: 1σ: 770–540 cal BC
2σ: 790–410 cal BC

Final comment: L Ladle (20 September 2007), the sample from the top of pollen zone 4 correlated with a peak in cereal production at the end of the late Bronze Age which continued into the early Iron Age.

References: Reimer *et al* 2004

SUERC–8159 3755 ±40 BP

$\delta^{13}C$: -27.5‰

Sample: BQ 05 K 671 1.8–1.9m, submitted on 20 September 2005 by L Ladle

Material: waterlogged plant macrofossil (-1.77 – -1.87m OD): *Corylus avellana*, nutshell (R Gale 2005)

Initial comment: the sample comes from a depth of between 1.80m and 1.90m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample is at the bottom of pollen zone 2 and sits above the lime decline and should confirm this event.

Calibrated date: 1σ: 2270–2060 cal BC
2σ: 2300–2030 cal BC

Final comment: L Ladle (20 September 2007), the sample is of the anticipated date and confirms the lime decline.

References: Andersen 1970
Andersen and Birks 1975
Godwin 1940
Godwin 1956
Godwin 1975
Haskins 1978
Reimer *et al* 2004
Scaife 1980
Scaife 2003
Sidell *et al* 2000
Turner 1962
Waller 1994
Waton 1983

SUERC–8160 3325 ±35 BP

$\delta^{13}C$: -27.8‰

Sample: Main profile. BQ 05 K 1.34m, submitted on 27 September 2005 by L Ladle

Material: waterlogged plant macrofossil (1.34m; -1.31m OD, *Rosa/Rubus* sp.) (R Gale 2005)

Initial comment: the sample comes from a depth of 1.34m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample lies just above the oak forest decline, that is, the base of zone 3 and will confirm or otherwise the date of this event.

Calibrated date: *1σ:* 1670–1530 cal BC
2σ: 1730–1510 cal BC

Final comment: L Ladle (27 September 2005), this sample was on the transition between pollen zones 3 and 4 and confirms the dramatic oak forest decline at the end of the early Bronze Age.

References: Reimer *et al* 2004

SUERC–8161 3355 ±35 BP

$\delta^{13}C$: -27.6‰

Sample: BQ 05 K 643 (1.35–1.36m), submitted on 27 September 2005 by L Ladle

Material: waterlogged plant macrofossil (-1.32 – -1.33m OD): *Prunus* sp., single fragment (R Gale 2005)

Initial comment: the sample comes from a depth of 1.35m to 1.36m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample lies above the postulated ‘oak decline’ and above the major deforestation phase. The sample will check whether or not there is a hiatus in the sequence.

Calibrated date: *1σ:* 1690–1610 cal BC
2σ: 1750–1520 cal BC

Final comment: L Ladle (20 September 2007), it was confirmed that the sample lay above the start of the oak decline and that there was no hiatus in the sequence.

References: Reimer *et al* 2004

SUERC–8162 3655 ±40 BP

$\delta^{13}C$: -29.9‰

Sample: BQ 05K 672 (1.91–1.92m), submitted on 20 September 2005 by L Ladle

Material: waterlogged wood (-1.88 – -1.89m OD): Pomoideae, twig (R Gale 2005)

Initial comment: the sample came from a depth between 1.91–1.92m from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Eighteenth- and nineteenth-century ceramic land drains had been laid on top of the peat deposit. The sample was permanent waterlogged. Approximately 0.5m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 280–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample lies on the pollen zone half boundary at the lime decline and should confirm this event.

Calibrated date: *1σ:* 2130–1950 cal BC
2σ: 2150–1910 cal BC

Final comment: see SUERC-8159

References: Reimer *et al* 2004

SUERC–8166 3360 ±35 BP

$\delta^{13}C$: -29.0‰

Sample: BQ 05 K 645 (1.40m), submitted on 20 September 2005 by L Ladle

Material: waterlogged wood (-1.37m OD): Pomoideae, twig (R Gale 2005)

Initial comment: the sample comes from a depth of 1.40m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample lies at the start of the major (oak) woodland decline and above the major deforestation phase.

The sample will check whether or not there is a hiatus in the sequence.

Calibrated date: *1σ*: 1690–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: L Ladle (20 September 2007), the determination confirms that the sample lay in pollen zone 3 and that there was major woodland clearance at this time with a change to an open agricultural landscape which was initially pasture.

References: Reimer *et al* 2004

SUERC–8845 2755 ±40 BP

δ¹³C: -27.5‰

Sample: BQ 05 K 642 (1.10–1.2m), submitted on 20 September 2005 by L Ladle

Material: waterlogged plant macrofossil (-1.07 – 1.17m OD): *Phragmites*, stem (R Gale 2005)

Initial comment: the sample comes from a depth of 1.10–1.20m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample will date the start and increase in cereals and the change from pasture to arable.

Calibrated date: *1σ*: 970–830 cal BC
2σ: 1010–810 cal BC

Final comment: L Ladle (20 September 2007), the date confirms an increase in cereal production at the end of the late Bronze Age, which lasted some 300 to 400 years.

References: Reimer *et al* 2004

SUERC–8863 1340 ±50 BP

δ¹³C: -26.6‰

Sample: BQ 05 K 604 (0.40–0.50m), submitted on 20 September 2005 by L Ladle

Material: waterlogged plant macrofossil (-0.37 – -0.47m OD): *Phragmites*, single fragment (R Gale 2005)

Initial comment: the sample comes from a depth of 0.40m–0.50m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample lies at the decline/regression of the cereal expansion and dating will confirm or otherwise this assumption.

Calibrated date: *1σ*: cal AD 650–690
2σ: cal AD 610–780

Final comment: L Ladle (20 September 2007), the determination confirmed that the sample was of early Saxon date and belonged to pollen zone 5 and confirms the decline/regression of cereals.

References: Reimer *et al* 2004

Bestwall Quarry: charcoal-filled pits, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project)

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multiperiod landscape during a 13-year 'rescue' archaeology project. Features date from the early Mesolithic to the post-medieval period and comprise field systems, droveways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle Bronze Age, late Bronze Age, Roman, and Saxon. The site has produced 1089 pits, whose widths varied from 0.1 to 3.6m and whose depths varied between 0.01m–0.60m. The pits varied in shape from sub-rectangular to circular and generally consisted of a basal layer of charcoal and an upper layer of soil, often containing charcoal pieces. Some pits did not have a defined charcoal layer. A number of pits produced Bronze Age, Iron Age, and Roman pottery. Prehistoric worked flint was found in more than half of the pits. These features could belong to one or more periods and some could be medieval.

Objectives: to discover whether the charcoal-filled pits are of a single period and if so which, or whether they date from several periods.

Final comment: L Ladle (20 September 2007), the series of 51 determinations from 27 charcoal-filled pits confirmed that charcoal burning activity began in the post-Roman period and had ceased by the late ninth century AD. There appeared to be a concentrated phase of activity in the seventh and eighth centuries. Ceramic material which was originally used to date the pits must therefore have been either residual or intrusive. The robust dates for these features give good confirmation of Saxon charcoal burning activities in features which were otherwise very difficult to date.

References: Cox and Hearne 1991
Ladle forthcoming

GrA–28482 1455 ±35 BP

δ¹³C: -25.7‰

Sample: BQ 04 L 316 (2), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: an oval pit with two fills. The lower fill (315) comprised a dark brown sandy loam with charcoal flecks. Three large pieces of iron slag weighing 13.02g were on the burnt base of the pit. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravelly sand and was approximately 0.40m below present ground surface.

Objectives: contribute towards the dating of the charcoal pits. This pit had three very large pieces of iron slag and would establish a date and association with metalworking on other parts of the site.

Calibrated date: 1σ: cal AD 570–650
2σ: cal AD 540–660

Final comment: L Ladle (20 September 2007), the determination for the pit falls into the later post-Roman period and before the main phase of middle Saxon activity. The presence of large pieces of slag confirms that iron working was contemporary with the use of this charcoal pit.

Laboratory comment: English Heritage (20 November 2007), two measurements (GrA-28482 and SUERC-6931) from this feature produced statistically consistent results (T'=1.2; T'(5%)=3.8; ν=1; Ward and Wilson 1978). A third sample from this feature (BQ 04 L 316 (1) failed.

References: Ward and Wilson 1978

GrA–29006 1310 ±35 BP

$\delta^{13}C$: -24.8‰

Sample: BQ 04 K 563 A (256), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Ilex aquifolium*, single fragment (R Gale 2005)

Initial comment: from an oval pit with steep sides and a flat base. There were two fills and the charcoal was collected from the bottom of the upper fill. This fill comprised a dark brown sandy loam. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravelly sand and was approximately 0.40m below the present ground surface.

Objectives: to contribute towards the dating of the charcoal pits.

Calibrated date: 1σ: cal AD 660–770
2σ: cal AD 650–780

Final comment: L Ladle (20 September 2007), this pit dates to the main period of middle Saxon activity.

GrA–29008 1300 ±35 BP

$\delta^{13}C$: -22.9‰

Sample: BQ 03 L 204A (168), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2005)

Initial comment: from an oval pit with steep sides and a flat base, with evidence of burning on the base. The fill comprised a mid-brown sandy loam with charcoal lumps and discrete lenses and pockets of charcoal. Twelve sherds of Roman pottery weighing 31g were retrieved from the fill. There was no intrusion or residuality. Local geology is valley gravels overlain by sandy acidic subsoil and topsoils. The pit was cut into gravel and was approximately 0.40m below present ground surface.

Objectives: as GrA-29006

Calibrated date: 1σ: cal AD 660–770
2σ: cal AD 650–780

Final comment: L Ladle (20 September 2007), this pit dates to the main period of middle Saxon activity, despite the presence of a relatively high number of Roman pottery sherds, which must have been residual.

GrA–29009 1295 ±35 BP

$\delta^{13}C$: -27.7‰

Sample: BQ 04 L 250A, submitted on 4 February 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2005)

Initial comment: from a very large oval pit with steep sides and a flat base. The lower fill (250) comprised a dense layer of charcoal. There were no finds. There was no intrusion or residuality. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravelly sand and was approximately 0.40m below present ground surface.

Objectives: as GrA-29006

Calibrated date: 1σ: cal AD 660–780
2σ: cal AD 650–780

Final comment: L Ladle (20 September 2007), this pit falls into the main period of middle Saxon activity.

SUERC–5839 1385 ±35 BP

$\delta^{13}C$: -26.3‰

Sample: BQ 03 L 204B (168), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2005)

Initial comment: as GrA-29008

Objectives: as GrA-29006

Calibrated date: 1σ: cal AD 640–670
2σ: cal AD 600–680

Final comment: L Ladle (20 September 2007), this pit dates to the earliest period of Saxon occupation of Dorset.

SUERC–5840 1250 ±35 BP

$\delta^{13}C$: -24.9‰

Sample: BQ 04 K 563B (256), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, *c* 11 growth rings, single fragment (R Gale 2005)

Initial comment: from an oval pit with steep sides and a flat base. There were two fills and charcoal was located from the bottom of the fill. The fill comprised a dark sandy loam.

There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravelly sand and was approximately 0.40m below present ground surface.

Objectives: as GrA-29006

Calibrated date: *1σ*: cal AD 680–810
2σ: cal AD 660–890

Final comment: L Ladle (20 September 2007), the pit falls within the main period of middle Saxon activity.

SUERC–5841 1215 ±35 BP

δ¹³C: -25.0‰

Sample: BQ 04 L 250B, submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2005)

Initial comment: as GrA-29009

Objectives: as GrA-29006

Calibrated date: *1σ*: cal AD 720–890
2σ: cal AD 680–900

Final comment: L Ladle (20 September 2007), the pit falls in the latest phase of charcoal burning activity.

SUERC–6931 1510 ±35 BP

δ¹³C: -25.9‰

Sample: BQ 04 L 316 (3), submitted on 4 March 2005 by L Ladle

Material: grain: *Avenena* sp., carbonised (W Carruthers 2005)

Initial comment: as GrA-28482

Objectives: as GrA-28482

Calibrated date: *1σ*: cal AD 530–600
2σ: cal AD 430–640

Final comment: L Ladle (20 September 2007), only four charcoal pits were bulk sampled and all produced grain-rich assemblages. There is no reason to suppose that other charcoal pits would have been different. The oat grain from this pit (L 316) had been processed and was indicative of either waste food or fodder. The post-Roman date implies organised agricultural activity at this time.

Laboratory comment: see GrA-28482

Bestwall Quarry: charred plants, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multi-period landscape during a 13-year 'rescue' archaeology programme. Features date from the early Mesolithic to the post-medieval period and comprise field systems, drove ways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle and late Bronze Age, Roman, and Saxon. This series consist of three samples of oats from middle Bronze Age contexts (ditch fills).

Objectives: to confirm (or otherwise) that oats were introduced and in cultivation in the middle Bronze Age.

Final comment: L Ladle (20 September 2007), the oat grain from pit K79 was dated to 1410-1130 cal BC (SUERC-6152) and provided an early record for south-east Dorset but as no chaff fragments were identified it was not possible to be certain whether wild or cultivated oats were preserved. By the Iron Age, oats were part of the arable regime at Bestwall. The determination from ditch segment L634 (SUERC-6153) dated this oat grain to the post-Roman period.

References: Carruthers 2003
Ladle and Woodward in press

GrA–28217 115 ±45 BP

δ¹³C: -26.2‰

Sample: BQ 04 L 856C, submitted on 4 February 2005 by L Ladle

Material: grain (oat, carbonised, single grain) (W Carruthers 2004)

Initial comment: a segment of a ditch 1m long. The grain came from a soil sample from the second of five fills. This layer comprised a dark brown sandy loam with sparse charcoal pieces. In total 19 sherds of pottery weighing 171g were retrieved from this layer. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The segment was cut into gravel and was approximately 0.5m below present ground surface.

Objectives: to establish that wild (or cultivated) oats were established in the middle Bronze Age. Very few sites have produced this type of grain in the early prehistoric period. The only record is from the early Bronze Age at Montefiore, Southampton.

Calibrated date: *1σ*: cal AD 1680–1955*
2σ: cal AD 1660–1955*

Final comment: L Ladle (20 September 2007), the middle Bronze Age determination confirms that oats were grown during this period, but the lack of chaff precludes absolute categorical affirmation of oats as a crop; they may have been weed seeds.

SUERC–6152 3035 ±35 BP

δ¹³C: -25.3‰

Sample: BQ 04 K 80C, submitted on 4 March 2005 by L Ladle

Material: grain (oat, carbonised, single grain) (W Carruthers 2004)

Initial comment: from an oval shallow pit with a single fill. The fill comprised a very dark brown, almost black, sandy loam with much charcoal present. Four ceramic weights were in this pit. One of these was decorated.

There was no intrusion or residuality. The local geology in valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravel and was approximately 0.5m below present ground surface.

Objectives: as GrA-28217

Calibrated date: *1σ*: 1390–1260 cal BC
2σ: 1410–1130 cal BC

Final comment: see GrA-28217

Laboratory comment: see GrA-28480

References: Ladle and Woodward in press

SUERC–6153 1420 ±35 BP

δ¹³C: -24.8‰

Sample: BQ 04 L 634C, submitted on 4 March 2005 by L Ladle

Material: grain (oat, carbonised, single grain) (W Carruthers 2004)

Initial comment: from a segment of a ditch 1m long. The soil sample came from the second of five fills. This layer comprised a dark brown sandy loam containing charcoal and charcoal ash. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravel and was approximately 0.5m below present ground surface.

Objectives: as SUERC-6152

Calibrated date: *1σ*: cal AD 600–660
2σ: cal AD 570–670

Final comment: L Ladle (20 September 2007), the ceramic material in this ditch suggested that the oat grain would have a middle Bronze Age date. The determination falls within the late post-Roman period and the grain which came from the upper fills of the ditch, may have originated from agricultural activities in this field during that time. Oats were identified from two charcoal pits in this field, one of which (L314), SUERC-6931 yielded a broadly contemporary date.

Laboratory comment: English Heritage (20 November 2007), two statistically consistent measurements on short-lived charcoal fragments from this context (GrA-28472 and SUERC-5830; (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggest that this ditch is middle Bronze Age in date and this oat grain intrusive.

References: Ward and Wilson 1978

Bestwall Quarry: early Bronze Age ditches, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multi-period landscape during a 13-year 'rescue' archaeology programme. Features date from the early Mesolithic to the post-medieval period and comprise field systems, drove ways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle and late Bronze Age, Roman, and Saxon. This series consist of sherds with residues from two early Bronze Age ditches.

Objectives: to date the construction, use, and abandonment of the field systems. Artefactual evidence has currently dated two of the ditches to the early Bronze Age.

References: Ladle *et al* 2004

GrA–29544 2690 ±40 BP

δ¹³C: -28.5‰

Sample: BQ 97F 371, submitted on 1 August 2005 by L Ladle

Material: carbonised residue (internal)

Initial comment: from a "U"-shaped ditch segment with very steep sides and a flat base. The fill comprised a mid-brown sandy loam with infrequent charcoal flecks, pottery, and scarce burnt flint. There was no intrusion or residuality. It is a part of ditch F179. The local geology was valley gravel overlain by sandy acidic subsoils and topsoils. The feature was cut into sandy gravel and was approximately 0.35m from the present ground surface. There was no disturbance.

Objectives: to establish the period of use and subsequent abandonment of the early Bronze Age ditches, the pre-cursors of the later, middle Bronze Age field system.

Calibrated date: *1σ*: 900–800 cal BC
2σ: 920–790 cal BC

Final comment: L Ladle (20 September 2007), ceramics spanning the early to late Bronze Age confirm the multi-phasing of ditch F179, the determination placing the sherd in the late Bronze Age agrees with the longevity of this feature in the landscape.

OxA–15105 3132 ±28 BP

δ¹³C: -26.5‰

Sample: BQ 2000 S350, submitted on 1 August 2005 by L Ladle

Material: carbonised residue (internal, Middle Bronze Age)

Initial comment: from a "U"-shaped ditch segment with a moderately steep side and a slightly rounded base. The fill comprised a light brown sandy loam with a deposit of raw clay. Pottery and burnt flint were present. The local geology was valley gravel overlain by sandy, acidic subsoils and topsoils. The feature was cut into sandy gravel and was approximately 0.35m from the present ground surface. There was no disturbance.

Objectives: as GrA-29544

Calibrated date: *1σ*: 1440–1390 cal BC
2σ: 1460–1320 cal BC

Final comment: L Ladle (20 September 2007), this sherd from the upper fill of the ditch provided a *terminus post quem* for the disuse of the later ditch system.

OxA–15124 3352 ±37 BP

δ¹³C: -28.9‰

Sample: BQ 97F 240, submitted on 1 August 2005 by L Ladle

Material: carbonised residue (internal)

Initial comment: from a "U"-shaped ditch segment with very steep sides and a flat base. The fill comprised a dark brown sandy loam containing pottery, burnt flint, and heathstone. There was no intrusion or residuality. It is a part of ditch F179. The local geology was valley gravel overlain by sandy, acidic subsoils and topsoils. The feature was cut into sandy gravel and was approximately 0.35m from the present ground surface. There was no disturbance.

Objectives: as GrA-29544

Calibrated date: 1σ: 1690–1610 cal BC
2σ: 1750–1520 cal BC

Final comment: L Ladle (20 September 2007), the determination of the sherd supported the view that the ditch was laid out in the latter part of the early Bronze Age.

OxA–15125 3255 ±31 BP

$\delta^{13}C$: -27.2‰

Sample: BQ 97F 238, submitted on 20 September 2007 by L Ladle

Material: carbonised residue (internal)

Initial comment: from a "U"-shaped ditch segment with very steep sides and a flat base. The fill comprised a mid-dark brown sandy loam with pottery dispersed throughout. There was no intrusion or residuality. It is a part of ditch F179. The local geology was valley gravel overlain by sandy, acidic subsoils and topsoils. The feature was cut into sandy gravel and was approximately 0.35m from the present ground surface. There was no disturbance.

Objectives: as GrA-29544

Calibrated date: 1σ: 1610–1490 cal BC
2σ: 1620–1440 cal BC

Final comment: L Ladle (20 September 2007), the determination of the sherd falls within the early middle Bronze Age and can be used to date the abandonment of the first phase of the ditch.

Bestwall Quarry: House X and ditch, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project)

Archival body: Dorset County Museum

Description: a later Bronze Age house constructed over part of early Neolithic pit L577, the late Neolithic timber structure and a stock control ditch. The house probably took advantage not only of the natural hollow but also of the partially silted-up ditches of the mortuary enclosure. The gully of the house enclosed 17 postholes which formed a single ring for posts which supported the roof.

Objectives: to date the construction and use of House X.

References: Ladle and Woodward in press

GrA–28420 3040 ±35 BP

$\delta^{13}C$: -26.5‰

Sample: BQ 04 L 1003A (202), submitted on 2 March 2005 by L Ladle

Material: charcoal: Ericaceae, single fragment (R Gale 2004)

Initial comment: from an oval pit with gently sloping sides and a flat base which was associated with burnt flint spread (803) and lay to the side of, and underneath, this feature. The fill comprised a compacted burnt flint with much charcoal within the compaction. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravel and was approximately 0.50m below the ground surface. There was no disturbance.

Objectives: to contribute towards the dating of a possible henge complex and the various archaeological sequences associated with this. To establish the period of use of a burnt area, identified as a hearth in the centre of the complex and its phasing.

Calibrated date: 1σ: 1390–1260 cal BC
2σ: 1410–1130 cal BC

Final comment: L Ladle (20 September 2007), the charcoal was derived from a spread of burnt flint which was interpreted as part of a hearth and which was located in the centre of House X. The determination confirmed middle Bronze Age occupation of this structure.

GrA–28422 3235 ±35 BP

$\delta^{13}C$: -28.0‰

Sample: BQ 04 L 878A (234), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2004)

Initial comment: from a circular posthole with vertical sides and a rounded base. The fill comprised a mid-brown sandy loam with most of the charcoal near the top of the fill. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravelly sand and was approximately 0.50m from the ground surface.

Objectives: to contribute towards the dating of a possible henge complex and the various archaeological sequences associated with this. To establish the period of use of a sequence of postholes within a ditched enclosure.

Calibrated date: 1σ: 1530–1450 cal BC
2σ: 1610–1430 cal BC

Final comment: L Ladle (20 September 2007), the charcoal came from the fill of a posthole belonging to the ring of postholes which held structural timbers belonging to House X and confirms a middle Bronze Age date for that structure.

Laboratory comment: English Heritage (19 November 2007), this result is significantly earlier than a second measurement from this posthole 1420–1210 cal BC (SUERC-5828; 3045 ±35 BP), which may suggest that this charcoal fragment was residual.

GrA–28423 3065 ±40 BP

δ¹³C: -26.4‰

Sample: BQ 04 L 804A (201), submitted on 2 March 2005 by L Ladle

Material: charcoal: Ericaceae, single fragment (R Gale 2004)

Initial comment: from a very shallow, oval scoop with edges that are difficult to define. The fill comprised a mid-brown sandy loam with dense concentrations of burnt flint, within which were deposits of charcoal. Two sherds of pottery came from the fill. There was no intrusion or residuality. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravelly sand and was approximately 0.40m below the ground surface.

Objectives: as GrA-28420

Calibrated date: 1*σ*: 1410–1270 cal BC
2*σ*: 1430–1210 cal BC

Final comment: L Ladle (20 September 2007), the heather charcoal from the hearth sequence in the centre of House X confirms a middle Bronze Age date for the structure. The heather may have had a specific use as a short-action but high temperature fuel. *See* SUERC-5827.

GrA–28424 3125 ±35 BP

δ¹³C: -25.8‰

Sample: BQ 04 L 532A (212), submitted on 2 March 2004 by L Ladle

Material: charcoal: *Betula* sp., single fragment (R Gale 2005)

Initial comment: from a circular posthole with vertical sides, but a 'step' to the west and a flat base. The fill comprised a dark brown, charcoal-rich sandy loam. There was neither intrusion nor residuality. The local geology is valley gravels overlain with sandy acidic subsoils and topsoils. The feature was cut into gravel and was approximately 0.40m below the ground surface.

Objectives: to contribute towards the dating of a possible henge complex and the various archaeological sequences associated with this. To establish a period of use of a sequence of postholes within a ditched enclosure.

Calibrated date: 1*σ*: 1440–1380 cal BC
2*σ*: 1500–1310 cal BC

Final comment: L Ladle (20 September 2007), the charcoal came from the fill of a posthole belonging to the ring of postholes which held structural timbers belonging to House X and confirms a middle Bronze Age date for that structure.

GrA–28426 3165 ±40 BP

δ¹³C: -26.8‰

Sample: BQ 04 L 760A (228), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2004)

Initial comment: a sub-square posthole with vertical sides and a flat base. The fill comprised a grey silty sand with charcoal and small amounts of burnt and worked flint. There was no intrusion or residuality. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravely sand and was approximately 0.40m below the ground surface.

Objectives: to contribute towards the dating of a possible henge complex and the various archaeological sequences associated with this. To establish a period of use of a sequence of postholes within a ditched enclosure.

Calibrated date: 1*σ*: 1500–1410 cal BC
2*σ*: 1520–1320 cal BC

Final comment: L Ladle (20 September 2007), the sample from the fill of posthole L759 produced an early middle Bronze Age date and post-excavation analysis placed it with a series postholes belonging to animal pens and drafting gates which were associated with ditches and gullies used in the control and movement of stock.

SUERC–5822 3105 ±35 BP

δ¹³C: -27.8‰

Sample: BQ 04 L 532B (212), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Alnus* sp., single fragment (R Gale 2005)

Initial comment: as GrA-28424

Objectives: as GrA-28420

Calibrated date: 1*σ*: 1430–1320 cal BC
2*σ*: 1450–1290 cal BC

Final comment: see GrA-28424

SUERC–5823 3230 ±40 BP

δ¹³C: -25.4‰

Sample: BQ 04 L 760B (228), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2005)

Initial comment: as GrA-28426

Objectives: as GrA-28426

Calibrated date: 1*σ*: 1530–1440 cal BC
2*σ*: 1620–1420 cal BC

Final comment: see GrA-28426

References: Pryor 1996
Pryor 1998

SUERC–5827 3105 ±35 BP

δ¹³C: -25.3‰

Sample: BQ 04 L 804B (201), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2005)

Initial comment: as GrA-28423

Objectives: as GrA-28420

Calibrated date: 1*σ*: 1430–1320 cal BC
2*σ*: 1450–1290 cal BC

Final comment: L Ladle (20 September 2007), the charcoal was derived from a spread of burnt flint which was interpreted as part of a hearth and which was located in the centre of House X. The determination confirmed middle Bronze Age occupation of this structure. *See* GrA-28423.

SUERC–5828 3045 ±35 BP

δ¹³C: -25.2‰

Sample: BQ 04 L 878B (234), submitted on 2 March 2005 by L Ladle

Material: charcoal: Salicaceae, single fragment (R Gale 2005)

Initial comment: as GrA-28422

Objectives: as GrA-28422

Calibrated date: *1σ*: 1390–1260 cal BC
2σ: 1420–1210 cal BC

Final comment: see GrA-28422

SUERC–6035 3120 ±35 BP

δ¹³C: -26.2‰

Sample: BQ 04 L 1003B (202), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Alnus* sp., single fragment (R Gale 2005)

Initial comment: as GrA-28420

Objectives: as GrA-28420

Calibrated date: *1σ*: 1440–1380 cal BC
2σ: 1490–1310 cal BC

Final comment: see GrA-28420

Bestwall Quarry: late Bronze Age houses and occupation, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multi-period landscape during a 13-year 'rescue' archaeology programme. Features date from the early Mesolithic to the post-medieval period and comprise field systems, drove ways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle and late Bronze Age, Roman, and Saxon. This series consists of five discrete structures comprising rings of postholes of varying numbers.

Objectives: to determine whether the houses are of a single date or whether they were constructed over a period of time. To establish a date for episodes of industrial activity.

Final comment: L Ladle (20 September 2007), the chronological model suggested that three areas of settlement in Fields P, F, and G which contained between one and three houses together with pits and activity areas showed a chronological progression of a single farmstead which was successively rebuilt further south. The good agreement of this model was noteworthy. Carbonised residues also contributed to the overall dating programme. Samples which were directly associated with metallurgy could be related to the period of the settlements.

References: Gibson 2004
Ladle and Woodward in press
Moore and Jennings 1992

GrA–28468 2875 ±35 BP

δ¹³C: -23.3‰

Sample: BQ 97 P 1493A, submitted on 2 March 2005 by L Ladle

Material: charcoal: *Ulex/Cytisus* sp., single fragment (R Gale 2003)

Initial comment: from an oval pit with steep, almost vertical, sides and a flat base. The fill comprised a charcoal-rich, humic soil with frequent chunks of burnt heathstone. Twenty-six sherds of pottery were present. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravel and was approximately 0.35m below present ground surface.

Objectives: to establish the period of use of House 13**.**

Calibrated date: *1σ*: 1120–1000 cal BC
2σ: 1200–920 cal BC

Final comment: L Ladle (20 September 2007), the determination confirmed that the farmstead at the north of the site was the earliest in the sequence and was established in the 960s or 950s cal BC and was probably in use for one or two generations. *See* SUERC-5833.

GrA–28470 2680 ±35 BP

δ¹³C: -26.1‰

Sample: BQ 97 F 368A, submitted on 2 March 2005 by L Ladle

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2003)

Initial comment: from a circular pit with moderately sloping sides and a flat base. The fill comprises a mid-brown sandy loam with charcoal throughout. Large amounts of heathstone were present together with 29 sherds of pottery. There was no intrusion or residuality. The local geology was valley gravels overlain with sandy acidic subsoils and topsoil. The feature was cut into sand and was approximately 0.40m below present ground surface.

Objectives: to determine whether the houses are of a single date or whether they were constructed over a period of time. To establish a date for episodes of industrial activity.

Calibrated date: *1σ*: 840–800 cal BC
2σ: 910–790 cal BC

Final comment: L Ladle (20 September 2007), this pit belonged to settlement 2 and as such helped to establish its date of abandonment to between 900–850 cal BC. *See* SUERC-5838.

GrA–28471 2670 ±35 BP

δ¹³C: -26.5‰

Sample: BQ 97 F 458A, submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (W Carruthers 2004)

Initial comment: from a circular feature with steep sides and a rounded base. The fill comprised a mid-brown sandy loam with frequent lumps of burnt heathstone and charcoal pieces. Three sherds of pottery (including one large sherd on the base of the feature) were in the fill. There was no intrusion or residuality. The local geology was valley gravels overlain with sandy acidic subsoils and topsoils. The ditch segment was cut into sand on the east and gravel on the west. There were some voids likely to be animal burrows. The feature was approximately 0.5m below present ground surface.

Objectives: as GrA-28470

Calibrated date: 1σ: 840–800 cal BC
2σ: 900–790 cal BC

Final comment: see GrA-28470

GrA–28481 2825 ±35 BP

δ¹³C: -25.2‰

Sample: BQ 97 F 270 (ii), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Ulex/Cytisus* sp., single fragment (R Gale 2005)

Initial comment: from a small oval pit with gently sloping sides and a rounded base. The fill comprised dark brown silty sand with large amounts of clay and brunt hearthstone. Forty-one sherds of pottery were present. There was no intrusion or residuality. The local geology was valley gravel overlain by sandy acidic subsoils and topsoils. The feature was cut into natural sands and was approximately 0.40m below present ground surface.

Objectives: to closely date an episode of industrial activity.

Calibrated date: 1σ: 1020–920 cal BC
2σ: 1120–900 cal BC

Final comment: L Ladle (20 September 2007), this pit was associated with activity related to settlement 2 and houses 11 and 12 and the determination confirmed activity in the first half of the tenth century cal BC.

GrA–28484 2725 ±35 BP

δ¹³C: -25.5‰

Sample: BQ 97 F 391 (ii), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Alnus glutinosa*, narrow roundwood, single fragment (R Gale 2005)

Initial comment: from a circular pit with moderately steep sloping sides and a flat base. The fill comprised a mid-brown sandy loam with pieces of burnt heathstone. Fifty-nine sherds of pottery were contained within the fill. There was no intrusion or residuality. The local geology was valley gravels overlain with sandy acidic subsoils and topsoils. The feature was cut into the present ground surface.

Objectives: as GrA-28470

Calibrated date: 1σ: 910–820 cal BC
2σ: 970–800 cal BC

Final comment: see GrA-28468 and SUERC-6149

GrA–28486 2725 ±35 BP

δ¹³C: -27.1‰

Sample: BQ 97 F 442 (ii), submitted on 2 March 2005 by L Ladle

Material: charcoal: Pomoideae, *(Sorbus* group), single fragment (R Gale 2005)

Initial comment: from a circular pit with steep almost vertical sides and a flat base. The fill comprised a dark brown sandy loam with lenses of raw clay and charcoal throughout. There was no intrusion or residuality. The local geology is valley gravels overlain with sandy acidic subsoils and topsoils. The feature was cut into natural sand and was approximately 0.40m below ground level.

Objectives: to establish the period of use of house 10.

Calibrated date: 1σ: 910–820 cal BC
2σ: 970–800 cal BC

Final comment: L Ladle (20 September 2007), the determination confirmed the date of this house and placed it in the final late Bronze Age sequence of shifting farmsteads on the site.

SUERC–5833 2830 ±35 BP

δ¹³C: -26.6‰

Sample: BQ 97 P 1493B, submitted on 2 March 2005 by L Ladle

Material: charcoal: Pomoideae, single fragment (R Gale 2003)

Initial comment: as GrA-28468

Objectives: as GrA-28468

Calibrated date: 1σ: 1020–920 cal BC
2σ: 1120–900 cal BC

Final comment: see GrA-28468

SUERC–5837 2720 ±35 BP

δ¹³C: -25.7‰

Sample: BQ 97 F 368B, submitted on 2 March 2005 by L Ladle

Material: charcoal: *Alnus glutinosa*, single fragment (R Gale 2003)

Initial comment: as GrA-28470

Objectives: as GrA-28470

Calibrated date: 1σ: 910–820 cal BC
2σ: 970–800 cal BC

Final comment: see GrA-28470

SUERC–5838 2695 ±40 BP

$\delta^{13}C$: -23.6‰

Sample: BQ 97 F 458B, submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2004)

Initial comment: as GrA-28471

Objectives: as GrA-28471

Calibrated date: *1σ*: 900–800 cal BC
2σ: 920–790 cal BC

Final comment: see GrA-28470

SUERC–6148 2860 ±35 BP

$\delta^{13}C$: -23.1‰

Sample: BQ 97 F 270 (i), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Ulex/Cytisus* sp., three growth rings, single fragment (R Gale 2005)

Initial comment: as GrA-28481

Objectives: as GrA-28481

Calibrated date: *1σ*: 1060–970 cal BC
2σ: 1130–910 cal BC

Final comment: see GrA-28481

SUERC–6149 2765 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: BQ 97 F 391 (i), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., narrow roundwood, single fragment (R Gale 2005)

Initial comment: as GrA-28484

Objectives: as GrA-28470

Calibrated date: *1σ*: 970–840 cal BC
2σ: 1010–820 cal BC

Final comment: see GrA-28468 and GrA-28484

SUERC–6150 2745 ±35 BP

$\delta^{13}C$: -25.1‰

Sample: BQ 97 F 442 (i), submitted on 2 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., three growth rings, roundwood, single fragment (R Gale 2005)

Initial comment: as GrA-28486

Objectives: as GrA-28486

Calibrated date: *1σ*: 920–830 cal BC
2σ: 980–810 cal BC

Final comment: see GrA-28486

Bestwall Quarry: marginal peat sequence, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multiperiod landscape during a 13-year 'rescue' archaeology project. Features date from the early Mesolithic to the post-medieval period and comprise field systems, droveways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle Bronze Age, late Bronze Age, Roman, and Saxon. The sample in this peat series comes from the short sequence from the western margin of the deposit (0.48m deep).

Objectives: to provide information on the chronology of sedimentation.

Final comment: L Ladle (20 September 2007), the base of this marginal peat sequence dates to 1060–890 cal BC and the environmental evidence from this column therefore relates to the late Bronze Age period onwards.

References: Birks *et al* 1975
Scaife 2005
Scaife and Jones 1988
Smith and Pitcher 1973

SUERC–8167 2815 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: PROFILE 2 (0.48m), submitted on 27 September 2005 by L Ladle

Material: waterlogged plant macrofossil: *Prunus spinosa*, stem (R Gale 2005)

Initial comment: the sample comes from a depth of 0.48m measured from the surface of the peat deposit. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic topsoils and subsoils. The waterlogged peat deposit was contained within the gravel horizon. Eighteenth- to nineteenth-century ceramic and stone land drains had been laid on top of the peat deposit. The sample was permanently waterlogged. Approximately 0.50m of topsoil had been removed.

Objectives: the base of the peat deposit has been dated to 2880–2490 cal BC (SUERC-5696; 4105 ±40 BP) (Reimer *et al* 2004). The sample lies at the base of section (262) at a depth of 0.48m, and is in the upper levels of the peat deposit and will secure dating for the later stages of the peat formation and associated landscape.

Calibrated date: *1σ*: 1010–910 cal BC
2σ: 1060–890 cal BC

Final comment: L Ladle (20 September 2007), the base of the marginal peat sequence was dated to the latest phase of the middle Bronze Age.

References: Reimer *et al* 2004

Bestwall Quarry: metalworking debris, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multi-period landscape during a 13-year 'rescue' archaeology programme. Features date from the early Mesolithic to the post-medieval period and comprise field systems, drove ways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle and late Bronze Age, Roman, and Saxon. The samples are from an area of metalworking activity comprising bases of furnaces and spreads of slag and other metal working debris.

Objectives: to establish the date of the features from which iron working slags were retrieved and activities associated with these.

Final comment: L Ladle (20 September 2007), the results from the ironworking features indicate that this industry spanned approximately the same period as the charcoal burning beginning in the fifth or early sixth century AD and ending in the late ninth or tenth century.

References: Aiano 1977
Salter and Maynard 1988

GrA–29004 1145 ±35 BP

$\delta^{13}C$: -27.1‰

Sample: BQ 04 K 502A (502), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Alnus glutinosa*, single fragment (R Gale 2004)

Initial comment: from an oval pit, bowl-shaped with shallow sloping sides. The fill contained charcoal and hammerscale, comprising a mid to dark brown sandy loam. Some raw clay was also present. Fill (502) was above a possible plano-convex bottom. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into sand and was approximately 0.40m below the present ground surface.

Objectives: to contribute towards the dating of the metalworking activity.

Calibrated date: *1σ:* cal AD 870–970
2σ: cal AD 770–990

Final comment: L Ladle (20 September 2007), hammerscale from this feature confirmed iron smithing on-site and the determination placed this activity in the eighth or ninth centuries AD. *See* SUERC-6142.

GrA–29005 1405 ±35 BP

$\delta^{13}C$: -24.9‰

Sample: BQ 94D 509A, submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., narrow roundwood, single fragment (R Gale 2004)

Initial comment: from a circular pit with gently sloping sides and a flat, but undulating, base, which has been burnt red. The fill comprised a mid brown sandy loam with large amounts of charcoal and slag (5220g). There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into sand and was approximately 0.35m below the present ground surface.

Objectives: as GrA-29004

Calibrated date: *1σ:* cal AD 610–660
2σ: cal AD 590–670

Final comment: L Ladle (20 September 2007), this pit was 1.5m away from the remnants of the base of a probable iron working furnace, the slag within the pit filling was probably derived from activities centred on the furnace. The determination places these activities at the beginning of the intensive phase of charcoal production which continued throughout the seventh and eighth centuries AD. *See* SUERC-6141.

SUERC–6141 1415 ±35 BP

$\delta^{13}C$: -25.1‰

Sample: BQ 94D 509B, submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2005)

Initial comment: as GrA-29005

Objectives: as GrA-29004

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 570–670

Final comment: see GrA-29005

SUERC–6142 1255 ±35 BP

$\delta^{13}C$: -27.9‰

Sample: BQ 04 K 502B (502), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: as GrA-29004

Objectives: as GrA-29004

Calibrated date: *1σ:* cal AD 680–780
2σ: cal AD 660–890

Final comment: see GrA-29004

Bestwall Quarry: middle Bronze Age occupation in field K, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multi-period landscape during a 13-year 'rescue' archaeology programme. Features date from the early Mesolithic to the post-medieval period and comprise field systems, drove ways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle and late Bronze Age, Roman, and Saxon. The pits and ditch segments in Field K produced large quantities of middle Bronze Age pottery. Pit (80) produced decorated ceramic weights.

Objectives: to closely date the pottery assemblage and ceramic weights, through association with other assemblages from middle Bronze Age houses and working areas.

Final comment: L Ladle (20 September 2007), determinations came from two pits and a single ditch segment. Measurements from two barley grains from the ditch fill suggest that the grain was deposited in the fifteenth century cal BC and that the ditch (K71) formed part of the initial layout of the Bronze Age field system. The ditch had gone out of use by *c* 1300 cal BC. Pit K79 which contained a decorated, perforated clay object was probably filled in the thirteenth century cal BC, as was pit K63, which contained the substantial remains of a middle Bronze Age bucket urn. The determination is consistent for the date range of this pottery. A previously dated assemblage of pottery and perforated clay objects (J712) suggests that they were deposited slightly earlier in the fourteenth century cal BC.

References: Barrett 1976
Ladle and Woodward in press

GrA–28462 2990 ±35 BP

$\delta^{13}C$: -24.0‰

Sample: BQ 04 K 65B, submitted on 4 March 2005 by L Ladle

Material: grain: *Hordeum* sp., hulled, carbonised, single fragment (W Carruthers 2004)

Initial comment: from a circular pit with two fills. The upper fill (64) comprised a very dark brown, almost black, compacted sandy loam, with much charcoal and ash. There were 42 sherds of pottery weighing 1065g in this layer including substantial remains of one vessel. There was no residuality or intrusion. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravel and was approximately 0.5m below present ground surface.

Objectives: to establish the period of use of a series of ditches and pits in Field K which were not associated with any house.

Calibrated date: *1σ*: 1300–1130 cal BC
2σ: 1380–1110 cal BC

Final comment: L Ladle (20 September 2007), the statistically consistent results from two samples from this pit (GrA-28462 and SUERC-6151; T′=3.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) suggest that the deposit was placed in the thirteenth century cal BC. The bucket urn in the coarse ware Deverel-Rimbury tradition occurred with sherds from a further bucket urn and decorated sherds from globular urns.

References: Ward and Wilson 1978

GrA–28480 2990 ±35 BP

$\delta^{13}C$: -25.9‰

Sample: BQ 04 K 80A, submitted on 4 March 2005 by L Ladle

Material: charcoal: *Ilex aquifolium*, single fragment (R Gale 2004)

Initial comment: from an oval, shallow pit with a single fill, which comprised a very dark, almost black, charcoal-rich, sandy loam. Four ceramic weights were in this pit, one of which was decorated. There was no residuality or intrusion. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The pit was cut into gravel and was approximately 0.5m below present ground surface.

Objectives: as GrA-28462

Calibrated date: *1σ*: 1300–1130 cal BC
2σ: 1380–1110 cal BC

Final comment: L Ladle (20 September 2007), three samples from this pit were dated (GrA-28480, SUERC-5829, and SUERC-6152). The results were not statistically consistent (T′=19.1; T′(5%)=6.0; ν=1; Ward and Wilson 1978), but this determination probably implies that the pit was infilled during the thirteenth century cal BC and as such, dates the perforated ceramic objects. *See* SUERC-5829 and SUERC-6152.

References: Ward and Wilson 1978

GrA–28487 3235 ±40 BP

$\delta^{13}C$: -22.9‰

Sample: BQ 04 K 70(ii), submitted on 4 March 2005 by L Ladle

Material: grain: *Hordeum* sp., hulled, carbonised, single grain (W Carruthers 2004)

Initial comment: from a segment of a ditch 0.7m long. The fill comprised a dark brown sandy loam, compacted in places, within which were 17 sherds of pottery weighing 198g. There was no intrusion or residuality. The local geology was valley gravels overlain with sandy acidic subsoils and topsoils. The ditch segment was cut into sand on the east and gravel on the west. There were some voids, likely to be animal burrows. The feature was approximately 0.5m below present ground surface.

Objectives: as GrA-28462

Calibrated date: *1σ*: 1530–1450 cal BC
2σ: 1620–1420 cal BC

Final comment: L Ladle (20 September 2007), the determination confirms that this ditch was disused by *c* 1400 cal BC and that it was part of the second phase of ditch digging. The pottery which was deposited in the fills suggested that the ditch had certainly been abandoned by *c* 1300 cal BC.

SUERC–5829 3195 ±35 BP

$\delta^{13}C$: -24.4‰

Sample: BQ 04 K 80B (179), submitted on 4 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2004)

Initial comment: as GrA-28480

Objectives: as GrA-28480

Calibrated date: 1σ: 1500–1420 cal BC
2σ: 1530–1410 cal BC

Final comment: L Ladle (20 September 2007), this sample was probably residual.

Laboratory comment: see GrA-28480

SUERC–6151 3085 ±35 BP

$\delta^{13}C$: -23.6‰

Sample: BQ 04 K 65A, submitted on 4 March 2005 by L Ladle

Material: grain: *Hordeum* sp., hulled, carbonised, single grain (W Carruthers 2004)

Initial comment: as GrA-28462

Objectives: as GrA-28462

Calibrated date: 1σ: 1420–1310 cal BC
2σ: 1440–1260 cal BC

Final comment: see GrA-28462

SUERC–6157 3165 ±35 BP

$\delta^{13}C$: -21.9‰

Sample: BQ 04 K 70(i), submitted on 4 March 2005 by L Ladle

Material: grain: *Hordeum* sp., naked, carbonised, single grain (W Carruthers 2004)

Initial comment: as GrA-28487

Objectives: as GrA-28462

Calibrated date: 1σ: 1500–1410 cal BC
2σ: 1510–1390 cal BC

Final comment: see GrA-28487

Bestwall Quarry: middle Bronze Age occupation in field L, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multi-period landscape during a 13-year 'rescue' archaeology programme. Features date from the early Mesolithic to the post-medieval period and comprise field systems, drove ways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle and late Bronze Age, Roman, and Saxon. This series consists of segments of ditch L (932) in field L which were filled with fresh midden material, including many large sherds with conjoins.

Objectives: to closely date the pottery assemblage, through association with other pottery groups from middle Bronze Age houses and working areas. To determine where the midden material originated and to confirm the date of Avon Stour style pottery.

Final comment: L Ladle (20 September 2007), five statistically consistent measurements suggest that the occupation debris was deposited in the fifteenth century cal BC and that the determinations not only dated a large deposit of Avon Stour style pottery but also provided a *terminus post quem* for the construction of the later phase of the field systems. Earlier episodes of ditch cleaning indicate that the ditch was dug some time before 1500 cal BC. One measurement from a residual fragment of charcoal indicates probable association with Beaker activity in the area. It was not possible to associate the deposit with any of the houses.

References: Brück 2001
Ellison 1981
Ladle and Woodward in press

GrA–28472 3235 ±40 BP

$\delta^{13}C$: -26.3‰

Sample: BQ 04 L 634A (218), submitted on 3 March 2005 by L Ladle

Material: charcoal: *Betula* sp., single fragment (R Gale 2004)

Initial comment: from a segment of ditch 1m long. The pottery came from the second of five fills. This layer comprised a dark brown sandy loam containing charcoal and charcoal ash. In total 14 sherds weighing 258g were retrieved from this layer. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The upper half of the feature was cut into sand and the lower half into gravel. The feature was approximately 0.40m below present ground surface.

Objectives: to establish the period of use of the ditch for midden material and to confirm the end of use of the ditch as a field boundary.

Calibrated date: 1σ: 1530–1450 cal BC
2σ: 1620–1420 cal BC

Final comment: L Ladle (20 September 2007), one of five statistically consistent dates suggesting that the midden material was deposited in the fiftheenth century cal BC and that the ditch had gone out of use by *c* 1400 cal BC. *See* GrA-28476.

GrA–28475 3180 ±35 BP

$\delta^{13}C$: -26.7‰

Sample: BQ 04 L 639AF (223), submitted on 3 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2004)

Initial comment: from a segment of ditch 1m long. The charcoal came from a soil sample in the middle fill of three layers. The fill comprised a very dark brown charcoal-rich, sandy loam. Much burnt flint was present. In total twenty-three sherds of pottery weighing 291g were retrieved from this layer. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The upper half of the feature was cut into sand and the lower half into gravel. The feature was approximately 0.40m below present ground surface.

Objectives: as GrA-28472

Calibrated date: *1σ*: 1500–1410 cal BC
2σ: 1520–1400 cal BC

Final comment: see GrA-28472

GrA–28476 3335 ±35 BP

$\delta^{13}C$: -25.6‰

Sample: BQ 04 L 856A (233), submitted on 3 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2004)

Initial comment: from a segment of a ditch 1m long. The charcoal came from a soil sample from the second of five fills. This layer comprised a dark brown sandy loam with sparse charcoal. In total nineteen sherds of pottery weighing 171g were retrieved from this layer. There was no intrusion or residuality. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The upper part of the feature was cut into sand and the lower part into gravel. The feature was approximately 0.4m below present ground surface.

Objectives: see GrA-28472

Calibrated date: *1σ*: 1690–1530 cal BC
2σ: 1740–1520 cal BC

Final comment: L Ladle (20 September 2007), this date from a residual fragment of charcoal may have been associated with Beaker activity in the area and predated the construction of the ditch.

Laboratory comment: English Heritage (20 November 2007), six radiocarbon measurements are available from the midden material in this ditch, of which five are statistically consistent (GrA-28472, GrA-28475, and SUERC-5830–2; T'=2.9; T'(5%)=9.5; ν=4; Ward and Wilson 1978). GrA-28476 is significantly older (T'=15.9; T'(5%)=11.1; ν=5; Ward and Wilson 1978) and may be from a residual fragment of charcoal.

References: Ward and Wilson 1978

GrA–28477 2920 ±35 BP

$\delta^{13}C$: -27.1‰

Sample: BQ 04 L 1174, submitted on 3 March 2005 by L Ladle

Material: carbonised residue (internal, Avon Stour style)

Initial comment: from a segment of a ditch 1m long. The pottery came from the second of five fills. This layer comprised a mid-brown, charcoal-rich, sandy loam with frequent gravel nodules. In total, 28 sherds of pottery, weighing 449g, were retrieved from this layer. There was no intrusion or residuality. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The upper part of the feature was cut into sand and the lower part into gravel. The feature was approximately 0.4m below present ground surface.

Objectives: to establish the period of use of the ditch for midden material and to confirm the end of use of the ditch as a field boundary.

Calibrated date: *1σ*: 1210–1040 cal BC
2σ: 1270–1000 cal BC

Final comment: L Ladle (20 September 2007), the determination from the sherd of Avon Stour style pottery probably relates to the latest phase of ditch infilling. This ditch had ceased being used as a boundary by 1400 cal BC.

GrA–28478 2240 ±35 BP

$\delta^{13}C$: -26.2‰

Sample: BQ 04 L 630, submitted on 3 March 2005 by L Ladle

Material: carbonised residue (internal)

Initial comment: from a segment of ditch 0.98m long. The pottery came from the upper fill of mid-brown sandy loam which contained burnt flint and lumps of white, raw clay. In total, 26 sherds of pottery weighing 387g were retrieved from this layer. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravelly sand (upper fill) and gravel (base and lower fill). The feature was approximately 0.4m below present ground surface.

Objectives: to establish the period of use of the ditch as a sump for midden material and to confirm the end of use of the ditch as a field boundary.

Calibrated date: *1σ*: 390–200 cal BC
2σ: 400–200 cal BC

Final comment: L Ladle (20 September 2007), the determination on this sherd indicates that it must have been intrusive and was probably deposited when the ditch had filled and gone out of use. Middle Iron Age evidence is sparse at Bestwall but pollen data implies a distinct phase of arable cultivation at this time and although the date was unexpected, it confirms activity during this artefactually impoverished period.

SUERC–5830 3215 ±35 BP

$\delta^{13}C$: -25.1‰

Sample: BQ 04 L 634B (218), submitted on 3 March 2005 by L Ladle

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2004)

Initial comment: as GrA-28472

Objectives: to establish the period of use of the ditch for midden material and to confirm the end of use of the ditch as a field boundary.

Calibrated date: *1σ*: 1520–1430 cal BC
2σ: 1610–1410 cal BC

Final comment: see SUERC-5832, GrA-28472, and SUERC-6153

SUERC–5831 3155 ±35 BP

$\delta^{13}C$: -25.8‰

Sample: BQ 04 L 639B (223), submitted on 3 March 2005 by L Ladle

Material: charcoal: Pomoideae, single fragment (R Gale 2004)

Initial comment: as GrA-28475

Objectives: as GrA-28472

Calibrated date: *1σ*: 1460–1400 cal BC
2σ: 1500–1320 cal BC

Final comment: see SUERC-5832 and GrA-28475

References: Ladle and Woodward in press

SUERC–5832 3210 ±40 BP

$\delta^{13}C$: -26.0‰

Sample: BQ 04 L 856B (233), submitted on 3 March 2005 by L Ladle

Material: charcoal: Salicaceae, single fragment (R Gale 2004)

Initial comment: as GrA-28476

Objectives: as GrA-28476

Calibrated date: *1σ*: 1520–1430 cal BC
2σ: 1610–1410 cal BC

Final comment: see GrA-28472

Laboratory comment: English Heritage (20 November 2007), two statistically consistent measurements on short-lived charcoal fragments from this context (GrA-28472 and SUERC-5830; (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggest that this ditch is middle Bronze Age in date and this oat grain intrusive.

References: Ward and Wilson 1978

Bestwall Quarry: monument in field L, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project)

Archival body: Dorset County Museum

Description: a rectangular timber building placed within an oval enclosure formed by a segmented ditch in Field L. Part of a complex area of pits, postholes, and ditches in a natural hollow at the extreme south-eastern corner of the field.

Objectives: to date the construction and use of the rectangular structure associated with the oval ditched monument in Field L.

Final comment: L Ladle and P Marshall (28 January 2008), unfortunately no samples were available to provide absolute dates for this structure. The single fragment of charcoal from posthole L1052 provided a middle Bronze Age date of 1370-1050 cal BC (GrA-29716). Since this posthole was cut by gully L611, which appears to be associated with the earlier middle bronze Age House X, it seems likely that this sample is intrusive in its context and does not date the rectangular structure.

References: Ladle and Woodward in press
Ladle forthcoming

GrA–28428 4955 ±40 BP

$\delta^{13}C$: -29.8‰

Sample: BQ 04 L 578, submitted on 2 March 2005 by L Ladle

Material: carbonised residue (internal, early Neolithic Plain Bowl)

Initial comment: from a large oval pit with steep sides and an undulating base. The fill comprised a mid-brown to grey sandy loam. Thirty-six sherds of pottery were found in the fill together with forty pieces of struck flint of an early Neolithic character. The feature was cut by posthole L522. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into sandy gravel and was approximately 0.40m from the ground surface. There was no disturbance.

Objectives: to contribute towards the dating of a possible henge area and the various archaeological sequences associated with the monument. To establish the period of use of the pit which predated the establishment of the later features. To date the pottery within the feature, and by so doing, date the associated flint assemblage.

Calibrated date: *1σ*: 3780–3660 cal BC
2σ: 3900–3650 cal BC

Final comment: L Ladle (20 September 2007), the residue sample from an undecorated body sherd of early Neolithic Plain Bowl pottery dates the pit which was one of four and which was the earliest set of features associated with the henge complex. Part of the interrupted henge ditch overlay, and was therefore later than, this feature.

References: Cleal 1990
Field *et al* 1964
Richards 1990
Thomas 1999
Woodward 2000

GrA–29716 2970 ±35 BP

$\delta^{13}C$: -27.0‰

Sample: BQ 04 L 1052 (1051)B, submitted on 1 July 2005 by L Ladle

Material: charcoal: *Prunus* sp., single fragment (R Gale 2004)

Initial comment: from a posthole with steep, almost vertical sides and a flat base. The fill comprised a dark brown sandy loam. Gravels were used as packing and there was much charcoal in the fill. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravel and was approximately 0.50m from the ground surface.

Objectives: to contribute towards the dating of a possible henge/mortuary sequence associated with the monument.

Calibrated date: *1σ*: 1270–1120 cal BC
2σ: 1370–1050 cal BC

Final comment: L Ladle (20 September 2007), this posthole was initially thought to belong to the late Neolithic mortuary house structure; the determination showed that it was part of the middle Bronze Age roundhouse structure.

GrA–29717 3010 ±40 BP

$\delta^{13}C$: -27.4‰

Sample: BQ 04 L 825 (232)B, submitted on 1 July 2005 by L Ladle

Material: charcoal: *Alnus* sp., single fragment (R Gale 2004)

Initial comment: from a segment of a gully (611) with steep almost vertical sides and a flattish base. Cuts stakehole (826). The fill comprised a dark brown sandy loam with frequent burnt flints and charcoal pieces. There was no intrusion or residuality. The local geology is valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into gravel and was approximately 0.50m from the ground surface.

Objectives: to contribute towards the dating of a possible henge/mortuary sequence associated with the monument.

Calibrated date: *1σ*: 1380–1210 cal BC
2σ: 1400–1120 cal BC

Final comment: L Ladle (20 September 2007), the charcoal from the burnt flint-rich fill of a gully was originally thought to belong to the middle to late Neolithic rectangular mortuary structure. The determination places this feature in the middle Bronze Age and therefore it must have been part of the structural remains, probably a baffle screen in front of the hearth, of House X.

GrA–29741 3095 ±35 BP

$\delta^{13}C$: -24.2‰

Sample: BQ 04 L 574 (214)B, submitted on 1 July 2005 by L Ladle

Material: charcoal: *Quercus* sp., roundwood, single fragment (R Gale 2004)

Initial comment: from a segment of gully (611) with steep almost vertical sides and a flat base. The fill comprised a dark brown sandy loam with a dense concentration of natural gravels together with burnt flint and moderate quantities of charcoal. The pottery was retrieved from this fill. The local geology was valley gravels overlain by sandy acidic subsoils and topsoils. The feature was cut into the gravels and was approximately 0.50m from the ground surface. There was no disturbance.

Objectives: as GrA-29717

Calibrated date: *1σ*: 1420–1310 cal BC
2σ: 1440–1260 cal BC

Final comment: see GrA-29717

SUERC–7352 3075 ±35 BP

$\delta^{13}C$: -27.7‰

Sample: BQ 04 L 574A (214)A, submitted on 1 July 2005 by L Ladle

Material: charcoal: *Prunus* sp., single fragment (R Gale 2005)

Initial comment: as GrA-29741

Objectives: as GrA-29717

Calibrated date: *1σ*: 1410–1300 cal BC
2σ: 1430–1260 cal BC

Final comment: see GrA-29717

SUERC–7353 3100 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: BQ 04 L 825 (232)A, submitted on 1 July 2005 by L Ladle

Material: charcoal: *Prunus* sp., single fragment (R Gale 2004)

Initial comment: as GrA-29717

Objectives: as GrA-29717

Calibrated date: *1σ*: 1420–1310 cal BC
2σ: 1440–1290 cal BC

Final comment: see GrA-29717

Bestwall Quarry: primary auger peat sequence, Dorset

Location: SY 935880
Lat. 50.41.28 N; Long. 02.05.31 W

Project manager: L Ladle (Bestwall Quarry Archaeology Project), 1992–2005

Archival body: Dorset County Museum

Description: excavations at this 55 hectare gravel quarry have uncovered a multiperiod landscape during a 13-year 'rescue' archaeology project. Features date from the early Mesolithic to the post-medieval period and comprise field systems, droveways, working areas, domestic structures, pit clusters, industrial activity, burials, and ritual deposits. The best-represented periods are middle Bronze Age, late Bronze Age, Roman, and Saxon.The peat deposit is approximately 20m wide and at least 50m long, with a depth of 2.7m, and was located in the central-south area of the site. The deposit is cut into natural gravels. This series consists of two samples obtained during primary survey of the pond.

Objectives: to assess the chronological range of organic deposits from the pond.

Final comment: L Ladle (20 September 2007), the dates (SUERC-5696 and SUERC-5813) suggested that the peat between 2m and 2.68m below the level of the stripped surface accumulated in the late Neolithic period. Thus much of the environmental evidence contained within this peat could be expected to be contemporary with the prehistoric and later activity at Bestwall.

References: Ladle forthcoming

SUERC–5696 4105 ±40 BP

$\delta^{13}C$: -29.1‰

Sample: BQ Peat Deposit 2m, submitted on 25 January 2005 by L Ladle

Material: waterlogged wood: *Alnus glutinosa*, single fragment (R Scaife 2005)

Initial comment: the sample was obtained from hand-auguring through the centre of the peat-filled hollow. The sample was obtained from a depth of 2m below the stripped surface and is in the earliest part of the sequence. There was no evidence for disturbance or intrusion, but shallow, modern land drains had been constructed over part of the peat-filled surface. The local geology was gravels overlain with sandy acidic topsoil and subsoil. The waterlogged peat feature was contained within the gravel horizon. Approximately 0.5m of topsoil had been removed. There were land drains on the surface of this feature.

Objectives: the assessment of the pollen content of the 'peat' deposit (Scaife 2005) and the inferred vegetational sequence, indicates a possible early prehistoric (?Neolithic) origin for the infilling of this hollow. Early in the vegetational sequence there is a dramatic change in vegetation type; ie a loss of woodland. A comparison with other pollen samples within the project indicates a Neolithic date. It is important to confirm this significant event by providing a spot date from the lower horizon of the core sample and to justify a more detailed analysis in the future.

Calibrated date: *1σ*: 2860–2570 cal BC
2σ: 2880–2490 cal BC

Final comment: L Ladle (20 September 2007), the possible early prehistoric (?Neolithic) origin for the infilling of the hollow suggested by the pollen content, has been confirmed as this radiocarbon result calibrates to 2880–2490 cal BC and thus falls in the late Neolithic period.

References: Scaife 2005

SUERC–5813 3655 ±35 BP

$\delta^{13}C$: -25.6‰

Sample: BQ Peat Deposit 1.68m, submitted on 25 January 2005 by L Ladle

Material: waterlogged wood: *Alnus glutinosa*, single fragment (R Scaife 2005)

Initial comment: this sample was obtained from hand-augering through the centre of the peat-filled hollow, from a depth of 1.68m below the stripped surface, and is in the earliest part of the sequence. There was no evidence for disturbance or intrusion, but shallow, modern land drains had been constructed over part of the peat-filled surface. The local geology was valley gravels overlain with sandy acidic topsoils and subsoils. The waterlogged peat feature was contained within the gravel horizon. Approximately 0.5m of the topsoil had been removed. There were land drains on the surface of this feature.

Objectives: as SUERC-5696

Calibrated date: *1σ*: 2130–1960 cal BC
2σ: 2140–1920 cal BC

Final comment: L Ladle (20 September 2007), the possible early prehistoric (?Neolithic) origin for the infilling of the hollow suggested by the pollen content, has been confirmed as this radiocarbon result calibrates to 2140–1920 cal BC and thus falls in the late Neolithic period.

Burlescombe, Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2005

Description: the watching brief on the topsoil stripping in advance of a quarry extension exposed a multiphase prehistoric and early medieval site, set in a shallow depression on a north-east-facing hill slope. This depression, measuring *c* 30m north-south and 25m east-west, had been infilled with colluvium to a maximum depth of 2m sometime in the mid- to late Iron Age, sealing and preserving the archaeological deposits. The site was identified during topsoil stripping when a spread of burnt stone and charcoal was exposed at the eastern edge of the colluvium. The site itself lies 15m below the crest of the hill at a height of *c* 150m OD. The archaeological features sealed within the depression by the colluvium consist of: 1) two Bronze Age burnt mounds with associated troughs; 2) a waterlogged pit containing planks and stakes; 3) an oak-plank-built springhead, set in a shallow hollow, with a plank-lined launder draining water from this feature to the east. A find of a single potsherd from this feature was provisionally dated to the middle- to late Iron Age; and 4) a stake- and wattle-lined pit *c* 1.5m in diameter, situated less than one metre to the west of the well described above, containing a hollowed tree trunk. This trunk measured *c* 0.5m in diameter and 0.6m high and was set upright within the pit. Initial assessment of the tool marks on this artefact suggested an early Iron Age date for this structure. The site was systematically sampled. Bulk samples were taken from every cut feature and spread of material, and where practicable, features were excavated in spits (of 50mm). Monoliths were also taken.

Objectives: the programme of analysis and conservation was designed to answer specific questions regarding the date, function, and setting of the various constituent features exposed during the fieldwork, and to make the results available through publication and the display of artefacts in a museum setting. Particular questions that needed to be addressed included: dating of the Bronze Age burnt mounds; dating of the troughs sealed by the burnt mounds; comparison of the dates to establish contemporaneity of the troughs and associated mounds; dating of the well features, and date of the earlier use of the reused timbers; the chronological relationship between the two springheads; establishing whether the site/features represent continuous utilization (throughout the Bronze/Iron Age transition) of the perched water table, or whether the site represents two distinct periods of exploitation; determining the length of time the various layers of dumping (over the burnt mounds) took to accumulate; establishing the date of the shoe (*see* below).

Final comment: T Gent (10 April 2007), the radiocarbon results from this project have been supplemented by dendrochronological study (Tyers 2007), and the combined results subject to Bayesian analysis (Best and Gent forthcoming). This has established a detailed chronology for the site, making it possible to: establish a chronological relation between the two burnt mounds; suggest the duration of use of the two burnt mounds; identify the early medieval date of the the springheads; establish a chronological relationship between the two springheads; date the shoe; and provide an approximate date for the colluviation of the site. A rigorous dating exercise also made it possible to demonstrate the 'mixed' nature of the material sampled for pollen analysis, and to ensure that the results of that analysis were interpreted accordingly.

References: Barfield 1991
Barfield and Hodder 1987
Best and Gent forthcoming
Hurley 1990
Jeffery 1991
Passmore and Pallister 1967
Ryder 1981
Tyers 2007

Burlescombe: burnt mounds and associated pits, Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2005

Archival body: The Royal Albert Memorial Museum (Exeter)

Description: the watching brief on the topsoil stripping in advance of a quarry extension exposed a multiphase prehistoric and early medieval site set in a shallow depression on a north-east-facing hill slope. This depression, measuring *c* 30m north-south and 25m east-west, had been infilled with colluvium to a maximum depth of 2m sometime in the mid- to late Iron Age, sealing and preserving the archaeological deposits.

Objectives: to date the Bronze Age burnt mounds; to date the troughs sealed by the burnt mound; to compare the dates to establish contemporaneity of the troughs and associated mounds.

Final comment: T Gent (11 October 2007), the results contribute to providing a chronological sequence for the site, strongly suggesting that burnt mound 549 was employed after burnt mound 569 went out of use. Further analysis of results (Best and Gent Forthcoming) also provides an estimate of the span of use of burnt mound 549 at *0–60 years (95% probability)*, and an estimate of the span of use of burnt mound 569 at *10–170 years (95% probability)*.

References: Barfield 1991
Barfield and Hodder 1987
Best and Gent forthcoming
Hurley 1990
Jeffery 1991
Passmore and Pallister 1967
Ryder 1981

OxA–15961 2432 ±33 BP

$\delta^{13}C$: -27.3‰

Sample: BLC04-360B, submitted in May 2006 by R Woodgate

Material: waterlogged wood (unidentified twig) (J Jones 2006)

Initial comment: this sample is from context 682. This context represents the waterlogged fill of a pit (672) with unknown function, sealed by a layer of oxidized gravel ('burnt mound'). There is little or no chance of intrusive elements or residuality. The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: to determine whether this pit (672) is contemporaneous with trough (645) (both of these features were sealed by the burnt mound (549)). Dating the fill of pit (672) will also help to determine the chronology of the site and relate this pit to other associated features.

Calibrated date: 1σ: 740–400 cal BC
2σ: 760–400 cal BC

Final comment: T Gent (17 April 2007), the dated material is considered intrusive.

Laboratory comment: English Heritage, the two results from this context are not statistically consistent (OxA-15961 and OxA-15983; T'=230.3; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15983 3122 ±31 BP

$\delta^{13}C$: -28.4‰

Sample: BLC04-360A, submitted in May 2006 by R Woodgate

Material: waterlogged plant macrofossil (hazelnut shell) (J Jones 2006)

Initial comment: as OxA-15961

Objectives: as OxA-15961

Calibrated date: 1σ: 1430–1380 cal BC
2σ: 1450–1310 cal BC

Final comment: T Gent (17 April 2007), this result shows that the pit was broadly contemporary with burnt mound 549 and trough 645.

Laboratory comment: see OxA-15961

References: Best and Gent forthcoming

SUERC–10148 3070 ±35 BP

$\delta^{13}C$: -25.0‰

Sample: BLC04-309A, submitted in February 2006 by T Gent

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: this sample is from context 549. It represents a spread of burnt stone (chert and gravels) and charcoal forming a 'burnt mound'. This was overlain by a series of silty dumping horizons. Those horizons were in turn sealed by a thick layer of colluvium. The mound 549 sealed two earlier features: a large pit (672) containing waterlogged material, and a timber lined trough (645 is also waterlogged). Due to the depth of deposits overlying the mound there is no chance of intrusive material or residuality.

The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: a control/comparative date for that obtained from University of Waikato on charcoal (*Corylus* sp.), 1450–1300 cal BC (Wk-16204: 3110 ±34 BP, $\delta^{13}C$ -25.2 ±-0.2‰).

Calibrated date: *1σ*: 1410–1300 cal BC
2σ: 1430–1220 cal BC

Final comment: T Gent (10 April 2007), this result has contributed to providing a chronological sequence for the site, suggesting strongly that burnt mound 549 was employed after burnt mound 569 went out of use. Further analysis of results (Best and Gent forthcoming) also provides an estimate of the span of use of burnt mound 549 at *0–60 years (95% probability)*.

Laboratory comment: English Heritage (20 November 2007), the three radiocarbon results from this context are statistically consistent (Wk-16204, and SUERC-10148–9; T′=0.7; T′(5%)=6.0;ν=2; Ward and Wilson 1978).

References: Best and Gent forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–10149 3100 ±35 BP

$\delta^{13}C$: -26.3‰

Sample: BLC04-309B, submitted in February 2006 by T Gent

Material: charcoal: cf *Corylus* sp., single fragment (R Gale 2006)

Initial comment: as SUERC-10148

Objectives: as SUERC-10148

Calibrated date: *1σ*: 1420–1310 cal BC
2σ: 1440–1290 cal BC

Final comment: see SUERC-10148

Laboratory comment: see SUERC-10148

SUERC–10150 3195 ±35 BP

$\delta^{13}C$: -25.0‰

Sample: BLC04-311A, submitted in February 2006 by T Gent

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: as OxA-15961

Objectives: the dates from this burnt mound will ascertain whether the two mounds are contemporary. They may also indicate how long the burnt mounds were in use. They would likewise prove useful as a comparative tool between the date of the mound and the trough the mound seals.

Calibrated date: *1σ*: 1500–1420 cal BC
2σ: 1530–1410 cal BC

Final comment: T Gent (10 April 2007), this result has contributed to providing a chronological sequence to the site, suggesting strongly that burnt mound 569 was used and abandoned before burnt mound 549 was employed. Further analysis of results (Best and Gent Forthcoming) also provides an estimate of the span of use of burnt mound 569 at *10–170 years (95% probability)*.

References: Best and Gent forthcoming

SUERC–10151 3225 ±35 BP

$\delta^{13}C$: -25.5‰

Sample: BLC04-311B, submitted in February 2006 by T Gent

Material: charcoal: cf *Corylus* sp., single fragment

Initial comment: as SUERC-10150

Objectives: as SUERC-10150

Calibrated date: *1σ*: 1530–1440 cal BC
2σ: 1610–1420 cal BC

Final comment: see SUERC-10150

References: Best and Gent forthcoming

SUERC–10152 3115 ±35 BP

$\delta^{13}C$: -25.1‰

Sample: BLC04-347A, submitted in February 2006 by T Gent

Material: charcoal: cf *Corylus* sp., single fragment (R Gale 2006)

Initial comment: the sample is from context 662, the fill of trough 645. This material was waterlogged, with some timber planking surviving at the edges of the trough. Charcoal is being used as radiocarbon sample as no suitable waterlogged material was available. The trough was sealed by a layer of burnt stone and gravel (burnt mound 549). The trough was cut into natural sands and gravels. Due to the depth of deposits overlying the mound there is no chance of intrusive material or residuality. The local geology is gravel. The material was beneath the water table. The context was undisturbed and un-bioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the date will prove useful as a comparative tool between the date of the mound and the trough. The dating of the trough may also establish whether the troughs were contemporary.

Calibrated date: *1σ*: 1430–1320 cal BC
2σ: 1450–1300 cal BC

Final comment: T Gent (10 April 2007), this result has contributed to provide a chronological sequence for the site, strongly suggesting that this trough, and burnt mound 549, was used after burnt mound 569 went out of use. *See* SUERC-10153.

SUERC–10153 3140 ±35 BP

$\delta^{13}C$: -26.2‰

Sample: BLC04-347B, submitted in February 2006 by T Gent

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: as SUERC-10152

Objectives: as SUERC-10152

Calibrated date: *1σ:* 1440–1390 cal BC
2σ: 1500–1310 cal BC

Final comment: see SUERC-10152

SUERC–10154 3280 ±35 BP

δ¹³C: -25.1‰

Sample: BLC04-350A, submitted in February 2006 by T Gent

Material: charcoal: cf *Corylus* sp., single fragment (R Gale 2006)

Initial comment: this sample is from context 666. It represents the upper fill of trough (659). The context was black in colour (5YR 2.5/1) and contained abundant heat shattered quartzite and chert. The trough was sealed by a spread of burnt stone (one of the burnt mounds). Due to the depth of deposits overlying the mound, there is no chance of intrusive material or risiduality. The local geology is gravel. This context was immediately above the water table. The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: to compare the date of this burnt horizon to that of the early overlying 'burnt mound' and the basal fill (689). The suite of the dates/samples (basal fill, upper fill, and overlying mound) should give a clear indication of the chronology of the feature(s) and with a similar dating strategy for the other burnt mound and trough, it will give some insight into the development of the site.

Calibrated date: *1σ:* 1620–1500 cal BC
2σ: 1640–1450 cal BC

Final comment: T Gent (10 April 2007), this result has contributed, with others, to provide a chronological sequence for the site, strongly suggesting that this trough, and burnt mound 569, was used and abandoned before burnt mound 549 was employed. *See* SUERC-10158.

SUERC–10158 3315 ±35 BP

δ¹³C: -26.8‰

Sample: BLC04-350B, submitted in February 2006 by T Gent

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: as SUERC-10154

Objectives: as SUERC-10154

Calibrated date: *1σ:* 1640–1520 cal BC
2σ: 1690–1500 cal BC

Final comment: see SUERC-10154

SUERC–10159 3245 ±40 BP

δ¹³C: -26.2‰

Sample: BLC04-354A, submitted in February 2006 by T Gent

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: the sample is from context 689. It represents the lower fill of trough (659), within a circular depression at the base of the trough. The context was reddish black in colour (2.5YR 2.5/1) with clay/silt and abundant charcoal throughout. The local geology is gravel and this context was immediately above the water table. The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: to compare the date of the horizon of that of the overlying 'burnt mound'. The suite of dates/samples (basal fill, upper fill, and overlying mound) should give a clear indication of the chronology of the feature(s) and, with the similar dating strategy for the other burnt mound and trough, it will give some insight into the development of the site.

Calibrated date: *1σ:* 1610–1450 cal BC
2σ: 1620–1430 cal BC

Final comment: T Gent (10 April 2007), this result has contributed to provide a chronological sequence to the site, strongly suggesting that this trough, and burnt mound 569, was used and abandoned before burnt mound 549 was employed. *See* SUERC-10160.

SUERC–10160 3220 ±35 BP

δ¹³C: -24.5‰

Sample: BLC04-354B, submitted in February 2006 by T Gent

Material: charcoal: *Prunus* sp., single fragment (R Gale 2006)

Initial comment: as SUERC-10159

Objectives: as SUERC-10159

Calibrated date: *1σ:* 1520–1440 cal BC
2σ: 1610–1420 cal BC

Final comment: see SUERC-10159

References: Best and Gent forthcoming

Burlescombe: monolith 324, Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2005

Archival body: The Royal Albert Memorial Museum (Exeter)

Description: the watching brief on the topsoil stripping in advance of a quarry extension exposed a multiphase prehistoric and early medieval site set in a shallow depression on a north-east facing hill slope. This depression, measuring *c* 30m north-south and 25m east-west, had been infilled with colluvium to a maximum depth of 2m sometime in the mid- to late Iron Age, sealing and preserving the archaeological deposits. The samples in this series are from a monolith taken through a series of colluvial deposits across most of the features on site. Due to the depth of deposits overlying this material there is no chance of intrusive material or residuality.

Objectives: to indicate the date and duration of the colluviation and when the site was sealed; to determine whether the rate of deposition of material was constant; to tighten the chronology of the feature

Final comment: T Gent (11 October 2007), the poor agreement between the radiocarbon results and stratigraphy from this monolith (324) is the result of the sampled material having been mixed (the datable material is likely to have been preserved in a waterlogged state in the vicinity, and then introduced to the sampled positions during an unknown number of colluvial episodes). The dates therefore provide only an approximate end point for these events during the Iron Age.

References: Barfield 1991
Barfield and Hodder 1987
Best and Gent forthcoming
Hurley 1990
Jeffery 1991
Passmore and Pallister 1967
Ryder 1981
Tyers 2007

OxA–15693 2511 ±28 BP

$\delta^{13}C$: -27.5‰

Sample: BLC04-324 (0.43–0.45m), submitted in February 2006 by T Gent

Material: waterlogged wood (0.05g) (unidentified twig) (R Gale 2006)

Initial comment: from a monolith taken through a series of colluvial deposits across most of the features on site. Due to the depth of deposits overlying this material there is no chance of intrusive material or residuality. The local geology is gravel. The spread of material overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH6.5) although exact parameters are unknown.

Objectives: the dating of the top and bottom of the monolith will indicate the date and duration of this colluviation and suggest when the site was sealed.

Calibrated date: *1σ*: 780–540 cal BC
2σ: 790–520 cal BC

Final comment: T Gent (10 April 2007), the poor agreement between the radiocarbon results and stratigraphy from both this monolith and the one taken through the fills of pit 658 (monolith 325) indicates that the sampled material has been mixed. The datable material is likely to have been preserved in a waterlogged state in the vicinity, and then introduced to the sampled positions during an unknown number of colluvial episodes. The dates therefore provide only an approximate end point for these events during the Iron Age.

Laboratory comment: English Heritage (20 November 2007), the two macrofossils from this level produced statistically inconsistent radiocarbon ages (OxA-15693 and SUERC-10675; (T′=4.0; T′(5%)=3.8; ν=1;Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15694 2437 ±27 BP

$\delta^{13}C$: -25.0‰

Sample: BLC04-324 (0.20–0.22m), submitted in February 2006 by T Gent

Material: charcoal: cf *Corylus* sp., single fragment (R Gale 2006)

Initial comment: from a monolith taken through a series of colluvial deposits across most of the features on site. Due to the depth of deposits overlying this material there is no chance of intrusive material or residuality. The local geology is gravel. The spread of material overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the dating of the top and bottom of the monolith will indicate the date and duration of colluviation and when the site was sealed.

Calibrated date: *1σ*: 740–410 cal BC
2σ: 760–400 cal BC

Final comment: T Gent (10 April 2007), the poor agreement between the radiocarbon results and stratigraphy from both this monolith and the one taken through the fills of pit 658 (monolith 325) indicate that the sampled material has been mixed. The datable material is likely to have been preserved in a waterlogged state in the vicinity, and then introduced to the sampled positions during an unknown number of colluvial episodes. The dates therefore provide only an approximate end point for these events during the Iron Age. *See* SUERC-10674.

Laboratory comment: English Heritage (20 November 2007), the two results from this level are not statistically consistent (OxA-15694 and SUERC-10674; T′=28.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that this sediment contained reworked material of a variety of ages.

References: Ward and Wilson 1978

OxA–15939 2766 ±29 BP

$\delta^{13}C$: -26.7‰

Sample: BLC04-324 (0.28–0.29m), submitted in February 2006 by T Gent

Material: charcoal (0.05g) (unidentified, single fragment) (S David 2006)

Initial comment: from a monolith taken through a series of colluvial deposits sealing most of the features on site. Due to the depth of deposits overlying this material there is no chance of intrusive material or residuality. The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the dating of the mid-section from the organic fill in addition to the top and base will indicate whether the rate of deposition of material was constant and serve to tighten the chronology of the feature. AMS dating of specific material is suggested to compare with the bulk humic acid fraction of this sample.

Calibrated date: *1σ*: 970–850 cal BC
2σ: 1000–830 cal BC

Final comment: T Gent (10 April 2007), the poor agreement between the radiocarbon results and stratigraphy from this monolith indicate that the sampled material has been mixed. The datable material is likely to have been preserved in a waterlogged state in the vicinity, and then introduced to the sampled positions during an unknown number of colluvial episodes. The dates therefore provide only an approximate end point for these events during the Iron Age.

Laboratory comment: English Heritage (20 November 2007), the two results from this level are not statistically consistent (OxA-15939 and OxA-15941; T′=9.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that this sediment contained reworked material of a variety of ages.

References: Ward and Wilson 1978

OxA–15941 2644 ±28 BP

$\delta^{13}C$: -27.5‰

Sample: BLC04-324 (0.28–0.29m), submitted in February 2006 by T Gent

Material: sediment (humic acid, bulk sample) (D Davis 2006)

Initial comment: as OxA-15939

Objectives: the dating of the mid-section from the organic fill in addition to the top and base will indicate the rate of deposition of material and serve to tighten the chronology of the feature. Dating of specific fractions from bulk sediment is suggested to compare with the charcoal AMS date requested.

Calibrated date: *1σ*: 820–790 cal BC
2σ: 840–790 cal BC

Final comment: see OxA-15939

Laboratory comment: see OxA-15939

References: Best and Gent forthcoming

SUERC–10674 2670 ±35 BP

$\delta^{13}C$: -26.0‰

Sample: BLC04-324 (0.20–0.22m), submitted in February 2006 by T Gent

Material: waterlogged plant macrofossil (0.05g) (unidentified bark, un-charred) (R Gale 2006)

Initial comment: from a monolith taken through a series of colluvial deposits sealing most of the features on site. Due to the depth of deposits overlying this material there is no chance of intrusive material or residuality. The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the dating of the top and bottom of the monolith will indicate the duration and date of this colluviation and when the site was sealed.

Calibrated date: *1σ*: 840–800 cal BC
2σ: 900–790 cal BC

Final comment: T Gent (10 April 2007), the poor agreement between the radiocarbon results and stratigraphy from this monolith indicates that the material contained has been mixed. The datable material is likely to have been preserved through waterlogging in the vicinity, and then introduced to the sampled positions during an unknown number of colluvial episodes. The dates therefore provide only an approximate end point for these events during the Iron Age.

Laboratory comment: see OxA-15694

References: Best and Gent forthcoming

SUERC–10675 2600 ±35 BP

$\delta^{13}C$: -28.6‰

Sample: BLC04-324 (0.43–0.45m), submitted in February 2006 by T Gent

Material: waterlogged plant macrofossil (0.05g) (bark, unidentified, single fragment) (R Gale 2006)

Initial comment: as OxA-15693

Objectives: as OxA-15963

Calibrated date: *1σ*: 810–780 cal BC
2σ: 820–670 cal BC

Final comment: see OxA-15963

References: Best and Gent forthcoming

SUERC–10676 2325 ±35 BP

$\delta^{13}C$: -28.4‰

Sample: BLC04-325 (60mm), submitted in February 2006 by T Gent

Material: waterlogged wood (waterlogged, twig, single fragment) (R Gale 2006)

Initial comment: as OxA-15691

Objectives: the dating will establish how long the pit took to fill up and will provide useful comparative information to the previous dating undertaken by Waikato.

Calibrated date: *1σ*: 410–380 cal BC
2σ: 410–360 cal BC

Final comment: see OxA-15940

SUERC–10677 2940 ±35 BP

$\delta^{13}C$: -28.2‰

Sample: BLC04-325 (0.40–0.50m), submitted in February 2006 by T Gent

Material: waterlogged wood (twig, single fragment) (R Gale 2006)

Initial comment: as OxA-15691

Objectives: the dating will establish how long the pit took to fill up and will provide useful comparative information to the previous dating undertaken by Waikato.

Calibrated date: 1σ: 1260–1050 cal BC
2σ: 1290–1010 cal BC

Final comment: see OxA-15640

References: Tyers 2007

Burlescombe: pit [658], Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2005

Archival body: The Royal Albert Memorial Museum (Exeter)

Description: pit 658 was located in the northern part of the hollow and measured up to 2.65m across and 0.6m deep. The pit was irregular in shape, largely as a consequence of the very soft and mixed natural sands in this area, but also due to disturbance by tree roots along the west edge. The infill of 658 was excavated as a single deposit (654), as it had been extensively sorted through waterlogging and showed no apparent differentiation. The pit contained the remains of a collapsed timber lining, including worked planks, stakes and natural pieces. The majority of the timbers were oak, with some hazel stakes and one fragment of yew. Horizontal planks 474, 475 and 483 were found at the base, and measured between 1.03 m–1.5m long and 0.1m–0.2m wide. Overlying these was an assortment of timbers, including randomly pitched stakes up to 0.82m in length. Several large timbers, comprising both worked planks and natural pieces lay above these. Oak trunk 469 was the largest timber, which measured 2.55m long and 0.28m wide, and extended beyond the excavated west edge of 658. Long timber fragment 482 measured 1.3m long and 0.06m wide and lined the upper, northeast edge of the pit. The remains of three vertical stakes, situated within an indentation on the southeast edge, also formed part of the timber revetment.

Objectives: to provide a precise date for the construction of the pit and provide a chronology for its subsequent infilling.

Final comment: T Gent (11 October 2007), the radiocarbon dating evidence from the fill of 658 suggests relatively homogonous mixing of material as a direct result of one of more colluvial events. As such it is impossible to tie any part of the record from these contexts to the on-site archaeology or provide a chronological framework for interpreting the palaeoenvironmental sequence.

References: Barfield 1991
Barfield and Hodder 1987
Best and Gent forthcoming
Hurley 1990
Jeffery 1991
Passmore and Pallister 1967
Tyers 2007

OxA–15691 3153 ±28 BP

$\delta^{13}C$: -26.5‰

Sample: BLC04-325 (0.45m), submitted in February 2006 by T Gent

Material: waterlogged wood: *Alnus* sp., waterlogged, single fragment (R Gale 2006)

Initial comment: from a monolith taken through pit 658. The backfill has been dated to the Iron Age. Due to the depth of the deposits overlying the site there is no chance of intrusive material or residuality. The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the dating will establish how long the pit took to fill up and will provide useful comparative information to the previous dating undertaken by Waikato.

Calibrated date: 1σ: 1450–1410 cal BC
2σ: 1500–1390 cal BC

Final comment: T Gent (10 April 2007), the poor agreement between the radiocarbon results and stratigraphy from both this monolith and monolith 324, indicate that the material contained has been mixed. The datable material is likely to have been preserved in a waterlogged state in the vicinity, and then introduced to the sampled positions during an unknown number or colluvial episodes. The dates therefore provide only an approximate end point for these events during the Iron Age. Three timbers from pit 658 were also successfully dated by dendrochronology, with support from radiocarbon wiggle-match dating. This group provided a date for the felling of these timbers of 1433–1422BC, confirming a Bronze Age date.

Laboratory comment: English Heritage (20 November 2007), the two measurements on short-lived plant macrofossils from this level are statistically consistent (OxA-15691–2; T'=0.2; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15692 3135 ±29 BP

$\delta^{13}C$: -26.6‰

Sample: 325 (0.45m), submitted in February 2006 by R Woodgate

Material: waterlogged wood: *Alnus* sp., waterlogged, single fragment (R Gale 2005)

Initial comment: as OxA-15691

Objectives: as OxA-15691

Calibrated date: 1σ: 1440–1390 cal BC
2σ: 1490–1320 cal BC

Final comment: see OxA-15691

Laboratory comment: see OxA-15961

OxA–15713 2757 ±34 BP

$\delta^{13}C$: -25.0‰

Sample: BLC04-325 (00–20mm), submitted in February 2006 by T Gent

Material: charcoal: cf *Corylus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-15691

Objectives: the dating will establish how long the pit took to fill up and will provide useful comparative information to the previous dating undertaken by Waikato (Wk-16204; 3110 ±34 BP;1450–1300 cal BC) (Reimer *et al* 2004).

Calibrated date: *1σ*: 930–840 cal BC
2σ: 1000–820 cal BC

Final comment: see OxA-15691

References: Best and Gent forthcoming
Reimer *et al* 2004

OxA–15940 3040 ±28 BP

$\delta^{13}C$: -28.2‰

Sample: BLC04-325 (0.25–0.26m bulk), submitted in February 2006 by T Gent

Material: sediment (humic acid fraction, bulk) (S Davis 2006)

Initial comment: as OxA-15691

Objectives: the dating will establish how long the pit took to fill up and will provide useful comparative information to the previous dating undertaken by Waikato (Wk-16204; 3110 ±34 BP;1450–1300 cal BC; Reimer *et al* 2004). Dating on specific fractions from bulk sediment is suggested to compare with the AMS date on plant macrofossil from this horizon.

Calibrated date: *1σ*: 1380–1260 cal BC
2σ: 1410–1210 cal BC

Final comment: T Gent (10 April 2007), the poor agreement between the radiocarbon results and stratigraphy from this monolith indicate that the material contained has been mixed. The datable material is likely to have been preserved through waterlogging in the vicinity, and then introduced to the sampled positions during an unknown number of colluvial episodes. The dates therefore provide only an approximate end point for these events during the Iron Age. Three timbers from pit 658 were also successfully dated by dendrochronology, with support from radiocarbon wiggle-match dating. This group provided a date for the felling of these timbers of 1433–1422 BC, confirming a Bronze Age date.

Laboratory comment: English Heritage (20 November 2007), the three results from this level are statistically consistent (OxA-15940 and OxA-15975–6; (T′=0.4; T′(5%)=6.0 ν=2; Ward and Wilson 1978).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15975 3022 ±29 BP

$\delta^{13}C$: -29.7‰

Sample: BLC04-325 (0.25–0.26m), submitted in February 2006 by T Gent

Material: waterlogged plant macrofossil (bark fragments) (S Davis 2006)

Initial comment: as OxA-15691

Objectives: the dating of the mid-section from the organic fill in addition to the top and base will indicate whether the rate of deposition of material was constant and serve to tighten the chronology of the feature. AMS dating of specific material is suggested to compare with the bulk sediment fractions dated.

Calibrated date: *1σ*: 1380–1210 cal BC
2σ: 1390–1130 cal BC

Final comment: T Gent (10 April 2007), *see* OxA-15940

Laboratory comment: see OxA-15940

OxA–15976 3015 ±30 BP

$\delta^{13}C$: -29.7‰

Sample: 325 0.25–0.26m, submitted in March 2006 by R Woodgate

Material: sediment (humin fraction, bulk sample) (S Davis 2006)

Initial comment: as OxA-15940

Objectives: as OxA-15940

Calibrated date: *1σ*: 1370–1210 cal BC
2σ: 1390–1130 cal BC

Final comment: see OxA-15940

Laboratory comment: see OxA-15940

Burlescombe: plank-lined springhead, Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2005

Archival body: The Royal Albert Memorial Museum (Exeter)

Description: the watching brief on the topsoil stripping in advance of a quarry extension exposed a multiphase prehistoric and early medieval site set in a shallow depression on a north-east facing hill slope. This depression, measuring *c* 30m north-south and 25m east-west, had been infilled with colluvium to a maximum depth of 2m sometime in the mid- to late Iron Age, sealing and preserving the archaeological deposits. The samples in this series come from context 691, representing the waterlogged fill of the plank-lined springhead (678) and from context 700, which represent the fill of a hollowed-out tree trunk.

Objectives: to provide a precise date for the well feature; to establish the chronological relationship between the two springhead wells.

Final comment: T Gent (11 October 2007), the radiocarbon results correspond with dendrochronology and identify an early medieval date for the plank-lined springhead (678), which appears to have been built shortly before the documented Saxon arrival in the area. They also indicate that plank-lined springhead (678) almost certainly predates the hollowed trunk (693).

References: Best and Gent forthcoming

SUERC–10174 1430 ±35 BP

$\delta^{13}C$: -26.4‰

Sample: BLC04-355, submitted in February 2006 by T Gent

Material: waterlogged plant macrofossils (*Rumex obtusifolius*, 10 seeds) (J Jones 2006)

Initial comment: the sample is from context 691; it represents the fill of the plank-lined springhead. The deposit surviving within the well-head was 100mm thick and was sampled in two spits. Waterlogged material from both spits has been identified as suitable for carbon dating. Due to the depth of deposits overlying colluvium there is no chance of intrusive material or residuality. The feature was cut into natural sands and gravels. The local geology is gravel. The context was immediately above the water table and was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the dating will clarify the date of the structure. It is known that certain timbers used in the structure have been reused, the tool working seems to be a mix of iron and bronze axe marks. The dating will also tie in with the planned dendrochronology.

Calibrated date: *1σ:* cal AD 600–660
2σ: cal AD 560–670

Final comment: T Gent (10 April 2007), dendrochronology provides a precise felling date for one of the timbers used in construction of the plank-lined springhead (678) of spring AD 629. The radiocarbon results correspond with dendrochornology studies, and identify an early medieval date for the structure, which appears to have been built shortly before the documented Saxon arrival in the area.

References: Tyers 2007

SUERC–10179 1475 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: BLC04-359-0-5 top, submitted in February 2006 by T Gent

Material: waterlogged plant macrofossils: *Polygonum aviculare*, 20 seeds (J Jones 2006)

Initial comment: this sample is from context 691. It represents the waterlogged fill of the plank-lined springhead (678). This was excavated in two spits. Due to the depth of deposits of overlying colluvium there is no chance of intrusive material or residuality. The feature was cut into natural sands and gravels, immediately above the water table. The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: this material may represent the most suitable material for ascertaining the period of utilisation of the springhead 678.

Calibrated date: *1σ:* cal AD 550–640
2σ: cal AD 530–650

Final comment: T Gent (10 April 2007), this result accompanies the other radiocarbon determinations and dendrochronolgy results from this feature, and supports an indication that plank-lined springhead 678 predates the hollowed trunk (693).

SUERC–10180 1455 ±40 BP

$\delta^{13}C$: -24.5‰

Sample: BLC04-359-0-5 bottom, submitted in February 2006 by T Gent

Material: waterlogged plant macrofossil: *Corylus avellana*, nut fragment (J Jones 2006)

Initial comment: as SUERC-10179

Objectives: as SUERC-10174

Calibrated date: *1σ:* cal AD 570–650
2σ: cal AD 540–660

Final comment: see SUERC-10179 and SUERC-10181

References: Tyers 2007

Burlescombe: the western well (hollowed tree trunk 546 and shoe), Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2005

Archival body: The Royal Albert Memorial Museum (Exeter)

Description: a sub-circular pit (693 was situated 1m to the west of springhead 678. This was up to 1.6m wide and 0.7m deep, with steep sides and a flattish base. Part of a hollowed tree trunk (546) had been placed vertically within the western part of the pit. This trunk was approximately 0.56m tall and up to 0.5m wide, and was identified as either poplar or willow. Redeposited natural sand (698) had been used to infill the pit around the trunk once it had been set in place. Fragments of nine vertical stakes and brushwood wattling, including species such as, oak, alder, holly but predominantly hazel (*ibid.*) were recovered from the upper part of fills (697 and 698), around the edge of the pit. It would appear that the tree trunk was originally surrounded by a wattle revetment to protect the well against the accumulation of soft sands at the base of the hillslope. The environmental evidence recovered from 697, 698 and the fill of the hollowed trunk was similar to those from the plank-lined springhead and launder, and suggests that this was an area used for watering animals. The tree trunk and its contents were lifted intact to allow excavation and sampling of its fill under laboratory conditions at the Wiltshire Conservation Centre. During this excavation, a leather shoe was exposed *c* 0.35m below the upper edge of the trunk, slightly squashed against the side.

Objectives: to provide a precise date for the construction of the western well and a chronology for its subsequent infilling, and to date the shoe.

Final comment: T Gent (11 October 2007), radiocarbon dates provide an estimate for the start of the use of the western well (546) of cal AD 670-760 *(95% probability; event 546;* Fig. 35; Best and Gent forthcoming) and probably *cal AD 680-730 (68% probability*). It thus post-dates the construction of the eastern well 678, dendrochronologically dated to spring AD 629.

References: Best and Gent forthcoming

OxA–15960 1227 ±31 BP

$\delta^{13}C$: -24.8‰

Sample: BLC04-547 (find # 546), submitted in May 2006 by R Woodgate

Material: waterlogged wood (willow/poplar) (R Gale 2006)

Initial comment: this sample represents part of a hollowed-out tree trunk (willow or poplar). The trunk was overlain by a thick band of colluvium, and was set into natural sands with an area of waterlogged trampling around it. There is little or no chance of intrusive elements or residuality. The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: the date will indicate the age of the hollowed tree trunk. It will also provide a comparison to the date of the leather shoe.

Calibrated date: 1σ: cal AD 710–870
2σ: cal AD 680–890

Final comment: T Gent (10 April 2007), this result indicates the early medieval date of the creation of the hollowed tree trunk. In combination with other results, it also suggests strongly that the hollowed trunk post-dates the plank-lined springhead (678)

OxA–15977 1346 ±27 BP

$\delta^{13}C$: -28.4‰

Sample: BLC04-548, submitted in May 2006 by R Woodgate

Material: leather (waterlogged)

Initial comment: the leather fragments/shoe were recovered from the waterlogged fill of a hollowed-out tree trunk (willow/poplar). The trunk was overlain by a thick bank of colluvium, and was set into natural sands with an area of waterlogged trampling around it. There is little or no chance of intrusive elements or residuality. The local geology is gravel. The spread of material immediately overlies the water table (the interface of this context and the underlying ones representing the level of the water table). The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: material from the top and bottom of the fill of this structure has also been submitted for radiocarbon dating, as has a fragment from the hollowed-out trunk. It was thought that the shoe may represent the 'earliest shoe' found in a British context, although scientific dating of the shoe is the only method available to us for clarifying this point. A plank-lined 'spring head' immediately to the east, initially thought to be prehistoric was dendrochronologically dated to AD 421–628, with a precise felling date for one timber of spring AD 629 (Tyers 2007).

Calibrated date: 1σ: cal AD 650–680
2σ: cal AD 640–760

Final comment: T Gent (14 April 2007), this radiocarbon result refutes initial suggestions of an Iron Age date for the shoe, and identifies an early medieval date. The results also suggest that the shoe is as much as 50 to 100 years older than the trunk in which it was found.

References: Tyers 2007

SUERC–10178 1285 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: BLC04-357, submitted in February 2006 by T Gent

Material: waterlogged plant macrofossil (*Rubus* sect. *Glandulosus*, 20 seeds) (J Jones 2006)

Initial comment: this sample is from context 697; it represents the waterlogged 'trample' around the hollow tree trunk, dark reddish brown (5YR 3/3) gritty sand. Due to the depth of the overlying colluvium there is no chance of intrusive material or residuality. The local geology is gravel. The context was immediately above the water table.The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown.

Objectives: this material may represent the most suitable material for ascertaining the period of utilisation of the hollow trunk (dates from the fills of the hollow marks its disuse and gradual filling, while dating the wood of the hollow determines the 'death' of the felled tree).

Calibrated date: 1σ: cal AD 670–780
2σ: cal AD 650–810

Final comment: T Gent (10 April 2007), in association with the radiocarbon results from the timber of the hollowed trunk, this result strongly suggests that the feature post-dates the construction of the plank-lined springhead (678) exposed to the east.

SUERC–10181 1260 ±35 BP

$\delta^{13}C$: -26.9‰

Sample: BLC04-546-0 top, submitted in February 2006 by T Gent

Material: waterlogged plant macrofossil (*Polygonum hydropiper*, 20 seeds) (J Jones 2006)

Initial comment: this sample is from context 700. The context represents the fill of a hollowed out tree trunk (willow or poplar). The waterlogged fill was taken out in spits, the first and last spits (spits 0 and 9) both had suitable waterlogged plant macrosfopssils and have been submitted for dating. The trunk was overlain by a thick band of colluvium, and was set into natural sands with an area of waterlogged trampling around it. There is little or no chance of intrusive elements or residuality. The local geology is gravel. The context was undisturbed and unbioturbated. The pH is likely to be slightly alkaline (approximately pH 6.5) although exact parameters are unknown. The base of the hollow trunk was below the water table.

Objectives: the dates will indicate the period of time it took for the hollow trunk to silt up. They will also provide a comparison to the date of the leather shoe.

Calibrated date: 1σ: cal AD 680–780
2σ: cal AD 660–880

Final comment: T Gent (10 April 2007), in association with the result obtained from the wood of the hollowed trunk, this result strongly suggests the this feature post-dates the plank-lined springhead (678). *See* SUERC-10180.

Burlescombe: wiggle-matching, Devon

Location: ST 810658
Lat. 51.23.26 N; Long. 02.16.23 W

Project manager: T Gent (Exeter Archaeology), 2004

Archival body: The Royal Albert Memorial Museum (Exeter)

Description: ten decadal blocks of tree-rings from the 245-year floating series from plank 475 within pit 658.

Objectives: to provide independent evidence for the dating of this timber, to determine whether tentative cross-dating for the tree-ring sequence, ending in 1433 BC (Tyers 2007), is valid.

Final comment: P Marshall (3 October 2007), wiggle-matching was initially performed using the data published by Reimer *et al* (2004). This suggests that the last ring of the timber dates to *1440–1400 cal BC* (*95% probability*). Since this distribution includes the suggested tree-ring date of BC 1433 (Tyers 2007), the analysis was repeated with this calendar date included as the final ring of the sequence (cf Bayliss *et al* 1999). Overall, the radiocarbon results are in good agreement with the date suggested by the dendrochronological analysis (A=46.7.%; (A_n=21.3%), and so the tree-ring date of 1433 BC for the last ring on this timber can be accepted. Allowing for missing sapwood, this timber was probably felled in 1433–1413 BC.

References: Bayliss *et al* 1999
Best and Gent forthcoming
Reimer *et al* 2004
Tyers 2007

GrN–30162 3355 ±14 BP

δ¹³C: -26.1‰

Sample: Sample A, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 18–27 of the 245-ring floating tree-ring series from timber 475.

Objectives: to provide independent evidence for the dating of this timber, to determine whether tentative cross-dating for the tree-ring sequence, ending in 1433 BC (Tyers 2007), is valid.

Calibrated date: *1σ*: 1685–1620 cal BC
2σ: 1690–1610 cal BC

Final comment: P Marshall (3 October 2007), wiggle-matching of the series of radiocarbon results suggests that this decadal block dates to *1660–1625 cal BC (GrN-30162*; Tyers 2007, Table 10). This is consistent with the date of 1660–1651 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30163 3341 ±21 BP

δ¹³C: -25.9‰

Sample: Sample B, submitted in April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 38–47 of the 245-ring floating tree-ring series from timer 475.

Objectives: as GrN-30162

Calibrated date: *1σ*: 1665–1610 cal BC
2σ: 1690–1530 cal BC

Final comment: P Marshall (3 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1640–1605 cal BC (GrN-30163*; Tyers 2007, Table 10). This is consistent with the date of 1640–1631 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30164 3343 ±21 BP

δ¹³C: -25.6‰

Sample: Sample C, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 58–67 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: *1σ*: 1670–1610 cal BC
2σ: 1690–1530 cal BC

Final comment: P Marshall (4 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1620–1585 cal BC (GrN-30164*; Tyers 2007, Table 10). This is consistent with the date of 1620–1611 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30165 3305 ±17 BP

δ¹³C: -26.0‰

Sample: Sample D, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 78–87 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: *1σ*: 1620–1525 cal BC
2σ: 1630–1520 cal BC

Final comment: P Marshall (4 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1600–1565 cal BC (GrN-30165*; Tyers 2007, Table 10). This is consistent with the date of 1600–1591 BC for there rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30166 3277 ±18 BP

δ¹³C: -25.8‰

Sample: Sample E, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 98–107 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: 1σ: 1605–1515 cal BC
2σ: 1615–1495 cal BC

Final comment: P Marshall (4 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1580–1545 cal BC (GrN-30166*; Tyers 2007, Table 10). This is consistent with the dates of 1580–1571 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30167 3291 ±25 BP

$\delta^{13}C$: -25.2‰

Sample: Sample F, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 118–127 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: 1σ: 1620–1520 cal BC
2σ: 1630–1490 cal BC

Final comment: P Marshall (4 October 2007), wiggle-matching the series of the radiocarbon results suggests that this decadal block dates to *1560–1525 cal BC (GrN-30167*; Tyers 2007, Table 10). This is consistent with the dates of 1580–1571 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30168 3243 ±17 BP

$\delta^{13}C$: -25.8‰

Sample: Sample G, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 138–147 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: 1σ: 1525–1495 cal BC
2σ: 1600–1455 cal BC

Final comment: P Marshall (4 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1540–1505 cal BC (GrN-30168*; Tyers 2007, Table 10). This is consistent with the date of 1540–1531 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30169 3243 ±20 BP

$\delta^{13}C$: -26.0‰

Sample: Sample H, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 158–167 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: 1σ: 1525–1495 cal BC
2σ: 1605–1450 cal BC

Final comment: P Marshall (3 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1520–1485 cal BC (GrN-30169*; Tyers 2007, Table 10). This is consistent with the date of 1520–1511 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30170 3205 ±17 BP

$\delta^{13}C$: -25.9‰

Sample: Sample I, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 178–187 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: 1σ: 1500–1445 cal BC
2σ: 1510–1430 cal BC

Final comment: P Marshall (3 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1500–1465 cal BC (GrN-30170*; Tyers 2007, Table 10). This is consistent with the date of 1500–1491 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

GrN–30171 3188 ±24 BP

$\delta^{13}C$: -26.6‰

Sample: Sample J, submitted on 25 April 2006 by I Tyers

Material: waterlogged wood: *Quercus* sp. (200–250g) (I Tyers 2006)

Initial comment: rings 198–207 of the 245-ring floating tree-ring series from timber 475.

Objectives: as GrN-30162

Calibrated date: 1σ: 1495–1430 cal BC
2σ: 1505–1410 cal BC

Final comment: P Marshall (3 October 2007), wiggle-matching the series of radiocarbon results suggests that this decadal block dates to *1475–1455 cal BC (*GrN-30171; Tyers 2007, Table 10). This is consistent with the date of 1480–1471 BC for these rings, derived from the tentative tree-ring match.

References: Tyers 2007

Catholme (Where Rivers Meet), Staffordshire

Location: SK 196416
Lat. 52.58.16 N; Long. 01.42.29 W

Project manager: M Hewson (Birmingham Archaeology), 2004

Description: the site lies on a sand and gravel terrace on the west bank of the river Trent, just north of its confluence with the river Tame. The principal monuments of the Catholme Ceremonial Complex are afforded statutory protection as Scheduled Ancient Monuments. No previous excavation has taken place within the scheduled areas and the monuments have not been affected directly by sand and gravel extraction. However, extensive quarrying has taken place in adjacent areas, accompanied by archaeological excavations, which have, for example, revealed Neolithic/early Bronze Age ritual monuments and a major Anglo-Saxon settlement. The focus of this landscape would appear to lie at Catholme Farm on the extensive river terrace immediately to the north of the confluence of the two rivers. The cluster of monuments here has been termed the "Catholme Ceremonial Complex", but further monuments spread out to the west and south up the valleys of the Trent and Tame, making the Catholme complex a focus for a more diffuse ritual landscape. This project consists of the Woodhenge and the ring ditch series. A total of nine samples were submitted for radiocarbon dating for this prioject.

Objectives: to confirm dates of use of the possible Neolithic woodhenge monument in absence of artefactual data, and to confirm dates for the probable Beaker/early Bronze Age ring ditch in order to compare with artefactual data.

Final comment: M Hewson (September 2007), the results from statistical analysis of the radiocarbon dating from the Woodhenge structure and the adjacent ring ditch (within the Sunburst Monument) indicate a statistically consistent date of *2570–2470 cal BC (95% probability; Last woodhenge*; fig x) for the former, and a date of *2570–2490 cal BC (95% probability; Event Ring ditch re-cut*; fig x; Hamilton *et al* forthcoming) for the latter. This means that the Woodhenge structure and the ring ditch at the centre of the Starburst monument are likely to have been contemporary monuments within the landscape. This is particularly interesting, given the results from the visualisation of the GPR survey of the ring ditch and Sunburst monument, which indicates that the ring ditch is a later feature than the Sunburst monument. Hence, the radiocarbon dating, and the Bayesian analysis of these dates, has added to a chronology for the site which begins with the construction of a cursus monument directly to the west, presumably towards the centre of the fourth millennium BC. This was followed by the construction of the Sunburst monument at some point prior to 2500 cal BC. At around 2500 cal BC, the Woodhenge structure was erected and, at approximately the same time, a ring ditch was cut around the central area of what had been the Sunburst Monument. This feature had one break in its eastern side and may more helpfully be considered to be a hengiform monument. It appears on the basis of pottery diagnostics that the construction of this feature was post-dated by the insertion of a central burial at the site at around 2000 cal BC.

References: Bain *et al* 2005
Hamilton *et al* forthcoming

Catholme Farm (Where Rivers Meet): ring ditch, Staffordshire

Location: SK 19461682
Lat. 52.44.54 N; Long. 01.42.42 W

Project manager: M Hewson (Birmingham Archaeology), 2004

Archival body: Potteries Museum, Stoke

Description: the site lies on a sand and gravel terrace on the west bank of the river Trent, just north of its confluence with the river Tame. The principal monuments of the Catholme Ceremonial Complex are afforded statutory protection as Scheduled Ancient Monuments. No previous excavation has taken place within the scheduled areas and the monuments have not been affected directly by sand and gravel extraction. However, extensive quarrying has taken place in adjacent areas, accompanied by archaeological excavations, which have, for example, revealed Neolithic/early Bronze Age ritual monuments and a major Anglo-Saxon settlement. The focus of this landscape would appear to lie at Catholme Farm on the extensive river terrace immediately to the north of the confluence of the two rivers. The cluster of monuments here has been termed the "Catholme Ceremonial Complex", but further monuments spread out to the west and south up the valleys of the Trent and Tame, making the Catholme complex a focus for a more diffuse ritual landscape.

In Area B2, a Beaker/early Bronze Age ring ditch with radiating pit alignments, previously known only from aerial photography, was excavated. The ditch, which had in a later phase been re-cut, was visible in its entirety. An ovoid pit was excavated in its centre, which contained numerous fragments of incised Beaker pottery and some worked flint. This pit was interpreted as the surviving remains of an inhumation, although no human remains were recovered. In Area A1, part of a probable Iron Age pit alignment was identified. These were found to contain several distinct deposition layers, although no artefacts were recovered.

Objectives: to confirm the date for the probable Beaker/ early Bronze Age ring ditch in order to compare with artefactual data.

Final comment: see final comment above

References: Bain *et al* 2005

OxA–16051 3997 ±30 BP

$\delta^{13}C$: -26.5‰

Sample: F105.01/1030A, submitted in May 2006 by M Hewson

Material: charcoal: *Alnus* sp., single fragment (R Gale 2006)

Initial comment: this was a sample from the primary fill of a recut ditch. It was sealed by at least one upper fill though also partially cut by a later recut ditch. It was cut into sandy gravel natural subsoil, free draining geology.

Objectives: to establish the period of use of the ring ditch and to compare with the artefactual data. To aid the provision of a context for the function of the monument within the wider ritual landscape.

Calibrated date: 1σ: 2570–2470 cal BC
2σ: 2580–2460 cal BC

Final comment: M Hewson (September 2007), a total of four samples were dated from the ring ditch feature. Two of these (SUERC-11072 and OxA-16052) were from the primary fill of the ring ditch, whereas the other two (SUERC-11071 and OxA-16051) derive from the recutting of this feature. Statistical analysis indicates that all four of these dates are consistent, thus presumably representing the overall recutting phase of the ditch at some period around 2570–2490 cal BC.

Laboratory comment: English Heritage (September 2007), the two measurements from the recut ditch (SUERC-11071 and OxA-16051) are statistically consistent (T′=0.2; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16052 4011 ±30 BP

$\delta^{13}C$: -25.6‰

Sample: F112.01/1022A, submitted in May 2006 by M Hewson

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: this sample is from the primary fill of a ditch. It was sealed by at least one upper fill though also partially cut by a later recut ditch. Cut into sandy gravel natural subsoil, free draining geology.

Objectives: as SUERC-11071

Calibrated date: *1σ*: 2580–2470 cal BC
2σ: 2620–2460 cal BC

Final comment: see SUERC-11071

Laboratory comment: see SUERC-11072

SUERC–11071 4020 ±35 BP

$\delta^{13}C$: -26.2‰

Sample: F105.01/1030, submitted in May 2006 by M Hewson

Material: charcoal: *Alnus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-16051

Objectives: as OxA-16051

Calibrated date: *1σ*: 2580–2470 cal BC
2σ: 2830–2460 cal BC

Final comment: see OxA-16051

Laboratory comment: see OxA-16051

SUERC–11072 3980 ±35 BP

$\delta^{13}C$: -26.4‰

Sample: F112.01/1022B, submitted in May 2006 by M Hewson

Material: charcoal: *Betula* sp., single fragment (R Gale 2006)

Initial comment: as OxA-16052

Objectives: as SUERC-11071

Calibrated date: *1σ*: 2570–2460 cal BC
2σ: 2580–2450 cal BC

Final comment: see SUERC-11071

Laboratory comment: English Heritage (September 2007), the two measurements from the primary fill (SUERC-11072 and OxA-16052) are statistically consistent (T′=0.5; v=1; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

Catholme Farm (Where Rivers Meet): Woodhenge, Staffordshire

Location: SK 19641667
Lat. 52.44.49 N; Long. 01.42.33 W

Project manager: M Hewson (Birmingham Archaeology), 2004

Archival body: Potteries Museum, Stoke

Description: the site lies on a sand and gravel terrace on the west bank of the river Trent, just north of its confluence with the river Tame. The principal monuments of the Catholme Ceremonial Complex are afforded statutory protection as Scheduled Ancient Monuments. No previous excavation has taken place within the scheduled areas and the monuments have not been affected directly by sand and gravel extraction. However, extensive quarrying has taken place in adjacent areas, accompanied by archaeological excavations, which have, for example, revealed Neolithic/early Bronze Age ritual monuments and a major Anglo-Saxon settlement. The focus of this landscape would appear to lie at Catholme Farm on the extensive river terrace immediately to the north of the confluence of the two rivers. The cluster of monuments here has been termed the "Catholme Ceremonial Complex", but further monuments spread out to the west and south up the valleys of the Trent and Tame, making the Catholme complex a focus for a more diffuse ritual landscape.

In Area B2, a Beaker/early Bronze Age ring ditch with radiating pit alignments, previously known only from aerial photography, was excavated. The ditch, which had in a later phase been recut, was visible in its entirety. An ovoid pit was excavated in its centre, which contained numerous fragments of incised Beaker pottery and some worked flint. This pit was interpreted as the surviving remains of an inhumation although no human remains were recovered. In Area A1, part of a probable Iron Age pit alignment was identified. These were found to contain several distinct deposition layers, although no artefacts were recovered. In Area A2 a 'woodhenge' feature, comprising a series of five concentric rings of circular pits, was partially exposed. Each of the excavated pits had steep, near vertical sides and measured between 0.7m and 1.23m in depth. One example contained what appeared to be the degraded and burnt remains of a wooden post. Two other pits also contained evidence of a post in the form of staining. It is likely that many if not all the pits once held upstanding posts. In Field F, a second ring ditch was also selected for excavation. Only a small section of the 5m diameter ring ditch was exposed during the excavation in Area F1. It proved to measure over 2m wide and clearly had been recut in a later phase. Two linear features were also located converging toward the ditch. These pre-dated the ring ditch having been truncated during the ditch's primary construction phase.

Objectives: to confirm dates for use of the possible Neolithic woodhenge monument in the absence of artefactual data.

Final comment: see final comment above

References: Bain *et al* 2005
Hamilton *et al* forthcoming

OxA–16048 4095 ±30 BP

$\delta^{13}C$: -25.6‰

Sample: F113.01/2018, submitted in May 2006 by M Hewson

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2006)

Initial comment: this sample came from a bulk sample from the primary fill of a post-pit. It was sealed by at least 0.30–0.40m of modern ploughsoil. Cut into sandy gravel natural subsoil, free-draining geology.

Objectives: to establish the period of use of the Woodhenge monument in the absence of artefactual data. To aid the provision of a context for the use of the monument within the wider ritual landscape.

Calibrated date: 1σ: 2840–2570 cal BC
2σ: 2870–2500 cal BC

Final comment: M Hewson (September 2007), this sample comes from the fifth (outer) ring of the woodhenge. A total of five samples were dated from the five rings of the Woodhenge structure. Of these samples statitical analysis demonstrated that the five samples were not statistically consistent (T'=14.0; T'(5%)=9.5; ν=4; Ward and Wilson 1978), although if sample SUERC-11070 (from ring 4) is excluded (T'=6.3; T'(5%)=7.8; ν=3; Ward and Wilson 1978), the remaining four dates are statistically consistent, indicating that they could be of the same age.

References: Ward and Wilson 1978

OxA–16049 4018 ±30 BP

$\delta^{13}C$: -25.5‰

Sample: F224/2046, submitted in May 2006 by M Hewson

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2006)

Initial comment: as OxA-16048

Objectives: as OxA-16048

Calibrated date: 1σ: 2580–2470 cal BC
2σ: 2620–2460 cal BC

Final comment: see OxA-16048

OxA–16050 4108 ±31 BP

$\delta^{13}C$: -25.7‰

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2006)

Initial comment: as OxA-16048

Objectives: as OxA-16048

Calibrated date: 1σ: 2860–2570 cal BC
2σ: 2870–2500 cal BC

Final comment: see OxA-16048

SUERC–11069 4115 ±35 BP

$\delta^{13}C$: -24.6‰

Sample: F207/2010, submitted in May 2006 by M Hewson

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2006)

Initial comment: this sample is from a single fill of a post-pit. It was sealed below 0.30–0.40m of modern plough soil. Cut into sandy gravel natural subsoil, free draining geology.

Objectives: to establish the period of use of the woodhenge monument in the absence of artefactual data. To aid the provision of a context for the use of the monument within the wider ritual landscape.

Calibrated date: 1σ: 2860–2580 cal BC
2σ: 2880–2500 cal BC

Final comment: see OxA-16048

SUERC–11070 3975 ±35 BP

$\delta^{13}C$: -25.4‰

Sample: F234/2061, submitted in May 2006 by M Hewson

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2006)

Initial comment: as SUERC-11069

Objectives: as SUERC-11069

Calibrated date: 1σ: 2570–2460 cal BC
2σ: 2580–2410 cal BC

Final comment: M Hewson (September 2007), this date from from the fourth ring of the woodhenge has to be excluded to make the dates consistent. *See* OxA-16048.

Cheviot Quarry, Northumberland

Location: NT 951328
Lat. 51.05.38 N; Long. 02.04.12 W

Project manager: B Johnson (Archaeological Research Services Ltd), 2005

Description: a series of postholes, hearths, and pits cut into fluvio-glacial terrace deposits within the Milfield Basin, Northumberland. Pits and hearths containing early, middle, and later Neolithic pottery, Beaker pottery, and presumed late Bronze Age pottery were discovered during excavations by Archaeological Research Services Ltd and from other, previous interventions. Most features within this application comprised one cut and one fill and all were truncated by later ploughing and construction activity. The postholes with which the Neolithic pottery was found in close association resolved themselves as seven buildings: two circular (buildings 4 and 5), four sub-rectangular (buildings 1, 2, 3, and 7), and finally one sub-triangular (building 6) structure, which had no close ceramic associations. The series consists of a number of widely distributed pits and hearths from all previous archaeological interventions at Cheviot Quarry that contained pottery vessels known to date by morphological association to the early, middle, and later Neolithic and the Beaker period. It also contains several pits and hearths in close associations with two circular post-built buildings that contained pottery sherds, and had produced late Bronze Age radiocarbon dates.

Objectives: the objectives of this radiocarbon dating programme were threefold; firstly to date the span of Neolithic activity at Cheviot Quarry, secondly to date the presumed late Bronze Age pottery at the site, and thirdly to establish the dates of construction and use of the buildings. An association with nearby features (buildings 2 and 3) of extremely similar morphology, that were themselves very closely associated with pits containing Grooved Ware pottery, suggests building 1 may be later Neolithic. No material culture was recovered directly from the postholes, however, and given the lack of vertical stratigraphy, the dates of the buildings cannot be ascribed with complete confidence. A total of four samples, comprising two samples of separate species from one posthole and two other samples from two postholes, are being submitted to endeavour to overcome any potential problems with residuality.

Final comment: B Johnson (9 November 2007), the spread of dates, together with the sequence of Neolithic pottery evident on the site, suggest that the Cheviot Quarry sites formed important parts of the landscape throughout the Neolithic period. Two of the dates are clearly incorrect, OxA-16098 on a residue from a Beaker vessel is too early and OxA-16162 on a residue from a Carinated Bowl is too late, when compared to the known corpus of dated pottery from the region. However, if these two dates are excluded from the discussion, the rest of the dates show Carinated Bowls and Plain Ware being used in the earlier half of the fourth millennium BC, followed by the use of Impressed Ware by the late fourth millennium BC, and Grooved Ware in the latter half of the early third millennium BC, and Beaker vessels in use by the late third millennium BC.

References: Johnson and Waddington in press

Cheviot Quarry: circular buildings, Northumberland

Location: NT 951328
Lat. 51.05.38 N; Long. 02.04.12 W

Project manager: B Johnson (Archaeological Research Services Ltd), 2005

Archival body: Archaeological Research Service Ltd.

Description: a series of postholes formed two circular buildings (building 4 and 5). Both contained material suitable for dating.

Objectives: to establish the dates of construction and use of the buildings, suggested by associated pottery to be early Neolithic.

Final comment: B Johnson (9 November 2007), based upon the radiocarbon dating undertaken as part of this work, the use of the circular buildings is estimated to have started during the tenth century cal BC and continued in use well into the ninth century cal BC. The dating programme has been very successful in providing the first evidence of lowland late Bronze Age settlement in the Milfield basin.

Laboratory comment: English Heritage (2007) all eight measurements from building 5 are statistically consistent (SUERC-9091–4 and SUERC-9098–9101; T′=8.5; T′(5%)=14.1; ν=7; Ward and Wilson 1978). If the two earlier results on clearly residual material (SUERC-9112 and SUERC-9114) are excluded, the other five results from building 4 are also statistically consistent (T′=2.7; T′(5%)=9.5; ν=4; Ward and Wilson 1978).

References: Johnson and Waddington in press
Ward and Wilson 1978

SUERC–9091 2735 ±35 BP

δ¹³C: -25.4‰

Sample: 308/127/1, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Corylus* sp., 3 years old, single fragment (J Huntley 2006)

Initial comment: from posthole 308, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 5), and is situated to the south-east of the circle, forming one side of an entranceway. Residuality is possible due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. Some rootlet penetration and truncat by ploughing also occurred.

Objectives: to establish the dates of construction and use of building 5. Posthole 316 contained Carinated Ware pottery. A very close association with a pit, 306, within the interior of the building, as well as nearby features, that all contained Carinated Ware pottery, as well as the morphological similarity and close proximity of building 4, suggests building 5 may be early Neolithic.

Calibrated date: *1σ:* 920–830 cal BC
2σ: 980–800 cal BC

Final comment: B Johnson (9 November 2007), the dating has shown that Building 5 is tenth and eleventh century cal BC in date. This is the first evidence of lowland late Bronze Age settlement in the Milfield basin.

SUERC–9092 2785 ±35 BP

δ¹³C: -26.4‰

Sample: 308/127/2, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Corylus* sp., 7 years old, single fragment (J Huntley 2006)

Initial comment: as SUERC-9091

Objectives: as SUERC-9091

Calibrated date: *1σ:* 980–890 cal BC
2σ: 1020–830 cal BC

Final comment: see SUERC-9091

References: Johnson and Waddington in press

SUERC–9093 2795 ±35 BP

δ¹³C: -27.0‰

Sample: 312/156/1, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Corylus* sp., 5 years old, single fragment (J Huntley 2006)

Initial comment: from posthole 312, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 5), and is situated to the south-east of the circle, forming one side of an entranceway. Residuality is possible due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: as SUERC-9091

Calibrated date: *1σ*: 1010–900 cal BC
2σ: 1030–840 cal BC

Final comment: see SUERC-9091

SUERC–9094 2820 ±35 BP

δ¹³C: -25.8‰

Sample: 312/156/2, submitted on 13 December 2006 by B Johnson

Material: charcoal (*Salix/Populus* sp., single fragment) (J Huntley 2006)

Initial comment: as SUERC-9093

Objectives: as SUERC-9101

Calibrated date: *1σ*: 1020–910 cal BC
2σ: 1060–890 cal BC

Final comment: see SUERC-9101

References: Johnson and Waddington in press

SUERC–9098 2855 ±35 BP

δ¹³C: -27.5‰

Sample: 3116/150/1, submitted on 13 December 2005 by B Johnson

Material: charcoal: *Corylus* sp., roundwood, single fragment (J Huntley 2006)

Initial comment: from posthole 316, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 5), and is situated to the south-east of the circle. It contains sherds of Carinated Ware pottery. Residuality is possibly due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: as SUERC-9101

Calibrated date: *1σ*: 1060–940 cal BC
2σ: 1130–910 cal BC

Final comment: see SUERC-9101

References: Johnson and Waddington in press

SUERC–9099 2790 ±30 BP

δ¹³C: -27.7‰

Sample: 316/128/2, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Corylus* sp., 6 years old, single fragment (J Huntley 2006)

Initial comment: as SUERC-9098

Objectives: as SUERC-9091

Calibrated date: *1σ*: 980–900 cal BC
2σ: 1020–840 cal BC

Final comment: see SUERC-9091

SUERC–9100 2850 ±35 BP

δ¹³C: -27.6‰

Sample: 489/161/1, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Corylus* sp., single fragment (J Huntley 2006)

Initial comment: from posthole 489, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 5), and is situated to the south-east of the circle, forming one side of an entranceway. Residuality is possible due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: as SUERC-9091

Calibrated date: *1σ*: 1060–930 cal BC
2σ: 1130–910 cal BC

Final comment: see SUERC-91091

SUERC–9101 2805 ±35 BP

δ¹³C: -24.2‰

Sample: 489/161/2, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Quercus* sp., twig, single fragment (J Huntley 2006)

Initial comment: as SUERC-9100

Objectives: as SUERC-9091

Calibrated date: *1σ*: 1010–900 cal BC
2σ: 1050–840 cal BC

Final comment: see SUERC-9101

References: Johnson and Waddington in press

SUERC–9109 2725 ±35 BP

δ¹³C: -27.9‰

Sample: 346/117/1, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Betula* sp., single fragment (J Huntley 2005)

Initial comment: from posthole 346, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 4), and is situated to the south-east of the circle, forming one side of an entranceway. Residuality is possible, due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: to establish the dates of construction and use of building 4. Postholes 338, 342, 346, and 352 all contained sherds of Carinated Ware pottery; this structure was also very closely associated with a large pit within the interior of the building, as well as nearby features, that also contained Carinated Ware pottery. Along with the morphological similarity and close proximity of building 5, all strands of evidence suggest building 4 may be early Neolithic.

Calibrated date: *1σ*: 910–820 cal BC
2σ: 970–800 cal BC

Final comment: B Johnson (9 November 2007), the dating has shown that Building 4 is tenth and eleventh century cal BC in date. This is the first evidence of lowland late Bronze Age settlement in the Milfield basin.

References: Johnson and Waddington in press

SUERC–9110 2800 ±35 BP

$\delta^{13}C$: -25.6‰

Sample: 346/117/2, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Cytisus* sp., single fragment (J Huntley 2005)

Initial comment: as SUERC-9109

Objectives: as SUERC-9109

Calibrated date: *1σ*: 1010–900 cal BC
2σ: 1050–840 cal BC

Final comment: see SUERC-9109

Laboratory comment: see SUERC-9109

SUERC–9111 2775 ±35 BP

$\delta^{13}C$: -25.5‰

Sample: 348/169/1, submitted on 11 January 2006 by B Johnson

Material: charcoal: Pomoideae, single fragment (J Huntley 2005)

Initial comment: from posthole 348, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 4), and is situated to the south-east of the circle. Residuality is possible due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: as SUERC-9109

Calibrated date: *1σ*: 980–890 cal BC
2σ: 1010–830 cal BC

Final comment: see SUERC-9109

Laboratory comment: English Heritage (2007), the two results on samples of charcoal that were submitted from posthole 348 (SUERC-9111 and SUERC-9112) are not statistically consistent (T'=1983.7; T'(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–9112 5015 ±35 BP

$\delta^{13}C$: -26.2‰

Sample: 348/69/2, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Corylus* sp., single fragment (J Huntley 2006)

Initial comment: as SUERC-9111

Objectives: as SUERC-9109

Calibrated date: *1σ*: 3930–3710 cal BC
2σ: 3950–3700 cal BC

Final comment: see SUERC-9109

Laboratory comment: English Heritage (2007), this fragment of charcoal is clearly residual. *See* SUERC-9111.

SUERC–9113 2745 ±35 BP

$\delta^{13}C$: -23.0‰

Sample: 363/82/2, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Corylus avellana*, single fragment (J Huntley 2005)

Initial comment: from posthole 363, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 4), and is situated to the south-east of the circle. Residuality is possible, due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: as SUERC-9109

Calibrated date: *1σ*: 920–830 cal BC
2σ: 980–810 cal BC

Final comment: see SUERC-9109

SUERC–9114 5740 ±35 BP

$\delta^{13}C$: -27.1‰

Sample: 369/89/2, submitted on 13 December 2006 by B Johnson

Material: charcoal: *Quercus* sp., twig, single fragment (J Huntley 2005)

Initial comment: from posthole 369, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole forms part of a circular structure (building 4), and is situated to the south-east of the circle. Residuality is possible, due to the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial gravel terrace deposits. There is some rootlet penetration and the feature was truncated by ploughing.

Objectives: as SUERC-9109

Calibrated date: *1σ*: 4670–4530 cal BC
2σ: 4690–4490 cal BC

Final comment: see SUERC-9109

Laboratory comment: English Heritage (2007), a second sample from this feature failed to produce sufficient carbon for dating. This piece of charcoal is probably residual.

SUERC–9513 2765 ±35 BP

$\delta^{13}C$: -25.6‰

Sample: 363/81/3, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Corylus avellana*, roundwood, single fragment (J Huntley 2006)

Initial comment: as SUERC-9113

Objectives: as SUERC-9109

Calibrated date: 1σ: 970–840 cal BC
2σ: 1010–820 cal BC

Final comment: see SUERC-9109

Cheviot Quarry: late Bronze Age pottery, Northumberland

Location: NT 951328
Lat. 51.05.38 N; Long. 02.04.12 W

Project manager: B Johnson (Archaeological Research Services Ltd), 2005

Archival body: Archaeological Research Services Ltd.

Description: the site consists of a series of pits and hearths in close association with two circular post-built buildings. These have provided late Bronze Age radiocarbon dates, but were originally thought to be early Neolithic, based on the pottery sherds found within them.

Objectives: the objective of this series was to date presumed late Bronze Age pottery at Cheviot Quarry.

Final comment: B Johnson (9 November 2007), the dating of the material concorded with the dates received from the posthole fills of the associated building, showing that the pottery also dates to the late Bronze Age.

References: Johnson and Waddington in press

OxA–16066 2759 ±30 BP

$\delta^{13}C$: -25.4‰

Sample: 483/1, submitted on 24 May 2006 by 11/05/2007

Material: grain: *Hordeum* sp., carbonised, single grain (B Johnson 2006)

Initial comment: the *Hordeum* (barley) grain was found in the primary fill of hearth F342, which was situated beneath subsoil 002. The hearth was cut into natural gravel deposit 003. The hearth is situated internally to building 4, which has provided radiocarbon dates from its postholes of the late- tenth to late-ninth centuries cal BC. The grain was deposited 0.6m from the surface, cut into a fluvio-glacial gravel terrace deposit. There was no rootlet penetration and no obvious bioturbation.

Objectives: the objective is to establish the date of the presumed late Bronze Age pottery at the Cheviot Quarry site. Pit F340 contained 96 typologically late Bronze Age pottery sherds. Two samples are being submitted to endeavour to overcome potential problems with residuality.

Calibrated date: 1σ: 930–840 cal BC
2σ: 1000–820 cal BC

Final comment: B Johnson (9 November 2007), the dating of the material concorded with the dates received from the posthole fills of the associated building, showing that the pottery dates to the late Bronze Age.

References: Johnson and Waddington in press

OxA–16067 2693 ±30 BP

$\delta^{13}C$: -25.9‰

Sample: 483/2, submitted on 24 May 2006 by B Johnson

Material: carbonised residue (internal, Flat Rimmed ware)

Initial comment: the pot sherd came from the primary fill of pit F340, underlying secondary fill 482, tertiary fill 477, and final fill 340, which in turn was situated beneath subsoil 002. The pit was cut into gravel deposit 003. The pit is situated internally to building 4, which has provided radiocarbon dates from its postholes of the late-tenth to late-ninth centuries cal BC. The potsherd was found in a deposit 1m from the surface, cut into fluvio-glacial gravel terrace deposits. There was no rootlet penetration and no bioturbation.

Objectives: as OxA-16066

Calibrated date: 1σ: 900–800 cal BC
2σ: 910–800 cal BC

Final comment: see OxA-16066

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), this sample produced a high yield of carbon (42–63%) on combustion.

References: Johnson and Waddington in press

OxA-X–2178–14 2785 ±75 BP

$\delta^{13}C$: -31.6‰

Sample: 306/2, submitted in May 2006 by B Johnson

Material: carbonised residue (internal, Flat Rimmed Ware)

Initial comment: the potsherd in primary fill of hearth F306, situated beneath subsoil 002. The pit was cut into natural gravel deposit 003. The pit is situated internally to building 5, which had provided radiocarbon dates from its postholes of the late tenth to ninth centuries cal BC. Potsherd in deposit 0.5m from the surface, cut into fluvio-glacial gravel terrace deposits. There was rootlet penetration and some bioturbation (worm).

Objectives: as OxA-16066

Calibrated date: 1σ: 1020–830 cal BC
2σ: 1190–800 cal BC

Final comment: see OxA-16066

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), this sample produced a low carbon yield (245 µg) and low target current of 8.3 µA.

OxA-X–2178–15 2755 ±55 BP

$\delta^{13}C$: -28.3‰

Sample: 342/1, submitted in May 2006 by B Johnson

Material: grain: *Hordeum* sp., carbonised, single grain (B Johnson 2006)

Initial comment: Hordeum (barley) grain in primary fill of hearth F342, situated beneath subsoil 002. The hearth was cut into natural gravel deposit 003. The hearth is situated internally to building 4, which has provided radiocarbon dates from its postholes of the late tenth to late ninth centuries cal BC. The grain was found in a deposit 0.6m from the surface, cut into fluvio-glacial gravel terrace deposits. There was no rootlet penetration and no obvious bioturbation.

Objectives: as OxA-16066

Calibrated date: 1σ: 980–830 cal BC
2σ: 1030–800 cal BC

Final comment: see OxA-16066

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), this sample yielded only 129 µg of carbon from combustion of just under 10mg of pretreated material, which is at the absolute limit of our smallest sized graphites. The graphite produced yielded a low target current of 4.7µA, which results in a higher than usual standard error. This result is reported with a health warning.

SUERC–11294 2795 ±40 BP

$\delta^{13}C$: -24.9‰

Sample: 342/2, submitted on 26 May 2006 by B Johnson

Material: grain: *Hordeum* sp., carbonised, single grain (B Johnson 2006)

Initial comment: as OxA-16066

Objectives: as OxA-16066

Calibrated date: 1σ: 1010–900 cal BC
2σ: 1050–830 cal BC

Final comment: see OxA-16066

Cheviot Quarry: Neolithic activity sequence, Northumberland

Location: NT 951328
Lat. 51.05.38 N; Long. 02.04.12 W

Project manager: B Johnson (Archaeological Research Services Ltd), 2005

Archival body: Archaeological Research Services Ltd.

Description: the site consists of a series of distributed pits and hearths from all previous archaeological interventions at Cheviot Quarry that contained pottery vessels known to date by morphological association to the early, middle, and late Neolithic and the Beaker period.

Objectives: the objective of this series was to date the span of Neolithic activity at the site.

Final comment: B Johnson (9 November 2007), the spread of dates, together with the sequence of Neolithic pottery evident on the site, suggest that the Cheviot Quarry sites formed important parts of the landscape throughout the Neolithic period.

References: Johnson and Waddington in press

OxA–16068 4999 ±32 BP

$\delta^{13}C$: -24.2‰

Sample: 052/1, submitted in August 2005 by B Johnson

Material: carbonised plant macrofossil (hazelnut, single fragment) (J Cotton 2006)

Initial comment: the hazelnut fragment came from the primary fill of pit F031, underlying secondary fill 031 which in turn was situated beneath subsoil 002. The pit was cut into natural gravel deposit 003. The potsherd was deposited 0.7m from the surface, cut into fluvio-glacial gravel terrace deposits. There was no rootlet penetration but some bioturbation (worm).

Objectives: to establish the sequence of Neolithic activity and pottery use at the Cheviot Quarry site. Pit 031 contained 85 typologically early Neolithic sherds. Two samples are being submitted in an endeavour to overcome any potential problems with residuality.

Calibrated date: 1σ: 3900–3710 cal BC
2σ: 3940–3700 cal BC

Final comment: B Johnson (9 November 2007), the spread of dates, together with the sequence of Neolithic pottery evident on the site, suggest that the Cheviot Quarry sites formed important parts of the landscape throughout the Neolithic period. The Carinated Bowls date to the earliest part of the fourth millennium BC with the earliest dates starting around *c* 3900 cal BC.

OxA–16069 4906 ±34 BP

$\delta^{13}C$: -27.2‰

Sample: 052/2, submitted on 24 May 2005 by B Johnson

Material: carbonised residue (internal, Carinated Bowl)

Initial comment: as OxA-16068

Objectives: as OxA-16068

Calibrated date: 1σ: 3710–3640 cal BC
2σ: 3770–3630 cal BC

Final comment: see OxA-16068

Laboratory comment: see OxA-16067

OxA–16070 4152 ±31 BP

$\delta^{13}C$: -23.7‰

Sample: 2133/1, submitted in August 2005 by B Johnson

Material: carbonised plant macrofossil (hazelnut, single fragment) (J Cotton 2006)

Initial comment: the hazelnut fragment is from the primary fill of pit F2133, which was situated beneath subsoil 002. The pit was cut into natural gravel deposit 003. The pit lay 2.2m east of building 3, a structure morphologically similar to buildings 1 and 2, which have produced radiocarbon results in the fifth to sixth centuries AD. The fragment was deposited 0.6m from the surface, cut into fluvio-glacial terrace deposits. There was no rootlet penetration but some bioturbation (worm).

Objectives: to establish the sequence of Neolithis activity and pottery use at the Cheviot Quarry site. Pit F2133 contained

10 typologically Grooved Ware pottery sherds. Two samples were submitted to endeavour to overcome any potential problems with residuality.

Calibrated date: *1σ*: 2880–2630 cal BC
2σ: 2880–2580 cal BC

Final comment: B Johnson (9 November 2007), the spread of dates, together with the sequence of Neolithic pottery evident on the site, suggest that the Cheviot Quarry sites formed important parts of the landscape throughout the Neolithic period. The Grooved Ware dates to the early third millennium BC and shows a clear overlap with the use of Impressed Ware.

OxA–16096 4177 ±33 BP

δ¹³C: -23.3‰

Sample: 2168/1, submitted in August 2005 by B Johnson

Material: carbonised plant macrofossil (hazelnut, single fragment) (J Cotton 2006)

Initial comment: the hazelnut fragment was from the primary fill of pit F2168, which was situated beneath subsoil 002. The pit was cut into natural gravel deposit 003. The pit lay 2.3m east of building 3, a structure morphologically similar to buildings 1 and 2, which have produced radiocarbon dates in the fifth to sixth centuries AD. The fragment is from a deposit 0.6m from the surface, cut into fluvio-glacial gravel terrace deposits. There was no rootlet penetration but some bioturbation (worm).

Objectives: to establish the sequence of Neolithic activity and pottery use at Cheviot Quarry. Pit F2168 contained three typologically Grooved Ware pottery sherds. Two samples are being submitted to overcome any potential problems with residuality.

Calibrated date: *1σ*: 2880–2690 cal BC
2σ: 2890–2630 cal BC

Final comment: see OxA-16070

OxA–16097 4933 ±35 BP

δ¹³C: -26.5‰

Sample: 051/1, submitted in August 2005 by B Johnson

Material: carbonised plant macrofossil (hazelnut, single fragment) (J Cotton 2006)

Initial comment: the hazelnut fragment was from the primary fill of pit 009. The pit was cut into natural gravel deposits 003. There is a slight possibility of residuality from bioturbation. The fragment is from a deposit 0.6m from the surface, cut into a fluvio-glacial gravel terrace deposit. There was no rootlet penetration but some bioturbation (worm).

Objectives: to establish the sequence of Neolithic activity and pottery use at the Cheviot Quarry site. Pit 009 contained 63 early Neolithic pottery sherds. Two samples are being submitted to endeavour to overcome any potential problems with residuality.

Calibrated date: *1σ*: 3760–3650 cal BC
2σ: 3790–3640 cal BC

Final comment: see OxA-16068

OxA–16098 4155 ±33 BP

δ¹³C: -27.8‰

Sample: MAP/F219/2, submitted on 24 May 2006 by B Johnson

Material: carbonised residue (internal, Beaker)

Initial comment: the potsherd (Beaker) in fill of pit F219 was situated beneath the subsoil. The pit was cut into natural gravel deposits. The sample was taken from a rimsherd. The potsherd was found in a deposit 0.6m from the surface, cut into fluvio-glacial gravel terrace deposits. There was some rootlet penetration and some bioturbation.

Objectives: to establish the sequence of Neolithic activity and pottery use at the Cheviot Quarry site. Two samples are being submitted to endeavour to overcome any potential problems with residuality.

Calibrated date: *1σ*: 2880–2630 cal BC
2σ: 2890–2580 cal BC

Final comment: B Johnson (9 November 2007), this date is too early for the known dates of Beaker pottery and has probably resulted from dating organic material incorporated in the clay of the pottery fabric that was scraped off as part of the residue sample collection.

Laboratory comment: see OxA-16067

OxA–16099 4348 ±34 BP

δ¹³C: -27.4‰

Sample: MAP/F204, submitted on 24 May 2006 by B Johnson

Material: carbonised residue (internal, Carinated Bowl)

Initial comment: the potsherd (Carinated Bowl) in the fill of pit F204 was situated beneath the subsoil. The pit was cut into natural gravel deposit. The potsherd is from a deposit 0.6m from the surface, cut into fluvio-glacial terrace deposits. There was some rootlet penetration and some bioturbation.

Objectives: as OxA-16098

Calibrated date: *1σ*: 3020–2900 cal BC
2σ: 3090–2890 cal BC

Final comment: see OxA-16070

Laboratory comment: see OxA-16067

OxA–16162 4870 ±40 BP

δ¹³C: -27.4‰

Sample: 051/2, submitted on 24 May 2006 by B Johnson

Material: carbonised residue (internal, Carinated Bowl)

Initial comment: as OxA-16097

Objectives: as OxA-16097

Calibrated date: *1σ*: 3700–3630 cal BC
2σ: 3710–3530 cal BC

Final comment: B Johnson (9 November 2007), this date is too late for the known dates for other Carinated Bowls.

OxA–16163 3625 ±40 BP

$\delta^{13}C$: -25.8‰

Sample: MAP/Pot1, submitted on 24 May 2006 by B Johnson

Material: carbonised residue (internal, Beaker)

Initial comment: as OxA-16098

Objectives: as OxA-16098

Calibrated date: *1σ*: 2040–1930 cal BC
2σ: 2140–1880 cal BC

Final comment: B Johnson (9 November 2007), the spread of dates, together with the sequence of Neolithic pottery evident on the site, suggest that the Cheviot Quarry sites formed important parts of the landscape throughout the Neolithic period. The Beakers date to the later part of the third millennium BC.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), this measurement has a health warning attached as the measurable carbon obtained from combustion was very low (480μg) and there was an offset between the δ^{13}C values measured on the AMS and on the mass spectrometer.

OxA–16178 4148 ±32 BP

$\delta^{13}C$: -27.2‰

Sample: MAP/F219/1, submitted on 24 May 2006 by B Johnson

Material: carbonised residue (internal, Impressed Ware)

Initial comment: the potsherd (Impressed Ware) was in the fill of pit F219, which was situated beneath subsoil. The pit was cut into a natural gravel deposits. The sherd is from a deposit 0.6m from the surface, cut into a fluvio-glacial gravel terrace deposits. There was some rootlet penetration and some bioturbation.

Objectives: as OxA-16163

Calibrated date: *1σ*: 2880–2630 cal BC
2σ: 2880–2580 cal BC

Final comment: see SUERC-11295

Laboratory comment: English Heritage (2007), this is not the same pot at F219/2 (OxA-16098). F219/1 is from higher in the fill.

SUERC–11295 4130 ±35 BP

$\delta^{13}C$: -24.4‰

Sample: 2133/2, submitted in August 2005 by B Johnson

Material: carbonised plant macrofossil (hazelnut, single fragment) (J Cotton 2006)

Initial comment: the hazelnut fragment was found in the primary fill of pit F2133, which was situated beneath subsoil 002. The pit was cut into natural gravel deposit 003. The pit lay 2.2m east of building 3, a structure morphologically similar to buildings 1 and 2, which have produced radiocarbon dates in the fifth to sixth centuries AD. The hazelnut fragment was deposited 0.6m from the surface, cut into fluvio-glacial gravel terrace deposits. There was no rootlet penetration but some bioturbaton (worm).

Objectives: as OxA-16070

Calibrated date: *1σ*: 2870–2620 cal BC
2σ: 2880–2570 cal BC

Final comment: see OxA-16070

SUERC–11296 4250 ±35 BP

$\delta^{13}C$: -26.0‰

Sample: 2168/2, submitted in August 2005 by B Johnson

Material: carbonised plant macrofossil (hazelnut, single fragment) (J Cotton 2006)

Initial comment: as OxA-16096

Objectives: as OxA-16096

Calibrated date: *1σ*: 2910–2870 cal BC
2σ: 2920–2760 cal BC

Final comment: see OxA-16070

Cheviot Quarry: sub-rectangular buildings, Northumberland

Location: NT 951328
Lat. 51.05.38 N; Long. 02.04.12 W

Project manager: B Johnson (Archaeological Research Services Ltd), 2005

Archival body: Archaeological Research Services Ltd.

Description: a series of postholes formed four sub-rectangular buildings. Samples were available for dating from two of these structures, buildings 1 and 2.

Objectives: to establish the dates of construction and use of the buildings, suggested by associated pottery to be middle Neolithic.

Final comment: B Johnson (9 November 2007), based upon the radiocarbon dating undertaken as part of this work, the rectangular buildings have been shown to be fifth or early sixth century cal AD in date. The dating programme has been very successful in providing intriguing evidence for early Dark Age activity, that could be either Anglo-Saxon or British in origin.

Laboratory comment: English Heritage (2007), the seven measurements from building 2 (OxA-15545–7 and SUERC-8959–62) are not statistically consistent (T'=890.4; T'(5%)=12.6; ν=6; Ward and Wilson 1978). However, if the two measurements from posthole 107 are excluded as being from residual, Iron Age, material, then the remaining results are statistically consistent (T'=2.1; T'(5%)=9.5; ν=4; Ward and Wilson 1978). The four measurements from building 1 (SUERC-9102–4 and SUERC-9108) are not statistically consistent (T'=882.0; T'(5%)=7.8; ν=3; Ward and Wilson 1978). Based on the spatial proximity and morphological similarity of buildings 1 and 2, it seems most plausible to interpret SUERC-9104 and SUERC-9108 as from residual, Bronze Age, material and to interpret building 1 as of Dark Age date.

References: Johnson and Waddington in press
Ward and Wilson 1978

OxA–15545 1517 ±26 BP

δ¹³C: -24.4‰

Sample: 2053/274/2, submitted on 3 January 2006 by B Johnson

Material: grain: *Hordeum* sp., carbonised, single grain (J Huntley 2006)

Initial comment: from posthole 2053, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 23 within a sub-rectangular structure (building 2) and is situated towards the eastern end of the southern axis. There is a possibility of residuality, given the unsealed nature of the context. The posthole was 0.4m from the surface, cut into a fluvio-glacial gravel terrace deposit. There was some rootlet penetration and it was truncated by ploughing.

Objectives: to establish the dates of construction and use of building 2. A very close association between the postholes of the building and a hearth feature within the interior of a structure that contained Grooved Ware pottery, as well as the extremely similar morphology of nearby structures (buildings 1 and 3), suggest building 2 may be later Neolithic. No material culture was recovered directly from the postholes, however, and, given the lack of vertical stratigraphy, the dates of the buildings cannot be ascribed with complete confidence. Eight samples, comprising two samples of separate species from four postholes, are being submitted to endeavour to overcome any potential problems with residuality.

Calibrated date: *1σ:* cal AD 530–580
2σ: cal AD 430–610

Final comment: B Johnson (9 November 2007), the dating has shown that building 2 is fifth or early sixth century cal AD in date and could be of Anglo-Saxon or British origin.

References: Johnson and Waddington in press

OxA–15546 1531 ±27 BP

δ¹³C: -25.4‰

Sample: 2047/322/2, submitted on 3 January 2006 by B Johnson

Material: charcoal (*Salix/Populus* sp., single fragment) (J Huntley 2006)

Initial comment: from posthole 2047, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 23 within a sub-rectangular structure (building 2) and is situated towards the eastern end of the southern axis. There is a possibility of residuality, given the unsealed nature of the context. The posthole was 0.4m from the surface, cut into a fluvio-glacial gravel terrace deposit. There was some rootlet penetration and it was truncated by ploughing.

Objectives: as OxA-15545

Calibrated date: *1σ:* cal AD 530–570
2σ: cal AD 430–610

Final comment: see OxA-15545

References: Johnson and Waddington in press

OxA–15547 2290 ±29 BP

δ¹³C: -26.2‰

Sample: 2107/376/2, submitted on 3 January 2006 by B Johnson

Material: charcoal (roundwood, single fragment) (J Huntley 2006)

Initial comment: from posthole 2107, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 23 within a sub-rectangular structure (building 2) and is situated towards the eastern end of the southern axis. There is a possibility of residuality, given the unsealed nature of the context. The posthole was 0.4m from the surface, cut into fluvio-glacial gravel terrace deposit. There was some rootlet penetration and it was truncated by ploughing.

Objectives: as OxA-15545

Calibrated date: *1σ:* 400–370 cal BC
2σ: 410–230 cal BC

Final comment: see OxA-15545

SUERC–8959 1520 ±35 BP

δ¹³C: -23.8‰

Sample: 2053/274/1, submitted on 3 January 2006 by B Johnson

Material: grain: *Hordeum* sp., carbonised, single grain (J Huntley 2006)

Initial comment: as OxA-15545

Objectives: as OxA-15545

Calibrated date: *1σ:* cal AD 530–600
2σ: cal AD 430–620

Final comment: see OxA-15545

Laboratory comment: see OxA-15545

SUERC–8960 1545 ±35 BP

δ¹³C: -29.0‰

Sample: 2047/322/1, submitted on 3 January 2006 by B Johnson

Material: charcoal: *Corylus* sp., single fragment (J Huntley 2006)

Initial comment: as OxA-15546

Objectives: as OxA-15545

Calibrated date: *1σ:* cal AD 430–570
2σ: cal AD 420–610

Final comment: see OxA-15545

Laboratory comment: see OxA-15546

SUERC–8961 2315 ±35 BP

δ¹³C: -24.9‰

Sample: 2107/376/1, submitted on 3 January 2006 by B Johnson

Material: charcoal (*Salix/Populus* sp., single fragment) (J Huntley 2006)

Initial comment: as OxA-15547

Objectives: as OxA-15545

Calibrated date: *1σ*: 410–380 cal BC
2σ: 410–260 cal BC

Final comment: see OxA-15545

References: Johnson and Waddington in press

SUERC–8962 1575 ±35 BP

δ¹³C: -22.7‰

Sample: 2057/400/2, submitted on 3 January 2006 by B Johnson

Material: grain: *Hordeum* sp., carbonised, single grain (J Huntley 2006)

Initial comment: from posthole 2057, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 23 within a sub-rectangular structure (building 2) and is situated towards the eastern end of the southern axis. There is a possibility of residuality, given the unsealed nature of the context. The posthole was 0.4m from the surface, cut into fluvio-glacial gravel terrace deposit. There was some rootlet penetration and it was truncated by ploughing.

Objectives: as OxA-15545

Calibrated date: *1σ*: cal AD 420–550
2σ: cal AD 400–570

Final comment: see OxA-15545

Laboratory comment: English Heritage (2007), a second sample from this posthole failed.

References: Johnson and Waddington in press

SUERC–9102 1620 ±35 BP

δ¹³C: -26.9‰

Sample: 2017/413/1, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Corylus* sp., single fragment (J Huntley 2005)

Initial comment: from posthole 2017, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 19 within a sub-rectangular structure (building 1) and is situated in the centre of the northern long axis. Residuality is possible, given the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial terrace deposits. There was some rootlet penetration and it was truncated by ploughing.

Objectives: to establish the dates of construction and use of building 1. An association with nearby features (buildings 2 and 3) of extremely similar morphology, that were themselves very closely associated with pits containing Grooved Ware pottery, suggests building 1 may be later Neolithic. No material culture was recovered directly from the postholes, however, and, given the lack of vertical stratigraphy, the date of the building cannot be ascribed with complete confidence. Eight samples, comprising two samples of separate species from four postholes, are being submitted to endeavour to overcome any potential problems with residuality.

Calibrated date: *1σ*: cal AD 400–530
2σ: cal AD 340–540

Final comment: B Johnson (9 November 2007), the dating has also shown that building 1 is fifth or early sixth century cal AD in date.

Laboratory comment: English Heritage (2007), one sample from each posthole failed to produce sufficient carbon for dating. Unfortuntately no more material was available.

SUERC–9103 1565 ±50 BP

δ¹³C: -27.0‰

Sample: 2019/340/1, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Crataegus* sp., single fragment (J Huntley 2005)

Initial comment: from posthole 2019, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 19 within a sub-rectangular structure and is situated in the centre of the northern long axis. Residuality is possible, given the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial terrace deposits. There was some rootlet penetration and it was truncated by ploughing.

Objectives: as SUERC-9102

Calibrated date: *1σ*: cal AD 420–560
2σ: cal AD 390–610

Final comment: see SUERC-9102

References: Johnson and Waddington in press

SUERC–9104 2795 ±35 BP

δ¹³C: -24.6‰

Sample: 2029/520/2, submitted on 11 January 2006 by B Johnson

Material: charcoal (*Salix/Populus* sp., single fragment) (J Huntley 2005)

Initial comment: from posthole 2029, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 19 within a sub-rectangular structure (building 1) and is situated in the centre of the northern long axis. Residuality is possible, given the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial terrace deposits. There was some rootlet penetration and it was truncated by ploughing.

Objectives: as SUERC-9102

Calibrated date: *1σ*: 1010–900 cal BC
2σ: 1030–840 cal BC

Final comment: see SUERC-9102

Laboratory comment: see SUERC-9102

SUERC–9108 2735 ±40 BP

δ¹³C: -26.2‰

Sample: 2037/315/1, submitted on 11 January 2006 by B Johnson

Material: charcoal: *Corylus* sp., single fragment (J Huntley 2005)

Initial comment: from posthole 2037, underlying subsoil 002 and cut into natural gravel deposit 003. The posthole is one of 19 within a sub-rectangular structure (building 1)and is situated in the centre of the northern long axis. Residuality is possible given the unsealed nature of the context. The posthole is 0.4m from the surface, cut into fluvio-glacial terrace deposits. There was some rootlet penetration and it was truncated by ploughing.

Objectives: as SUERC-9102

Calibrated date: 1σ: 920–820 cal BC
2σ: 980–800 cal BC

Final comment: see SUERC-9102

Cossington, Leicestershire

Location: SK 605128
Lat. 52.42.33 N; Long. 01.06.16 W

Project manager: C O'Brien and J Thomas (Leicester Museums and University of Leicester Archaeological Service), 1976 and 1999

Description: the 1976 excavation was of two ring ditches and associated cremations. Site 1 consisted of a small recut ring ditch with a central feature (no evidence for burial) and 11 associated cremations located just outside the barrow to the south-east. Site 2 consisted of a larger barrow represented by two concentric ring ditches. A central inhumation was associated with cremations and grave goods. The 1999 excavation at Cossington quarry, adjacent to Platts Lane, included recording of a single recut ring ditch (barrow-Area A) with a surviving denuded mound. The barrow had no central burial, but a fine jet, amber, and faience Bronze Age bead necklace had been buried close to the inside of the ditch. Evidence was also recovered for later reuse of the barrow mound during the Iron Age, Roman, and Anglo-Saxon periods, when a group of 'warrior' burials were placed within the mound. To the east of the barrow, an area of formerly marshy ground was represented by a rich organic layer, which contained a scatter of flints and was associated with a row of pits/postholes extending into the layer from the south. Part of a palaeochannel was also revealed during quarrying in the vicinity of the barrow (Area D), which contained well-preserved environmental remains and supporting evidence from a group of animal bones.

Objectives: at site 1 the objectives were to provide a date range for the cremation group; to see if there are differences between the overall dates indicated for the urned and unurned cremations and; to provide a chronological relationship between the cremations and the ring ditch phases (cremation F4). At site 2 the objectives were to provide dating for the period of use of the ring ditch and to provide comparative dating with the inhumation. At site 3 the objectives were to provide a date range for the palaeochannel deposits; to provide comparative dating evidence with those obtained from the associated bone group, and to provide information on the environmental history of the site from the Bronze Age (or earlier) to the Anglo Saxon period. At site 4 the objectives were to provide dating for the bone group (are they a contemporary group?); to provide dating for the palaeochannel; to provide comparative environmental information for the wider landscape of the excavations; and to provide complementary environmental evidence to pollen samples taken from the channel to inform on the contemporary Soar Valley landscape. Finally, at site 5, the objective was to establish a date for the infilling of the barrow ring ditch (both samples came from the upper fills of the ditch).

Final comment: J Thomas (12 September 2007), the dating programme has been extremely useful in providing an absolute chronological framework for the various episodes of activity revealed at Cossington. It has identified environmental deposits in the palaeochannel dating to the late third millennium cal BC, providing a snapshot of the contemporary Soar Valley environment and a background to the landscape in which the barrows were constructed. It has also helped to 'fine tune' our understanding of the Bronze Age burial sequence, in particular highlighting the early date for the cremation burials clustered around Barrow 1.

References: Thomas 2005
Thomas 2007

Cossington: site 1, Leicestershire

Location: SK 605128
Lat. 52.42.33 N; Long. 01.06.16 W

Project manager: C O'Brien and J Thomas (Leicester Museums and University of Leicester Archaeological Service), 1976 and 1999

Archival body: Leicestershire County Council Heritage Services

Description: the samples were from the cremation cemetery south-east of the 1976 site 1 ring ditch. The samples included three urned cremations (F24, F6, and F9) and four unurned cremations (F20, F22, and F25 from the south-eastern group, and F4 which cuts the first-phase ring ditch).

Objectives: to provide a date range for the cremation group; to see if there are differences between the overall dates indicated for the urned and unurned cremations; and to provide a chronological relationship between the cremations and the ring ditch phases (cremation F4).

Final comment: J Thomas (12 September 2007), the dates provided for the period of cremation burial at barrow 1 indicate a range of use between *1910–1690 cal BC (95% probability; first cremation;* Marshall *et al* 2007*)* and *1660–1520 cal BC (95% probability; last cremation*; Marshall *et al* 2007), suggesting the period of deposition occurred in the later stages of the Early Bronze Age. This was surprising as, in other aspects, the cemetery had similarities with middle Bronze Age, 'Deverel-Rimbury' type groups.

Laboratory comment: English Heritage (2007), a bulk sample of unidentified charcoal was dated from a bedding of small pebbles with flint scraper and waste flakes in the silting of the first phase of the ring ditch, soon after the excavation. This date, 1940–1620 cal BC (HAR-4897; 3460 ±60BP; Reimer *et al* 2004), provide a *terminus post quem* for the secondary use of the barrow.

References: Marshall *et al* 2007
Reimer *et al* 2004
Thomas 2005
Thomas 2007

OxA–16155 3352 ±33 BP

Sample: Coss-Site1/F24, submitted in June 2006 by J Thomas

Material: cremated human bone (humerus/femur) (H Jacklin 2006)

Initial comment: F24 was the most complete urned cremation from the site. The top 0.05m (base) of the urn was damaged but otherwise the pot was intact. F24 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: to establish the period of use for the cremation cemetery and provide comparative evidence to determine if there was a difference in date between the urned and unurned cremations on the site.

Calibrated date: *1σ*: 1690–1610 cal BC
2σ: 1740–1520 cal BC

Final comment: J Thomas (12 September 2007), this date has provided a late early Bronze Age date for the cremation burial of this adult, possibly a male of around 24 years. In contrast to the majority of other burials in this cremation cemetery, F24 was buried in an upright urn and was one of the better-preserved examples. The generally consistent date with the inverted burials suggests there was no clear chronological difference in the two burial traditions.

OxA–16156 3317 ±33 BP

Sample: Coss-Site1/F25, submitted in June 2006 by J Thomas

Material: cremated human bone (possible cranial bone) (H Jacklin 2006)

Initial comment: F25 was the northernmost cremation in the group. Although appearing to be unurned, a scatter of pottery sherds to the immediate south may indicate that this was a badly disturbed urned cremation. The focus of cremated bone was located on top of a triangular stone slab. F25 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: as OxA-16155

Calibrated date: *1σ*: 1640–1520 cal BC
2σ: 1690–1500 cal BC

Final comment: J Thomas (12 September 2007), this was a very disturbed cremation burial but was apparently once associated with an urn, judging by the scatter of sherds surrounding the bone. The date is statistically consistent with the other cremation burials in the group and helps confirm the date range for this cemetery.

References: Thomas 2005
Thomas 2007

OxA–16157 3359 ±34 BP

Sample: Coss-Site1/F9, submitted in June 2006 by J Thomas

Material: cremated human bone (possible tibia or ulna/radius) (H Jacklin 2006)

Initial comment: F9 was a cremation in a disturbed inverted urn. Only the upper (rim) part of the urn survived. Cranium and long bone skeletal fragments were represented. A small scatter of associated pottery and bone was also recovered from the surrounding area.

Objectives: as OxA-16155

Calibrated date: *1σ*: 1690–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: J Thomas (12 September 2007), this determination provided a late to early Bronze Age date for an inverted cremation burial of an adult individual, located to the south-east of barrow 1. The burial had been placed within an upturned biconical urn and had been badly truncated by ploughing.

Laboratory comment: English Heritage (September 2007), OxA-16158 is a replicate of OxA-16157. The weighted mean is 3330 ±24 BP (1690–1525 cal BC; Reimer *et al* 2004) and the two results are statistically consistent (T′=1.3; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–16158 3306 ±33 BP

Sample: Coss-Site1/F9, submitted in June 2006 by J Thomas

Material: cremated human bone (possible tibia or ulna/radius) (H Jacklin 2006)

Initial comment: as OxA-16155

Objectives: as OxA-16157

Calibrated date: *1σ*: 1630–1520 cal BC
2σ: 1690–1490 cal BC

Final comment: see OxA-16157

Laboratory comment: see OxA-16157

SUERC–11272 4285 ±35 BP

Sample: Coss-Site/F4, submitted in June 2006 by J Thomas

Material: cremated human bone (cranial bone, possibly occipital bone) (H Jacklin 2006)

Initial comment: F4 was an unurned cremation in a small pit. It was the only cremation to have a direct stratigraphic relationship with the ring ditch, cutting the phase 1 ditch. F4 was cut into the backfilled/silted ring ditch, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: to provide chronological evidence for the disuse of the phase 1 ditch and to establish the period of use for the cremation cemetery and provide comparative evidence to determine if there was a difference in date between the urned and unurned cremations on the site.

Calibrated date: *1σ*: 2920–2880 cal BC
2σ: 2930–2870 cal BC

Final comment: J Thomas (12 September 2007), this date returned a surprisingly late Neolithic result from cremated human bone that had been deposited in a pit that clearly post-dated the infilled Bronze Age ditch of barrow 1. It is possible that the sample contained stray residual material that was chosen for dating. It is also a possibility that the construction of barrow 1 had disturbed an earlier monument or cremation and the bones had been retained until the time of reburial.

SUERC–11273 3340 ±35 BP

Sample: Coss-Site1/F6, submitted in June 2006 by J Thomas

Material: cremated human bone (fibula) (H Jacklin 2006)

Initial comment: F6 was a cremation in an inverted urn, placed in a shallow pit. Only the upper part of the urn survived but the cremated material was well preserved, with all parts of the skeleton being represented. A small scatter of bone had spilled into the base of the pit. The pit containing F6 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: as OxA-16155

Calibrated date: 1σ: 1690–1530 cal BC
2σ: 1740–1520 cal BC

Final comment: J Thomas (12 September 2007), this determination provided a late to early Bronze Age date for an inverted cremation burial of an adult ?male, located to the south-east of barrow 1. The burial had been placed within an upturned biconical urn and had been badly truncated by ploughing, such that only the upper portions of the vessel remained.

SUERC–11274 3525 ±35 BP

Sample: Coss-Site1/F20, submitted in June 2006 by J Thomas

Material: cremated human bone (possible tibia) (H Jacklin 2006)

Initial comment: F20 was part of the cremation group to the south-east of the ring ditch. Although apparently unurned, fragments of pottery urn were recovered in association with the cremated bone. In addition a scatter of cremated bone was observed to the south east of the feature. In all likelihood F20 is a disturbed urned cremation. It lay near the centre of the cremation group. F20 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: as OxA-16155

Calibrated date: 1σ: 1910–1770 cal BC
2σ: 1950–1740 cal BC

Final comment: J Thomas (12 September 2007), this date has provided a late to early Bronze Age date for the cremation burial of this adult individual in an inverted urn. It helps to clarify the chronological position of this small cemetery in the sequence of burials at the site.

SUERC–11275 3360 ±35 BP

Sample: Coss-Site1/F22, submitted in June 2006 by J Thomas

Material: cremated human bone (possible proximal radius) (H Jacklin 2006)

Initial comment: F22 was the southernmost cremation in the group. Very little information exists for this cremation although it was recorded with associated pottery sherds raising the possibility that this was a disturbed urned cremation. F22 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: as OxA-16155

Calibrated date: 1σ: 1690–1610 cal BC
2σ: 1750–1530 cal BC

Final comment: J Thomas (12 September 2007), this date has provided a late to early Bronze Age date for the cremation burial of this adult individual in an inverted urn. It helps to clarify the chronological position of this small cemetery in the sequence of burials at the site.

Cossington: site 2, Leicestershire

Location: SK 605128
Lat. 52.42.33 N; Long. 01.06.16 W

Project manager: C O'Brien and J Thomas (Leicester Museums and University of Leicester Archaeological Service), 1976 and 1999

Archival body: Leicestershire County Council Heritage Services

Description: cremations associated with the 1976 site 2 ring ditch and central inhumation. F14 is from an urned cremation north of the burial and F17 is from a stone cist south of the burial.

Objectives: to provide dating for the period of use of the ring ditch, and to provide comparative dating with the inhumation.

Final comment: J Thomas (12 September 2007), dating of these two cremation burials has helped identify their chronological distinction from the cremation burials located near barrow 1 and has added to the overall understanding of the development of the two closely related monuments (barrows 1 and 2).

Laboratory comment: English Heritage (2007), the centre of this barrow contained a sub-rectangular burial pit with a contracted inhumation. Bone fragments from this individual (F15-BT) were submitted for dating to AERE Harwell in 1981. However, in 1985 attempts to obtain a measurement on the small counters (Otlet *et al* 1983) were abandoned, due to the poor quality of the bone.

References: Otlet *et al* 1983
Thomas 2005
Thomas 2007

SUERC–11276 3430 ±35 BP

Sample: Coss-Site2/F14, submitted in June 2006 by J Thomas

Material: cremated human bone (possible tibia) (H Jacklin 2006)

Initial comment: F14 was a cremation located 6m north of the site 2 inhumation. Cremated bone was found in association with a small Collared Urn. The excavators suggested the urn had fallen over during interment, spilling the contents. F14 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: to establish the period of use for the ring ditch and provide comparative evidence to determine if there was a difference in date between the cremations and the inhumation.

Calibrated date: *1σ*: 1770–1680 cal BC
2σ: 1880–1630 cal BC

Final comment: J Thomas (12 September 2007), this confirms the early Bronze Age date for the cremation burial of an adult ?male, suggested by the association with a Collared urn. The urn and cremated remains had been placed side-by-side in a small pit. The pot may originally have been placed on a ledge within the pit, perhaps as an accompaniment to the cremation burial.

Laboratory comment: English Heritage (2007), in 1981 a bulk sample of charcoal from this cremation was dated. The surviving sub-sample was mostly too small to identify (but it did contain *Quercus* sp. sapwood and heartwood, Salicaceae, and cf. *Acer* sp.). This result 1930–1460 cal BC (HAR-4898; 3390 ±90 BP; Reimer *et al* 2004) is statistically consistent with SUERC-11276 (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978), suggesting that HAR-4898 did not contain sufficient long-lived charcoal to produce a significant age-at-death offset.

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–11277 3660 ±35 BP

Sample: Coss-Site2/F17, submitted in June 2006 by J Thomas

Material: cremated human bone (possible humerus/radius) (H Jacklin 2006)

Initial comment: F17 was located 4m south of the site 2 inhumation and consisted of cremated bone packed into a rectangular possible 'cist'. A single sherd of Beaker pottery was associated with the bone in the pit/'cist'. F17 was cut into river terrace gravels, approximately 300m north of the river Wreake. The land on which the site was situated had apparently been cultivated for a considerable length of time prior to the excavation. No other details are known.

Objectives: to establish the period of use for the ring ditch and provide comparative evidence to determine if there was a difference in date between the cremations and the inhumation on the site.

Calibrated date: *1σ*: 2130–1970 cal BC
2σ: 2140–1930 cal BC

Final comment: J Thomas (12 September 2007), this confirmed an early Bronze Age date for this burial and indicated that F17 had been the primary burial within barrow 2.

Cossington: site 3, Leicestershire

Location: SK 605128
Lat. 52.42.33 N; Long. 01.06.16 W

Project manager: C O'Brien and J Thomas (Leicester Museums and University of Leicester Archaeological Service), 1976 and 1999

Archival body: Leicestershire County Council Heritage Services

Description: samples from a pollen core taken from palaeochannel deposits in excavation area D of the Cossington, Platts Lane quarry site. The channel deposits are also associated with the animal bone group (series Cossington site 4). The samples provided relate to the more organic levels of the core (0.23–5m and 0.86–8m deep).

Objectives: to provide a date range for the palaeochannel deposits; to provide comparative dating evidence with those obtained from the associated bone group, and to provide information on the environmental history of the site from the Bronze Age (or earlier) to the Anglo–Saxon period.

Final comment: J Thomas (12 September 2007), the dates obtained from surviving pollen, plant remains, and insects recovered from the palaeochannel have been successful in providing snapshots of the Soar Valley landscape from the Neolithic onwards. This has not only been important for providing an environmental setting for the archaeological activity but will also complement previous environmental information recovered from the Soar Valley.

References: Thomas 2005
Thomas 2007

OxA–16055 4693 ±32 BP

$\delta^{13}C$: -27.6‰

Sample: Coss-Site3/CoreD1, submitted in June 2006 by J Thomas

Material: waterlogged plant macrofossils (<5g) (from organic levels approximately 0.23–5m): *Schoenoplectus* cf. *tabernaemontani*, seven fragments; *Rubus* subg. *Glandolosus*, single fragment; *Cirsium* sp., two fragments; *Sambucus nigra*, single fragment; *Fraxinus excelsior*, twig; *Prunus/Crataegus* sp., two fragments; *Ranunculus* subgen *Ranunculus*, two fragments; *Alnus glutinosa*, three buds (J Greig 2006)

Initial comment: the sample was obtained from pollen monolith boxes taken from palaeochannel deposits. The sample was recovered from organic levels approximately 0.23–5m from the top of the column. The palaeochannel was cut into natural gravels.

Objectives: to establish a period of activity for the palaeochannel; to provide comparative evidence for dates obtained from an associated bone group, and to provide environmental evidence for the landscape in which the archaeological activities on the site took place.

Calibrated date: *1σ*: 3620–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: J Thomas (12 September 2007), the dates obtained from surviving pollen, plant remains, and insects recovered from the palaeochannel have been successful in providing snapshots of the Soar Valley landscape from the Neolithic onwards. This has not only been important for providing an environmental setting for the archaeological activity but will also complement previous environmental information recovered from the Soar Valley.

Laboratory comment: English Heritage (2007), three measurements on bulk macrofossils are available from this level. OxA-16055 is nearly 900 radiocarbon years older than the other two results (OxA-16056–7), which are statistically consistent (T′=1.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2007), OxA-16055 and OxA-16056 are duplicate dates from the same submitted sample. The submitted material was divided and treated separately using identical chemistry. This is part of Oxford's programme of internal reproducibility. We think the divergent ages represent a heterogeneous composition of the material rather than a measurement problem.

References: Ward and Wilson 1978

OxA–16056 3863 ±32 BP

δ¹³C: -27.4‰

Sample: Coss-Site3/CoreD1, submitted in June 2006 by J Thomas

Material: waterlogged plant macrofossils (from organic levels approximately 0.23–0.25m from the top of the column): *Schoenoplectus* cf. *tabernaemontani*, seven fragments; *Rubus* subg. *Glandolosus*, single fragment; *Cirsium* sp., two fragments; *Sambucus nigra*, single fragment; *Fraxinus excelsior*, twig; *Prunus/Crataegus* sp., two fragments; *Ranunculus* subgen *Ranunculus*, two fragments; *Alnus glutinosa*, three buds (J Greig 2006)

Initial comment: replicate of OxA-16055

Objectives: as OxA-16055

Calibrated date: *1σ*: 2460–2280 cal BC
2σ: 2470–2200 cal BC

Final comment: see OxA-16055

Laboratory comment: see OxA-16055

OxA–16057 3813 ±30 BP

δ¹³C: -26.6‰

Sample: Coss-Site3/CoreD1 (sample 2), submitted in June 2006 by J Thomas

Material: waterlogged plant macrofossils (from organic levels approximately 0.23–0.25m from the top of the column): *Schoenoplectus* cf. *tabernaemontani*, seven fragments; *Rubus* subg. *Glandolosus*, single fragment; *Cirsium* sp., two fragments; *Sambucus nigra*, single fragment; *Fraxinus excelsior*, twig; *Prunus/Crataegus* sp., two fragments; *Ranunculus* subgen *Ranunculus*, two fragments; *Alnus glutinosa*, three buds (J Greig 2006)

Initial comment: as OxA-16055

Objectives: as OxA-16055

Calibrated date: *1σ*: 2300–2200 cal BC
2σ: 2400–2140 cal BC

Final comment: see OxA-16055

Laboratory comment: see OxA-16055

OxA–16058 3882 ±30 BP

δ¹³C: -26.0‰

Sample: Coss-Site3/CoreD2 (sample 1), submitted in June 2006 by J Thomas

Material: waterlogged plant macrofossils (from organic levels approximately 0.86–8m from the top of the column): *Schoenoplectus* cf. *tabernaemontani*, two fragments; cf. *Eleocharis* sp., single fragment; *cf.* Alismataceae, two fragments; *Lycopus europaeus*, single fragment; *Aethusa cynapium* L., single fragment; *Rosa* sp., single fragment; *Chenopodium* sp., two fragments; *Sambucus nigra*, three fragments; *Lycopus europaeus*, single fragment; *Oenanthe* sp., single fragment; *Rumex* sp., four fragments; *Ranunculus* subgen *Ranunculus*, two fragments; *Alnus glutinosa*, catkin, two buds; *Alnus glutinosa*, eight seeds (J Greig 2006)

Initial comment: the sample was obtained from pollen monolith boxes taken from palaeochannel deposits. The sample was recovered from organic levels approximately 0.86–0.88m from the top of the column. The palaeochannel was cut into natural gravels.

Objectives: as OxA-16055

Calibrated date: *1σ*: 2470–2290 cal BC
2σ: 2470–2210 cal BC

Final comment: see OxA-16055

Laboratory comment: English Heritage (2007), the two measurements on bulk macrofossils from this level are statistically consistent (OxA-16058–9; T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16059 3877 ±29 BP

δ¹³C: -25.6‰

Sample: Coss-Site3/CoreD2 (sample 2), submitted in June 2006 by J Thomas

Material: waterlogged plant macrofossils (from organic levels approximately 0.86–0.88m from the top of the column): *Schoenoplectus* cf. *tabernaemontani*, single fragment; cf. *Eleocharis* sp., single fragment; *cf.* Alismataceae, two fragments; *Sambucus nigra*, three fragments; *Lycopus europaeus*, single fragment; *Aethusa cynapium* L., single fragment; *Oenanthe* sp., single fragment; *Rosa* sp., single fragment; *Rumex* sp., four fragments; *Chenopodium* sp., two fragments; *Ranunculus* subgen *Ranunculus*, two fragments; *Alnus glutinosa*, catkin, two buds; *Alnus glutinosa*, eight seeds (J Greig 2006)

Initial comment: as OxA-16058

Objectives: as OxA-16058

Calibrated date: *1σ:* 2470–2290 cal BC
2σ: 2470–2210 cal BC

Final comment: see OxA-16055

Laboratory comment: see OxA-16058

Cossington: site 4, Leicestershire

Location: SK 605128
Lat. 52.42.33 N; Long. 01.06.16 W

Project manager: J Thomas (Leicester Museums and University of Leicester Archaeological Service), 1999

Archival body: Leicestershire County Council Heritage Services

Description: a group of animal bone recovered from the base of a palaeochannel (area D) recorded in the vicinity of the barrow excavated in 1999.

Objectives: to provide dating for the bone group – are they a contemporary group?; to provide dating for the palaeochannel; to provide comparative environmental information for the wider landscape of the excavations; and to provide complementary environmental evidence to pollen samples taken from the channel to inform on the contemporary Soar Valley landscape.

Final comment: J Thomas (12 September 2007), the dates recovered from the bone group reflect an accumulated assemblage representing different ages at the base of the silted channel. They provide important complimentary evidence to the other environmental information recovered from the channel. Additionally the bones, including examples of aurochs and red deer, some with evidence of butchery, provide good evidence for human activity in the area in the Neolithic. OxA-16054 provides a *terminus post quem* of 2550-2300 cal BC (Reimer *et al* 2004) for the infilling of the channel.

References: Reimer *et al* 2004
Thomas 2005
Thomas 2007

OxA–16032 4029 ±37 BP

$\delta^{13}C$: -21.9‰

Sample: Coss-Site4/163c (1), submitted in June 2006 by J Thomas

Material: animal bone: *Bos taurus* (J Browning 2006)

Initial comment: the bone was recovered from a group of animal remains located within the base layer of a palaeochannel to the north of the 1999 excavation areas. The palaeochannel was cut into river terrace gravels, approximately 300m west of the river Soar. Context 163 was the earliest evidence for silting of the channel, lying directly above possible natural gravels.

Objectives: to establish the age of the bone group; to understand if the bone group was deposited in one episode or was an accumulation over time; and to establish a comparative date for the palaeochannel in relation to the other sites excavated in the quarry.

Calibrated date: *1σ:* 2580–2480 cal BC
2σ: 2840–2460 cal BC

Final comment: J Thomas (12 September 2007), the dates recovered from the bone group reflect an accumulated assemblage representing different ages at the base of the silted channel. They provide important complementary evidence to the other environmental information recovered from the channel. Additionally the bones, including examples of aurochs and red deer, some with evidence of butchery, provide good evidence for human activity in the area in the Neolithic. OxA-16054 provides a *terminus post quem* of 2550–2300 cal BC (Reimer *et al* 2004) for the infilling of the channel.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (September 2006), this measurement was made on a bone of very low collagen yield. The yield was 5.2mg of ultrafiltered gelatin from 1100mg starting weight. This is less than our laboratory cut-off of 10mg collagen and <1% wt collagen. The sample was therefore given an experimental number (OxA-X-d) and should be treated with caution.

Laboratory comment: English Heritage (September 2006), OxA-16032 and SUERC-11282 are two measurements from the left humerus of a domestic cow. The results are statistically consistent (T'=0.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and the weighted mean is 4038 ±25 BP (2830–2470 cal BC; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–16053 4519 ±32 BP

$\delta^{13}C$: -22.8‰

Sample: Coss-Site4/163b (1), submitted in June 2006 by J Thomas

Material: antler: *Cervus elaphus* (J Browning 2006)

Initial comment: the bone was recovered from a group of animal remains located within the base layer of a palaeochannel to the north of the 1999 excavation areas. The palaeochannel was cut into river terrace gravels, approximately 300m west of the river Soar. Context 163 was the earliest evidence for silting of the channel, lying directly above possible natural gravels.

Objectives: as OxA-16032

Calibrated date: *1σ:* 3360–3100 cal BC
2σ: 3370–3090 cal BC

Final comment: see OxA-16032

Laboratory comment: English Heritage (2007), the two measurements on this antler (OxA-16053 and SUERC-11278) are not statistically consistent (T'=6.8; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16054 3931 ±31 BP

$\delta^{13}C$: -23.6‰

Sample: Coss-Site4/163d, submitted in June 2006 by J Thomas

Material: animal bone: *Bos primigenius* (J Browning 2006)

Initial comment: as OxA-16053

Objectives: as OxA-16032

Calibrated date: 1σ: 2480–2360 cal BC
2σ: 2550–2300 cal BC

Final comment: see OxA-16032. This date provides a *terminus post quem* for the infilling of the palaeochannel.

SUERC–11278 4395 ±35 BP

δ¹³C: -22.6‰

Sample: Coss-Site4/163b (2), submitted in June 2006 by J Thomas

Material: antler: *Cervus elaphus* (J Browning 2006)

Initial comment: as OxA-16053

Objectives: as OxA-16053

Calibrated date: 1σ: 3090–2920 cal BC
2σ: 3270–2910 cal BC

Final comment: see OxA-16053

Laboratory comment: see OxA-16053

References: Thomas 2005
Thomas 2007

SUERC–11282 4045 ±35 BP

δ¹³C: -22.6‰

Sample: Coss-Site4/163c (2), submitted in June 2006 by J Thomas

Material: animal bone: *Bos taurus* (J Browning 2006)

Initial comment: as OxA-16032

Objectives: as OxA-16032

Calibrated date: 1σ: 2620–2490 cal BC
2σ: 2840–2470 cal BC

Final comment: see OxA-16032

Laboratory comment: see OxA-16032

References: Thomas 2005
Thomas 2007

Cossington: site 5, Leicestershire

Location: SK 605133
Lat. 52.42.49 N; Long. 01.06.37 W

Project manager: J Thomas (Leicester Museums and University of Leicester Archaeological Service), 1999

Archival body: Leicestershire County Council Heritage Services

Description: charcoal recovered from two discrete areas of the 1999 barrow ring ditch.

Objectives: to establish a date for the infilling of the barrow ring ditch (both samples came from the upper fills of the ditch).

Final comment: J Thomas (12 September 2007), datable samples from barrow 3 were scarce, however but discrete samples reflected activities towards the end of the barrow's life, prior to final infilling of the surrounding ditch. The dates provided from the two samples suggest that the infilling of the ditch was almost complete by the early second millennium cal BC.

References: Thomas 2005
Thomas 2007

OxA–16060 3477 ±32 BP

δ¹³C: -25.8‰

Sample: Coss-Site5/637, submitted in June 2006 by J Thomas

Material: charcoal: *Quercus* sp., 15-years growth, single fragment (G Morgan 2006)

Initial comment: the charcoal was retrieved from a charcoal-rich patch within the upper backfill of the barrow ring-ditch. The ditch was cut into natural sand. Due to the level of the sample, within the upper areas of the ditch, some rootlet penetration is possible.

Objectives: to establish a date for the backfilling/abandonment of the barrow ring ditch and provide comparative dating evidence with the two ring ditches to the south.

Calibrated date: 1σ: 1880–1740 cal BC
2σ: 1890–1690 cal BC

Final comment: J Thomas (12 September 2007), datable samples from barrow 3 were scarce, but these discrete samples reflected activities towards the end of the barrows life, prior to final infilling of the surrounding ditch. The dates provided from the two samples suggest that the infilling of the ditch was almost complete by the early second millennium cal BC.

Laboratory comment: English Heritage (2007), the two measurements (OxA-16060 and OxA-16061) on this fragment of charcoal are statistically consistent (T′=2.1; T′(5%)=3.8); v=1; Ward and Wilson 1978). Their weighted mean is 3511 ±22 BP (1915–1745 cal BC; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–16061 3539 ±29 BP

δ¹³C: -25.9‰

Sample: Coss-Site5/637, submitted in June 2006 by J Thomas

Material: charcoal: *Quercus* sp., 15 years growth, single fragment (G Morgan 2006)

Initial comment: as OxA-16060

Objectives: duplicate measurement made as part of the internal programme of reproducibility run by the Oxford Radiocarbon Accelerator Unit.

Calibrated date: 1σ: 1920–1780 cal BC
2σ: 1960–1770 cal BC

Final comment: see OxA-16060

Laboratory comment: see OxA-16060

SUERC–11283 3295 ±35 BP

$\delta^{13}C$: -26.6‰

Sample: Coss-Site5/675, submitted in June 2006 by J Thomas

Material: charcoal (single fragment, blackthorn, 4 years growth) (G Morgan 2006)

Initial comment: as OxA-16060

Objectives: as OxA-16060

Calibrated date: *1σ:* 1620–1510 cal BC
2σ: 1690–1490 cal BC

Final comment: see OxA-16060

East London Gravels: Hunt's Hill Farm, Greater London

Location: TQ 565830
Lat. 51.31.25 N; Long. 00.15.22 E

Project manager: P Rowsome (Museum of London Archaeology Service), 1989–97

Archival body: London Archaeological Archive and Research Centre

Description: extensive multi-period site located on the Corbets Tey Thames Gravel Terrace, near Upminster, and excavated in advance of gravel quarrying. The site included settlement and agricultural features such as post-fast structures, field ditches, and enclosures. The majority of these are dated to the later prehistoric periods. This series contains nine prehistoric potsherds with organic residues suitable for radiocarbon dating.

Objectives: the aim of this dating is to improve the site chronology and to help refine the dating of the prehistoric ceramic fabric series for the East London area.

Final comment: I Howell (23 October 2007), the results broadly confirm the ceramic sequence, although the small number of measurements mean it is not possible to undertake any more detailed analysis. A number of discrepancies have highlighted errors in dating, in particular building 103, which suggests more extensive scientific dating would have revealed further inconsistencies in the site sequence.

Laboratory comment: English Heritage (8 December 2007), further radiocarbon dates from Hunt's Hill Farm are reported by Bayliss *et al* (2007a, 51–2).

References: Bayliss *et al* 2007a
Swift *et al* forthcoming

GrA–32960 2895 ±35 BP

$\delta^{13}C$: -27.5‰

Sample: UP-HH 89A (195) E 87 potsherd (flin1), submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: this context (195) is from a pit of Bronze Age date. No land-use details exist. The feature was dug into the Thames Terrace gravel.

Objectives: the aim of dating the organic residues on selective prehistoric sherds is twofold: a) to improve the site chronology of Hunt's Hill Farm which is based on either artefacts or pot typology, and b) to improve the stylistic/typological dating of the selective late prehistoric sand-tempered fabrics of the late Bronze Age and Iron Age. This will help refine the regional chronology of these fabrics.

Calibrated date: *1σ:* 1130–1010 cal BC
2σ: 1250–940 cal BC

Final comment: I Howell (23 October 2007), the results of the radiocarbon dating has refined the expected date and indicates that the pit belongs to the middle Bronze Age.

GrA–32961 2220 ±40 BP

$\delta^{13}C$: -27.4‰

Sample: UP-HH 89C (5422) seg 1 B potsherd (sand 2), submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: this context (5422) is the fill of a ring ditch (building 103, group 5423). It has been dated to the late Bronze Age to early Iron Age. This feature was dug into the Thames Terrace gravel.

Objectives: as GrA-32960

Calibrated date: *1σ:* 380–200 cal BC
2σ: 400–170 cal BC

Final comment: I Howell (23 October 2007), the discrepancy between the radiocarbon dating and the expected date might suggest the pottery is intrusive. However, given the currently under-represented middle Iron Age assemblage and the provisional assumption that sand-tempered fabrics belong to this period it is probable that building 103 does date to the middle Iron Age.

Laboratory comment: English Heritage (2007), the two measurements (GrA-32961 and OxA-16668) from the same sherd (seg 1) are statistically consistent (T'=0.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978). Their weigthed mean is 2220 ±24BP (390–200 cal BC; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–32963 2450 ±30 BP

$\delta^{13}C$: -27.2‰

Sample: UP-HH 89D (2720) 0191 potsherd (flin 1), submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: this context (2720) is the fill of waterhole (structure 103, group 2752), which contained lots of pottery. It is dated to the late Bronze Age to early Iron Age.

Objectives: the aim of dating the organic residues on selected prehistoric sherds is twofold: a) to improve the site chronology of Hunt's Hill Farm, which is based on either artefacts or pot typology, and b) to improve the stylistic/typological dating of the selected late prehistoric coarse flint tempered fabrics of late Bronze Age and

Iron Age. This will help refine the regional chronology of these fabrics.

Calibrated date: 1σ: 750–410 cal BC
2σ: 770–400 cal BC

Final comment: I Howell (23 October 2007), the results of the radiocarbon dating has refined the expected date and indicates that the pit belongs to the early Iron Age.

GrA–32964 2900 ±35 BP

$\delta^{13}C$: -26.6‰

Sample: UP-HH 89E (4342) E 87 potsherd finger tip dec (sand), submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: this context (4342) is from a possible cremation in structure 126, a mass of postholes of early Iron Age date.

Objectives: as GrA-32960

Calibrated date: 1σ: 1130–1010 cal BC
2σ: 1260–970 cal BC

Final comment: I Howell (23 October 2007), the results of the radiocarbon dating suggest a middle Bronze Age date for this feature. This contradicts other results and confirms the use of sand-tempered fabrics in this period.

OxA–16658 2181 ±28 BP

$\delta^{13}C$: -25.9‰

Sample: UP-HH 89C (5422) seg 2 c 208 potsherd (sand 3), submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: as GrA-32961

Objectives: as GrA-32961

Calibrated date: 1σ: 360–190 cal BC
2σ: 370–160 cal BC

Final comment: see GrA-32961

OxA–16659 2496 ±28 BP

$\delta^{13}C$: -26.8‰

Sample: UP-HH 89C (2893) D191 potsherd fabric: flin1, submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: this context (2893) is part of an early Iron Age waterhole, group 2433 structure 130. This feature was dug into the Thames Terrace gravel and its fills consist of silt and sands. The lower fills were moist.

Objectives: as GrA-32960

Calibrated date: 1σ: 770–540 cal BC
2σ: 790–510 cal BC

Final comment: I Howell (23 October 2007), this result confirms the expected date and the use of calcinated flint-tempered fabrics in this period.

OxA–16667 2890 ±30 BP

$\delta^{13}C$: -28.8‰

Sample: UP-HH 89C (2884) D 192 potsherd (flin1), submitted on 27 September 2007 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: this context (2884) is the fill of a pit of Bronze Age date. This feature was dug into the Thames Terrace gravel.

Objectives: as GrA-32960

Calibrated date: 1σ: 1130–1010 cal BC
2σ: 1210–970 cal BC

Final comment: I Howell (23 October 2007), the radiocarbon dating has refined the general date for this feature and confirmed that calcinated flint-tempered fabrics were in use during this period.

OxA–16668 2209 ±29 BP

$\delta^{13}C$: -27.9‰

Sample: UP-HH 89C (5422) seg 1 A potsherd (sand 2), submitted on 27 September 2006 by B Watson

Material: carbonised residue (internal, coarse flint-tempered fabric)

Initial comment: as OxA-16658

Objectives: as OxA-16658

Calibrated date: 1σ: 370–200 cal BC
2σ: 390–190 cal BC

Final comment: see GrA-32961

Laboratory comment: see GrA-32961

Flixton Park Quarry, Suffolk

Location: TM 303640
Lat. 52.13.32 N; Long. 01.22.21 E

Project manager: S Boulter (Suffolk County Council Archaeological Field Projects Team), 2005

Archival body: Suffolk Historic Environment Record

Description: this is a multiple-period site on river terrace gravels. There is significant archaeology of prehistoric, Roman, early Saxon, and post-medieval date.

Objectives: pit 0269 was located adjacent to the early Anglo-Saxon cemetery, but the only datable finds were Roman ceramics. However, the character of the pit was similar to those seen at Snape early Anglo-Saxon cemetery. The objective, therefore, is to ascertain whether the pit was contemporary with the cemetery (early Anglo-Saxon) or late Iron Age/Roman.

Final comment: S Boulter (26 June 2007), bulk samples FLN 053 0270 & FLN 053 0718 were processed from pit FLN 053 0269 and the charcoal was isolated for dating.

References: Pestell 2002

OxA–16710 1542 ±25 BP

$\delta^{13}C$: -24.9‰

Sample: FLN 053 0718A, submitted in October 2006 by S Boulter

Material: charcoal: Pomoideae, single fragment (R Gale 2006)

Initial comment: this is an isolated feature with *in situ* burning (heat-altered flints and charcoal lining). The charcoal is not likely to be intrusive. The feature was immediately below ploughsoil and cut into river terrace gravels. The water table was at several metres depth. Root penetration was common throughout the feature.

Objectives: pit FLN 053 0269 is similar in size and character to features recorded at Snape Anglo-Saxon cemetery. However, the only datable finds comprised Roman pottery which could be residual and derived from Roman activity, which also occurred in the immediate vicinity. At Snape, these features have been tentatively interpreted as feasting hearths associated with the cemetery. The objective at Flixton is simply to confirm the date of the feature. Is it contemporary with the early Anglo Saxon cemetery or the Roman phase of the site?

Calibrated date: *1σ:* cal AD 440–560
2σ: cal AD 420–590

Final comment: S Boulter (26 June 2006), the results were entirely in keeping with what was hoped. The early medieval date was confirmed, indicating that the feature was contemporary with the cemetery and almost certainly performed a similar function to those recorded at Snape.

Laboratory comment: English Heritage (2007), OxA-16711 is a replicate of OxA-16710, from the same fragment of charcoal. The two results are statistically consistent (T′=0.4; T′(5%)=3.8; v=1;Ward and Wilson 1978) Their weighted mean is 1560 ±18BP (cal AD 420–570; Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–16711 1564 ±25 BP

$\delta^{13}C$: -25.9‰

Sample: FLN 053 0718A, submitted in October 2006 by S Boulter

Material: charcoal: Pomoideae, single fragment (R Gale 2006)

Initial comment: replicate of OxA-16710

Objectives: this sample was a duplicate run by the Oxford Radiocarbon Accelerator Unit as part of their internal quality control procedures.

Calibrated date: *1σ:* cal AD 430–550
2σ: cal AD 420–570

Final comment: see OxA-16710

Laboratory comment: see OxA-16710

OxA–16712 1574 ±25 BP

$\delta^{13}C$: -26.0‰

Sample: FLN 053 0718B, submitted in October 2006 by S Boulter

Material: charcoal: *Prunus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-16710

Objectives: as OxA-16710

Calibrated date: *1σ:* cal AD 420–540
2σ: cal AD 410–560

Final comment: see OxA-16710

Geoarchaeology of the Trent tributaries, Derbyshire, Nottinghamshire, and Staffordshire

Location: SK 038684; SK 280 260; SK 7603 7501: SK 7906 9402
Lat. 53.12.45 N; Long. 01.56.35 W, : Lat. 52.49.50 N; Long. 01.35.04 W: Lat. 53.15.59 N; Long. 01.51.36 W: Lat. 53.26.12 N; Long. 00.48.35 W

Project manager: A J Howard (University of Birmingham), December 2005

Description: the Dove flows from the Peak District uplands and is one of two major tributary rivers that feed the Trent in its middle reaches (the other is the Derwent). It has a broad, low-lying floodplain with numerous palaeochannels, indicating considerable lateral migration of the river through the Holocene. The Idle drains the Mansfield Plateau and enters the Trent in its lower reaches. The floodplain is low-lying and, prior to agricultural drainage, formed an extensive wetland area crossed by numerous channels. Three sites were identified with sediments suitable for palaeoecological analysis and dating within the Idle Valley: one exposed ditch section at Misterton Carr; one exposed ditch section and one borehole at Fountains Farm. Both are situated on adjacent areas of the floodplain at similar stratigraphic levels. Two sites were identified in the Dove Valley; one borehole at Tutbury; and two adjacent ditch sections at Eaton Dovedale. The site of the Tutbury borehole is close to (but stratigraphically higher than) the adjacent contemporary channel, whilst the Eaton Dovedale sections are located at the edge of the floodplain.

Objectives: to determine the timing of inorganic alluviation within the respective catchments; to determine both the timing and cessation of organic sedimentation within the respective catchments; and to identify episodes of changing flood frequency and magnitude in the Dove Valley.

Final comment: A J Howard (25 October 2007), overall, a successful dating programme, though the Tutbury dates are affected by recycling of organic sediments in response to changing flood frequency and magnitude.

References: Buckland and Dolby 1973
Buckland and Sadler 1985
Challis *et al* 2007
Smith 1953
Van de Noort and Ellis 1997

Geoarchaeology of the Trent tributaries: Eaton Dovedale, Dove 1, Derbyshire

Location: SK 10473723
Lat. 52.55.55 N; Long. 01.50.39 W

Project manager: A J Howard (University of Birmingham), 2005

Archival body: Derbyshire County Council, SMR

Description: a recut modern drainage ditch, located 200m east from the contemporary channel contained a series of organic rich deposits with significant environmental potential. The ditch was approximately three metres deep and inspection of aerial photographs and historic maps indicated that the ditch was probably excavated through a former river channel flowing along the eastern margin of the valley floor. Dove 1 was 2.6m deep and divided into five stratigraphic units with the richest biological remains associated with grey organic silty units between 1.9-2.6m.

Objectives: to provide a chronology for the palaeoenvironmental work being undertaken on the core and to understand the alluvial chronology of the valley floor deposits.

Final comment: A J Howard (25 October 2007), an age estimate of approximately 75 years from the upper sample from Dove 1 suggests this material is recent, and is probably derived from the (modern) hawthorn hedgerow.

References: Challis *et al* 2007
Dalton 1988
Havelock and Howard 2002
Howard 2005
Hudson-Edwards *et al* 2002

SUERC–10033 325 ±30 BP

$\delta^{13}C$: -27.3‰

Sample: Dove 1 Lower, submitted in January 2006 by A J Howard

Material: waterlogged wood: *Betula* sp., roundwood, single fragment (W Smith 2006)

Initial comment: analysis of aerial photographs and LiDAR as part of the Trent Tributaries project resulted in the identification of a major palaeochannel of the river Dove at the eastern margin of the floodplain, inset immediately beneath a higher terrace, assumed to be of late Pleistocene date. Two sections (Dove 1 and Dove 2) were cut back into a recently excavated drainage ditch, which demonstrated that over 2m of fine-grained, organic-rich sediment cropped out across the valley floor. The sediments were excavated within a drainage ditch, which, by its very nature, is periodically filled with water. However, the water drains rapidly into the Dove and on every occasion the site was visited both in the summer and autumn, only a small amount of water filled the very bottom of the ditch. No evidence of root penetration was observed in the cleaned sections.

Objectives: to determine the timing of the organic sedimentation across the Holocene floodplain; to determine the duration of channel infilling with organic material, which has been analysed to provide an environmental history of this part of the valley floor and is being analysed with respect to models of landscape development within the Trent Valley; and to determine the timing of accelerated (inorganic) alluviation, indicated by the deposition of the overlying red/brown/grey (inorganic) silt. This material is usually associated with catchment deforestation and increased anthropogenic activity and its date will provide an important indication of when accelerated soil erosion is occuring in the Dove Valley. Again, this will be fed into more general models of alluviation in the Trent Valley.

Calibrated date: *1σ:* cal AD 1490–1650
2σ: cal AD 1460–1650

Final comment: A J Howard (25 October 2007), this date appears to fit well with both the stratigraphic and palaeoecological evidence and hence fairly reflects the timing of alluviation in this part of the Dove Valley.

SUERC–10034 75 ±35 BP

$\delta^{13}C$: -28.7‰

Sample: Dove 1 Upper, submitted in February 2006 by A J Howard

Material: waterlogged wood: *Crataegus* sp., single fragment (W Smith 2006)

Initial comment: analysis of aerial photographs and LiDAR as part of the Trent tributaries project resulted in the identification of a major palaeochannel of the river Dove at the eastern margin of the floodplain, inset immediately beneath a higher terrace, assumed to be of late Pleistocene date. Two sections (Dove 1 and Dove 2) were cut back into a recently excavated drainage ditch, which demonstrated that over 2m of fine-grained, organic-rich sediment cropped out across the valley floor. The underlying geology of this part of the valley floor comprises mudstones and thin sandstones of the Mercia Mudstone Group, a formation of Triassic age, originally deposited under semi-arid desert conditions, around 280 million years ago. The stratigraphy and sedimentology of the deposits recorded within the excavated sections demonstrate that these areas had infilled naturally in the quiet, low-energy backswamp area at the edge of the floodplain. No evidence was found for human manipulation/occupation within the sampled part of the palaeochannel. The sediments were excavated within a drainage ditch, which by its very nature, is periodically filled with water. However, the water drains rapidly into the Dove and on every occasion the site was visited both in the summer and autumn, only a small amount of water filled the very bottom of the ditch. No evidence of root penetration was observed in the cleaned sections.

Objectives: to determine the duration of channel infilling with organic material, which has been analysed to provide an environmental history of this part of the valley floor and is being analysed with respect to models of landscape development within the Trent Valley, and to determine the timing of accelerated (inorganic) alluviation, indicated by the deposition of the overlying red/brown/grey (inorganic) silt. This material is usually associated with catchment deforestation and increased anthropogenic activity and its date will provide an important indication of when accelerated soil erosion is occurring in the Dove Valley. Again, this will be fed into more general models of alluviation in the Trent Valley.

Calibrated date: *1σ:* cal AD 1690–1955*
2σ: cal AD 1680–1960

Final comment: A J Howard (25 October 2007), this date appears much too young in relation to both the stratigraphic and palaeoecological evidence and hence is regarded as a sampling contamination problem (?root penetration).

Geoarchaeology of the Trent tributaries: Eaton Dovedale, Dove 2, Derbyshire

Location: SK 10453701
Lat. 52.55.48 N; Long. 01.50.40 W

Project manager: A J Howard (University of Birmingham), 2005

Archival body: Derbyshire County Council, SMR

Description: a recut modern drainage ditch, located 200m east from the contemporary channel contained a series of organic rich deposits with significant environmental potential. he second section, Dove 2 was slightly deeper and stratigraphically more complex than Dove 1 and divided into nine units of grey organic rich silt intercalated with bands of sand, possibly associated with flooding; the most prominent of these was at 2.16m, but sandy facies were common between 1.98-2.34m.

Objectives: to provide a chronology for the palaeoenvironmental work being undertaken on the core and to understand the alluvial chronology of the valley floor deposits.

Final comment: A J Howard (5 October 2007), the upper sample from Dove 2 yielded an age estimate of over 330 years and was more akin to other basal ages; it is therefore suggested that this date (on a sample of common reed) probably reflects contamination by older material during ditch cleaning.

References: Challis *et al* 2007

SUERC–10035 345 ±35 BP

$\delta^{13}C$: -29.1‰

Sample: Dove 2 Lower, submitted in February 2006 by A J Howard

Material: waterlogged plant macrofossil (unidentified root fragment) (W Smith 2006)

Initial comment: as SUERC-10034

Objectives: SUERC-10034

Calibrated date: *1σ:* cal AD 1460–1640
2σ: cal AD 1440–1650

Final comment: see SUERC-10033

SUERC–10036 330 ±35 BP

$\delta^{13}C$: -27.9‰

Sample: Dove 2 Upper, submitted in February 2006 by A J Howard

Material: waterlogged plant macrofossil: *Phragmites australis* (W Smith 2006)

Initial comment: as SUERC-10034

Objectives: as SUERC-10034

Calibrated date: *1σ:* cal AD 1480–1650
2σ: cal AD 1450–1650

Final comment: A J Howard (25 October 2007), this date appears to fit well with both the stratigraphic and palaeoecological evidence and hence fairly reflects the timing of alluviation in this part of the Dove Valley.

Geoarchaeology of the Trent tributaries: Fountains Farm (FN01), Nottinghamshire

Location: SK 7208797346
Lat. 53.28.04 N; Long. 00.54.50 W

Project manager: A J Howard (University of Birmingham), 2005

Archival body: Bassetlaw Museum, Retford, Nottinghamshire County Council, SMR

Description: the Fountains Farm site lies close to Misterton Carr Farm, where excavations by Buckland and Dolby (1973) identified a number of scatters of Mesolithic and Neolithic lithic material. To the east, the Humber Wetlands Project recovered a scatter of lithics on the western edge of the palaeochannel of probable Neolithic and Bronze Age date (Misterton-11, Van De Noort & Ellis 1997). Aerial photographic analysis and borehole modelling identified a large organic-rich depression trending south-north from the modern river Idle across the area. A single auger core was taken.

Objectives: to provide a chronology for the palaeoenvironmental work being undertaken on the core and to understand the alluvial chronology of the valley floor deposits.

Final comment: A J Howard (25 October 2007), radiocarbon dating indicate the these organic sediments span a relatively narrow timescale between *c* 3900–3000 BC (i.e. Bronze Age).

References: Buckland and Dolby 1973
Buckland and Sadler 1985
Challis *et al* 2007
Smith 1953
Van de Noort and Ellis 1997

OxA–15896 2883 ±33 BP

$\delta^{13}C$: -29.8‰

Sample: FN01 a (upper, 1.10m), submitted in March 2006 by A J Howard

Material: sediment (18g) (humin fraction, bulk sample) (W Smith 2006)

Initial comment: analysis of aerial photographs, LiDAR, and borehole records resulted in the identification of a major palaeochannel of the Idle on land owned by Fountains Farm. Following a number of prospection holes, a single gouge core (FN01) was drilled through the thickest part of the organic sequence and samples were recovered for environmental analysis and radiocarbon dating. This sample is from the top of the organic-rich silty clay and was immediately sealed by inorganic alluvium. The stratigraphy and sedimentology of the deposits within the ditch section suggest aggradation within a backswamp floodplain wetland of the river Idle. The sediments were moist throughout and the watertable was encountered at the base of the ditch, approximately 1.9m below the ground surface. With the exception of the upper 0.4m (modern topsoil development), no evidence of root penetration was observed in the recorded section.

Objectives: as OxA-15895

Calibrated date: *1σ*: 1130–1000 cal BC
2σ: 1200–930 cal BC

Final comment: A J Howard (25 October 2007), this palaeochannel feature is incised into the deposits analysed as part of FN05 dating programme, and hence the age estimate agrees with the geomorphological evidence for a younger age chronology spanning the early to middle Bronze Age. The contrasting measurements from the humic and humin fractions probably reflects the mixing of sediments in a higher energy 'in-channel' depositional context.

Laboratory comment: English Heritage (2007), the measurements on the humic acid and humin fractions of this bulk sediment sample (OxA-15936 and OxA-15896) are not statistically consistent (T'=15.7; T'(5%)=3.8; ν=1; Ward and Wilson, 1978).

References: Ward and Wilson 1978

OxA–15936 3055 ±28 BP

$\delta^{13}C$: -27.9‰

Sample: FN01 a (upper, 1.10m), submitted in March 2006 by A J Howard

Material: sediment (18g) (humic acid fraction, bulk sample) (W Smith 2006)

Initial comment: as OxA-15896

Objectives: as OxA-15895

Calibrated date: *1σ*: 1390–1270 cal BC
2σ: 1410–1220 cal BC

Final comment: see OxA-15896

Laboratory comment: see OxA-15896

Geoarchaeology of the Trent tributaries: Fountains Farm (FN05), Nottinghamshire

Location: SK 7248297352
Lat. 53.28.04 N; Long. 00.54.29 W

Project manager: A J Howard (University of Birmingham)

Archival body: Bassettlaw Museum, Redford, Nottinghamshire County Council, SMR

Description: the Fountains Farm site lies close to Misterton Carr Farm, where excavations by Buckland and Dolby (1973) identified a number of scatters of Mesolithic and Neolithic lithic material. To the east, the Humber Wetlands Project recovered a scatter of lithics on the western edge of the palaeochannel of probable Neolithic and Bronze Age date (Misterton-11, Van De Noort & Ellis 1997). Aerial photographic analysis and borehole modelling identified a large organic rich depression trending south-north from the modern river Idle across the area. Fountains Farm Core 5 was taken from a ditch section.

Objectives: to provide a chronology for the palaeoenvironmental work being undertaken on the core and to understand the alluvial chronology of the valley floor deposits.

Final comment: A J Howard (25 October 2007), radiocarbon dating indicate that these organic sediments span a relatively narrow timescale between *c* 3900–3000 BC (i.e. Bronze Age).

References: Buckland and Dolby 1973
Van de Noort and Ellis 1997

OxA–15895 3640 ±33 BP

$\delta^{13}C$: -26.4‰

Sample: FN05 a (upper, 1.20m), submitted in March 2006 by A J Howard

Material: waterlogged wood: *Corylus avellana*, roundwood, 12 years growth, single fragment (W Smith 2006)

Initial comment: analysis of LiDAR, aerial photography, and borehole records indicated that a major palaeochannel of the Idle was located within this area, close to Fountains Farm. Field investigation confirmed the presence of a visible depression, which was cored and sampled (FN01). However, cleaned drainage ditches approximately 500m west of FN01 demonstrated that organic-rich sediments were preserved over extensive areas of the floodplain. Large tree remains near the base of the organic-rich sediments suggested burial of mature floodplain woodland at some point in time. A representative section through these floodplain sediments was cleaned, recorded, and sampled for environmental assessment and dating.

This radiocarbon sample is from the top of the woody peat and was sealed immediately beneath inorganic alluvium. The underlying geology of this part of the valley floor comprises mudstones and thin sandstones of the Mercia Mudstone Group, a formation of Triassic age, originally deposited under semi-arid desert conditions, around 280 million years ago. The stratigraphy and sedimentology of the deposits within the ditch section suggest aggradation within a backswamp floodplain wetland of the river Idle. The sediments were moist throughout and the watertable was encountered at the base of the ditch, approximately 1.9m below the ground surface. With the exception of the upper 0.4m (modern topsoil development), no evidence of root penetration was observed in the recorded section.

Objectives: to determine the cessation of organic sedimentation and the onset of inorganic alluviation.

Calibrated date: *1σ*: 2110–1950 cal BC
2σ: 2140–1910 cal BC

Final comment: A J Howard (25 October 2007), this date indicates organic sedimentation continued through the early Bronze Age, though it may well have continued into the later prehistoric and historic periods, although the evidence of this continued wetland development is no longer present (through peat deflation, desiccation, and agricultural intensification). Again, such dates fit with regional models of floodplain mire development.

OxA–15935 3920 ±28 BP

δ¹³C: -27.0‰

Sample: FN05b (lower, 1.85m), submitted in March 2006 by A J Howard

Material: waterlogged wood: *Alnus glutinosa*, roundwood, 11 years growth, single fragment (W Smith 2006)

Initial comment: analysis of LiDAR, aerial photography, and borehole records indicated that a major palaeochannel of the Idle was located within this area, close to Fountains Farm. Field investigation confirmed the presence of a visible depression, which was cored and sampled (FN01). However, cleaned drainage ditches approximately 500m west of FN01 demonstrated that organic-rich sediments were preserved over extensive areas of the floodplain. Large tree remains near the base of the organic-rich sediments suggested burial of mature floodplain woodland at some point in time. A representative section through these floodplain sediments was cleaned, recorded and sampled for environmental assessment and dating. Radiocarbon sample (FN05) is from the base of the woody peat. The stratigraphy and sedimentology of the deposits within the ditch section suggest aggradation within a backswamp floodplain wetland of the river Idle. The sediments were moist throughout and the watertable was encountered at the base of the ditch, approximately 1.9m below the ground surface. With the exception if the upper 0.4m (modern topsoil development), no evidence of root penetration was observed in the recorded section.

Objectives: to determine the onset of organic sedimentation.

Calibrated date: *1σ*: 2470–2340 cal BC
2σ: 2480–2290 cal BC

Final comment: A J Howard (25 October 2007), this date suggests the organic sedimentation from the late Neolithic to the early Bronze Age, which fits in with regional models of floodplain mire development.

Geoarchaeology of the Trent tributaries: Misterton Carr, Nottinghamshire

Location: SK 73029603
Lat. 53.27.21 N; Long. 00.54.01 W

Project manager: A J Howard (University of Birmingham), 2005

Archival body: Nottinghamshire County Council SMR

Description: a large, sinuous palaeochannel was recorded from lidar and aerial photographs running north/south through the area of Misterton Carr Farm. It is possible that this channel is a continuation of the large feature identified at Fountains Farm. Field inspection indicated that the feature was demarcated by soft, black peaty soil surrounded by pale grey alluvium. Following environmental assessment of a number of sites further analysis was focused on Misterton Carr Farm Core 03 taken from a ditch section.

Objectives: to provide a chronology for the palaeoenvironmental work being undertaken on the core and to understand the alluvial chronology of the valley floor deposits.

Final comment: A J Howard (25 October 2007), radiocarbon dating indicate these organic sediments span a relatively narrow timescale between *c* 3900–3000 BC (i.e. Bronze Age).

References: Buckland and Dolby 1973
Buckland and Sadler 1985
Challis *et al* 2007
Smith 1953
Van de Noort and Ellis 1997

OxA–15933 3767 ±28 BP

δ¹³C: -26.5‰

Sample: MC03 b (lower, 1.87m), submitted in March 2006 by A J Howard

Material: waterlogged wood: cf *Alnus glutinosa*, single fragment (W Smith 2006)

Initial comment: nationally important Mesolithic remains have been recorded from Misterton Carr (Buckland and Dolby 1973). Analysis of LiDAR, aerial photographs, and borehole information as part of this project demonstrated the presence of a number of organic channels and wetland areas. Field inspection of Misterton Carr indicated that the peat-rich sediments are now of very variable thickness and many are extremely thin and desiccated. A representative section through these floodplain sediments was cleaned, recorded, and sampled for environmental assessment and dating. This section was excavated through the area where the peat deposit was thickest and where it was moist (ie with the greatest environmental potential). This sample was from the base of the woody peat. The stratigraphy and sedimentology of the deposits within the ditch section suggest aggradation within a backswamp floodplain wetland of the river Idle. The sediments were moist throughout and the watertable was encountered at the base of the ditch, approximately 1.9m below the ground surface. With the exception of the upper 0.4m (modern topsoil development), no evidence of root penetration was observed in the recorded section.

Objectives: to determine the onset of organic sedimentation.

Calibrated date: *1σ*: 2270–2130 cal BC
2σ: 2290–2050 cal BC

Final comment: A J Howard (25 October 2007), this date suggests the organic sedimentation from the late Neolithic to the early Bronze Age, which fits in with regional models of floodplain mire development.

References: Buckland and Dolby 1973

OxA–15934 3606 ±29 BP

δ¹³C: -26.9‰

Sample: MC03 a (upper, 1.27m), submitted in March 2006 by A J Howard

Material: waterlogged wood (too soft to thin section, single fragment) (W Smith 2005)

Initial comment: nationally important Mesolithic remains have been recorded from Misterton Carr (Buckland and Dolby 1973). Analysis of LiDAR, aerial photographs, and borehole information as part of this project demonstrated the presence of a number of organic channels and wetland areas. Field inspection of Misterton Carr indicated that the peat-rich sediments are now of very variable thickness and many are extremely thin and desiccated. A representative section through these floodplain sediments was cleaned, recorded, and sampled for environmental assessment and dating. This sample was from the top of the woody peat and was sealed immediately by inorganic alluvium. The stratigraphy and sedimentology of the deposits within the ditch section suggest aggradation within a backswamp floodplain wetland of the river Idle. The sediments were moist throughout and the watertable was encountered at the base of the ditch, approximately 1.9m below the ground surface. With the exception of the upper 0.4m (modern topsoil development), no evidence for root penetration was observed in the recorded section.

Objectives: to determine the cessation of organic sedimentation and the onset of inorganic alluviation.

Calibrated date: 1σ: 2020–1920 cal BC
2σ: 2040–1880 cal BC

Final comment: A J Howard (25 October 2007), this date indicates organic sedimentation continued through the early Bronze Age. It may well have continued into the later prehistoric and historic periods, although the evidence of this continued wetland development is no longer present (through peat deflation, desiccation, and agricultural intensification). Again, such dates fit with regional models of floodplain mire development.

References: Buckland and Dolby 1973

Geoarchaeology of the Trent tributaries: Tutbury Castle, Derbyshire, Nottinghamshire, and Staffordshire

Location: SK 208294
Lat. 52.51.41 N; Long. 01.41.28 W

Project manager: A J Howard (University of Birmingham), 2005

Archival body: Nottinghamshire and Derbyshire County Council SMR

Description: analysis of aerial photography and LiDAR resulted in the identification of a major meander loop of the Dove on the floodplain immediately below Tutbury Castle. Following a number of prospection holes, a single gouge core (43) was drilled through the thickest part of the organic sequence and samples were recovered for environmental analysis and radiocarbon dating.

Objectives: to determine the timing of inorganic alluviation within the catchment; to determine the timing of organic sedimentation within the channel and hence floodplain development; and to determine the timing of significant flood events and periods of floodplain quiescence.

Final comment: A J Howard (25 October 2007), changing flood frequency and magnitude appears to be a significant issue in the Dove Valley over the last 1000 years. This appears to have affected the integrity of the dating programme undertaken on sediments within a channel fill close to the main channel and has led to several inverted dates.

References: Challis *et al* 2007
Dalton 1988
Havelock and Howard 2002
Howard 2005
Hudson-Edwards *et al* 2002

SUERC–10025 1165 ±35 BP

$\delta^{13}C$: -28.5‰

Sample: Tutbury 34 S6 3.40m, submitted in February 2006 by A J Howard

Material: sediment (7g) (humic acid fraction, bulk sample) (W Smith 2006)

Initial comment: analysis of aerial photographs and LiDAR resulted in the identification of a major meander loop of the Dove on the floodplain, immediately below Tutbury Castle. Following a number of prospection holes, a single gouge core (34) was drilled through the thickest part of the organic sequence and samples were recovered for environmental analysis and radiocarbon dating. The underlying geology of this part of the valley floor comprises mudstones and thin sandstones of the Mercia Mudstone Group, a formation of Triassic age, originally deposited under semi-arid desert conditions, around 280 million years ago. The stratigraphy and sedimentology of the deposits from the drilled core indicate that the sediments were aggraded in an abandoned meander of the river Dove. However, three thin sand units through the sequence indicate that periodically floods washed through the palaeochannel. The sediments were moist throughout and the watertable was encountered at approximately 2.5m below the ground surface. With the exception of the upper 0.4m (modern topsoil development), no evidence of root penetration was observed in the core.

Objectives: to determine the timing of organic sedimentation within the channel and hence floodplain development.

Calibrated date: 1σ: cal AD 780–940
2σ: cal AD 770–980

Final comment: A J Howard (25 October 2007), a younger date than for material higher up the sequence of the channel clearly indicates recycling of sediments within this channel and hence caution should be exercised with the reliability of this date as an estimate for the timing of channel sedimentation. Recycling during flood events helps to explain the disparity between the humin and humic acid fractions.

Laboratory comment: English Heritage (2007), the measurements on the humin and humic acid fractions of this bulk sample are not statistically consistent (T'=8.6; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10026 1310 ±35 BP

$\delta^{13}C$: -28.3‰

Sample: Tutbury 34 S6 3.40m, submitted in February 2006 by A J Howard

Material: sediment (7g) (humin fraction, bulk sample) (W Smith 2006)

Initial comment: as SUERC-10025

Objectives: to determine the timing of organic sedimentation within the channel and hence floodplain development.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: A J Howard (25 October 2007), a younger date than material higher up the sequence of the channel clearly indicates recycling of sediments within this channel and hence caution should be exercised with the reliability of this date as an estimate for the timing of channel sedimentation.

Laboratory comment: see SUERC-10025

SUERC–10027 335 ±35 BP

$\delta^{13}C$: -26.7‰

Sample: Tutbury 34 S2 1.78m, submitted in February 2006 by A J Howard

Material: waterlogged wood (cf. *Salix* sp., twig) (W Smith 2006)

Initial comment: as SUERC-10025

Objectives: to determine the timing of a significant flood event. This sample will provide a *terminus ante quem* for this event.

Calibrated date: *1σ:* cal AD 1470–1650
2σ: cal AD 1450–1650

Final comment: A J Howard (25 October 2007), this date would appear to be within the age range expected for the upper part of the channel fill at Tutbury and would fit with regional patterns of the timing of significant flood events. However, the presence of an older date from above (SUERC-11619) clearly indicates caution must be exercised with acceptance of this date as representing the true age of the upper part of the channel fill.

SUERC–10028 290 ±35 BP

$\delta^{13}C$: -30.2‰

Sample: Tutbury 34 S4 1.94m, submitted in February 2006 by A J Howard

Material: waterlogged wood: *Betula* sp., twig (W Smith 2006)

Initial comment: as SUERC-11619

Objectives: to determine the timing of a significant flood event.

Calibrated date: *1σ:* cal AD 1520–1650
2σ: cal AD 1480–1800

Final comment: A J Howard (25 October 2007), a significantly younger date, which clearly demonstrates the recycling of materials within this channel sequence.

SUERC–10032 955 ±35 BP

$\delta^{13}C$: -28.0‰

Sample: Tutbury 34 S5 3.20m, submitted in February 2006 by A J Howard

Material: waterlogged wood (unidentified, roundwood, single fragment) (W Smith 2006)

Initial comment: as SUERC-10025

Objectives: to determine the cessation of organic (peat) deposition and the onset of less organic sedimentation and ultimately, changing flood frequency and magnitude.

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 1010–1170

Final comment: A J Howard (25 October 2007), a younger date than material higher up the sequence of the channel clearly indicates recycling of sediments within this channel and hence caution should be exercised with the reliability of this date as an estimate for the timing of channel sedimentation.

SUERC–11619 3820 ±60 BP

$\delta^{13}C$: -27.1‰

Sample: Tutbury 34 S1 0.9m, submitted in February 2006 by A J Howard

Material: sediment (humin fraction, bulk sample) (W Smith 2006)

Initial comment: as SUERC-10025

Objectives: to determine the timing of accelerated (inorganic) alluviation, indicated by the deposition of the overlying red/brow/grey (inorganic) silt. This material is usually associated with catchment deforestation and increased anthropogenic activity and dating it will provide an important indication of when accelerated soil erosion occurred in the Dove Valley. Again, this will be fed into more general models of alluviation in the Trent Valley.

Calibrated date: *1σ:* 2400–2140 cal BC
2σ: 2470–2040 cal BC

Final comment: A J Howard (25 October 2007), clearly an inverted date cause by the recycling of older organic material during flooding into the upper part of an ‘in-channel sequence’.

Laboratory comment: English Heritage (25 January 2008), the humic acid fraction of this sample produced insufficient carbon for dating.

SUERC–11620 910 ±30 BP

$\delta^{13}C$: -29.0‰

Sample: Tutbury 34 S3 1.82m, submitted in February 2006 by A J Howard

Material: sediment (12g) (humic acid fraction, bulk sample) (W Smith 2006)

Initial comment: as SUERC-10025

Objectives: to determine the timing of a significant flood event. This sample will provide a *terminus post quem* for this event.

Calibrated date: *1σ:* cal AD 1040–1170
2σ: cal AD 1020–1220

Final comment: A J Howard (25 October 2007), this date would appear within the age range expected for the upper part of the channel fill at Tutbury and would fit with regional patterns of the timing of significant flood events. However, the presence of an older date from above (SUERC-11619) and a significantly younger date below (SUERC-10028) clearly indicates caution must be exercised with acceptance of this date as representing the true age of this part of the fluvial sequence. The problems of sediment mixing during high energy 'in-channel' events most probably explains the discrepancies with the humic acid and humin fractions.

Laboratory comment: English Heritage (2007), the humic acid and humin fraction measurements on this bulk sample (SUERC-11620 and SUERC-11621) are not statistically consistent ($T'=174.8$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson, 1978).

References: Ward and Wilson 1978

SUERC–11621 1770 ±60 BP

$\delta^{13}C$: -28.6‰

Sample: Tutbury 34 S3 1.82m, submitted in February 2006 by A J Howard

Material: sediment (12g) (humin fraction, bulk sample) (W Smith 2006)

Initial comment: as SUERC-10025

Objectives: as SUERC-11619

Calibrated date: *1σ:* cal AD 170–350
2σ: cal AD 80–420

Final comment: A J Howard (25 October 2007), this date would appear within the age range expected for the middle part of the channel fill at Tutbury. However, the presence of a significantly younger date below (SUERC-10028) clearly indicates caution must be exercised with acceptance of this date as representing the true age of this part of the fluvial sequence. The problems of sediment mixing during high energy 'in-channel' events most probably explains the discrepancy in the record.

Laboratory comment: see SUERC-11620

Gwithian, Cornwall

Location: SW 58974221
Lat. 50.13.48 N; Long. 05.22.48 W

Project manager: J Nowakowski (Historic Environment Service, Cornwall County Council), 2005

Description: samples from two major separate excavations were submitted for scientific dating. At GMI, a small settlement of post-Roman date comprising a series of small circular buildings was discovered during the excavations at Gwithian (with related sites GM/A, GM/B, GM/E, GMXX and GMXXI). Distinctive and stratified occupation horizons – layers A, B, and C – were recorded and these were dated by pottery to the post-Roman period. Each major occupation horizon was sealed by deposits of wind-blown sand. A major phase of activity associated with layer B was characterised by a number of small sunken cells which are likely to have been workshops. These housed stone-lined hearths. Industrial pits (perhaps related to small-scale ironworking) were found together with domestic middens. Remains of an associated field system were also found. Recent work on the structure and stratigraphy of the post-Roman sequence reveals that the evidence excavated at GMI spans a major phase of activity from the fifth to eighth centuries AD. Abandonment of the site is likely to date from the late seventh or eighth centuries AD. At sites GMX, GMIX, and GMXV a number of related investigations, the remains of a major phase of settlement dating to the second millennium BC were found at Gwithian. Three major phases of occupation were discovered in a well-stratified, deep, localised sequence made up of old land surfaces (layers 8, 7, 5, and 3 – bottom to top). Each major occupation horizon was sealed by layers of wind-blown sand concealing well-preserved episodes of continuing occupation. Wooden and stone-built structures were found alongside fields where cultivation marks (plough and spade marks) survived. Human cremations were found alongside human burial. The entire site was buried by middens at the end of the sequence. The major occupation horizons were distinguished and dated by diagnostic ceramics. In 1963 mixed charcoal taken from four different cremation fire pits excavated in layer 5 produced a radiocarbon date of 1530–1010 cal BC (Reimer *et al* 2004) (NPL-21; 3070 ±103BP) (Callow *et al* 1963, 36). Recent work on the structure and stratigraphy of the Bronze Age sequence reveals an almost continuous use of the landscape for settlement and farming from the early Bronze Age through to the later Bronze Age. The sequence spans the best part of 1,000 years during the second millennium BC.

Objectives: samples GMI (A, B, and C), GMX (3 and 5), GMIX, and GMXV were submitted to spot-date major occupation horizons from two separate sites. GMI dates occupation from the post-Roman period. Samples from GMX, GMIX, and GMXV all come from a well-preserved Bronze Age sequence. An additional objective has been to provide accurate dates for distinctive ceramic forms.

Final comment: J Nowakowski (16 May 2007), the overall dating programme has been successful. The dates have confirmed spot dates for the major occupation horizons for both the localised Bronze Age and post-Roman stratigraphic sequences at Gwithian. Most of the dates are also in good agreement with the ceramic forms.

References: Callow *et al* 1963
Hamilton *et al* 2007
Nowakowski *et al* forthcoming
Nowakowski 2004
Nowakowski 2007
Reimer *et al* 2004
Thomas 1958

Gwithian: post-Roman, Cornwall

Location: SW 58954212
Lat. 50.13.45 N; Long. 05.22.49 W

Project manager: J Nowakowski (Historic Environment Service, Cornwall County Council), 2005

Archival body: Royal Cornwall Museum, Truro, Cornwall

Description: the post-Roman "industrial settlement" discovered at Gwithian comprised a series of small linked structures surrounded by industrial features – principally found at sites GMI, GMA and GMIV (at the latter, only industrial features were found). Associated with these structural features was "settlement" debris (middens) found at sites GMI, GMA, GMB, GME and GMIV. This major post-Roman phase (that is Phases 3 and 4) falls within the fifth to eighth centuries AD. The site is characterised by craft-based industries - such as ironworking, leatherworking, boneworking, and perhaps woodworking and fishing, and may best be described as a “workshop centre”. The structures are unlikely to have been residential “houses” but rather may have been “shelters” and “workshops” perhaps used seasonally.All the residues submitted for dating came from a selection of distinctive sherds and taken from two of the main proposed occupation horizons recorded at GMI.

Objectives: to test whether the proposed post-Roman sequence of ′Layers′ (three principal archaeological horizons or banded phases of archaeological activity (A–C) identified across the site in the 1950’s and 1960’s can be verified by dating the carbonised residues surviving on the internal surfaces of pottery sherds.

Final comment: J Nowakowski and P Marshall (16 May 2007), in general the dates seem reliable and to be in good agreement with the proposed stratigraphic sequence although there is some overlap. However, all the dated samples come from general spreads with the exception of GMI/13 which was from the sealed rubble collapse of House (2241). On present knowledge, the dates reveal a main phase of activity at GMI which falls within the fifth to eighth centuries AD. Abandonment of the site was likely to have taken place in the late seventh/eighth centuries AD, and the evidence for abandonment could suggest fairly systematic closure.

References: Nowakowski *et al* forthcoming
Nowakowski 2007

OxA–14526 1448 ±28 BP

$\delta^{13}C$: -25.9‰

Sample: GMI (7), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: the stratigraphy for GMI was recorded as three broad sandy-soil occupation layers (A, B, C) each probably separated by layers of blown sand. Within each layer were features such as huts and pits. The samples were recorded as ′w baulk middle′ within layer B, the middle of the three occupation layers. The geology consists of slate bedrock beneath blown calcareous sand layers. Layer B is the middle major occupation layer sealed between two sand layers. This sample was from context (2208) and belongs to phase 3.

Objectives: to provide a spot date to help date the occupation horizon represented by layer B and to fix its position within the overall GMI stratigraphy.

Calibrated date: *1σ:* cal AD 590–650
2σ: cal AD 560–660

Final comment: J Nowakowski (16 May 2007), the date is taken from the residue of a body sherd. The date is good for the ceramic form and also confirms the date of this major occupation horizon (phase 3).

Laboratory comment: English Heritage (2007), the two results from the carbonised residue on this sherd are statistically consistent (OxA-14526 and SUERC-6159; T′=3.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean is 1480 ±22 BP, which calibrates to cal AD 540–640 (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–14528 1460 ±27 BP

$\delta^{13}C$: -27.3‰

Sample: GMI (1), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, Gwithian-style base sherd)

Initial comment: the stratigraphy for GMI was recorded as three broad sandy-soil occupation layers (A, B, C) each probably separated by layers of blown sand. Within each layer were features such as huts and pits. Layer C represents the lowest of the three occupation layers: the sample comes from within a building within the layer context (2210). The geology consists of slate bedrock beneath blown calcareous sand layers. Layer C is the lowest occupation layer, between two sand layers.

Objectives: to provide a spot date to help date the occupation horizon represented by layer C and to fix its position within the overall GMI stratigraphy. The artefacts from layers A–C suggest a developing sequence; potentially a key sequence for the early medieval period in the region. Dates will provide clarification and support for this.

Calibrated date: *1σ:* cal AD 570–640
2σ: cal AD 550–650

Final comment: J Nowakowski (16 May 2007), the date is taken from the residue of a base sherd. The date is good for the ceramic form – known as the Gwithian Style – and also confirms the original interpretation of the date of this major occupation horizon.

OxA–14529 1534 ±29 BP

$\delta^{13}C$: -26.3‰

Sample: GMI (9), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, base sherd)

Initial comment: the stratigraphy for GMI was recorded as three broad sandy-soil occupation layers (A, B, C) separated by blown sand. Within each layer were features such as huts and pits. Layer C represents the lowest of the three occupation layers: the sample was recorded from ′NW corer House 1′ within the layer: context (2210). The geology consists of slate bedrock beneath blown calcareous sand layers. Layer C is the lowest occupation layer, between two sand layers.

Objectives: as OxA-14528

Calibrated date: *1σ:* cal AD 460–570
2σ: cal AD 420–610

Final comment: see OxA-14528

Laboratory comment: English Heritage (2007), the two results from the carbonised residue on this sherd are statistically consistent (OxA-14526 and SUERC-6159; (T′=3.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–6158 1455 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: GMI (6), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: the stratigraphy for GMI was recorded as three broad sandy-soil occupation layers (A, B, C) each probably separated by blown sand. Within each layer were features such as huts and pits. Layer C represents the lowest of the three occupation layers. This sample was recorded as 'mid house 1' within layer C: context (2210). The geology consists of slate bedrock beneath blown calcareous sand layers. Layer C is the lowest occupation layer, between two sand layers.

Objectives: to provide a spot date to help date the occupation horizon represented by layer C and to fix its position within the overall GMI stratigraphy. The artefacts from layers A–C suggest a developing sequence, potentially a key sequence for the early medieval period in the region. Dates will provide clarification and support for this.

Calibrated date: *1σ:* cal AD 570–650
2σ: cal AD 540–660

Final comment: J Nowakowski (16 May 2007), the date is taken from the residue of a body sherd and is considered good for the ceramic form. This date also confirms the original interpretation of the date of this major occupation horizon.

SUERC–6159 1525 ±35 BP

δ¹³C: -26.7‰

Sample: GMI (7), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: as OxA-14526

Objectives: as OxA-14526

Calibrated date: *1σ:* cal AD 530–580
2σ: cal AD 420–620

Final comment: see SUERC-6158

Laboratory comment: see OxA-14526

SUERC–6160 1310 ±35 BP

δ¹³C: -26.1‰

Sample: GMI (13), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, grass-marked base sherd)

Initial comment: the stratigraphy for GMI was recorded as three broad sandy-soil occupation layers (A, B, C) each probably separated by blown sand. Layer A is the uppermost occupation soil. The sample was recorded as sherd 924 from layer A (context (2238), from within the walls and rubble of house 2 [2241]). This is phase 3. The geology consists of slate bedrock beneath blown calcareous sand layers.

Objectives: to provide a spot date to help date the occupation horizon represented by layer C and to fix its position within the overall GMI stratigraphy. The artefacts from layers A–C suggest a developing sequence, potentially a key sequence for the early medieval period in the region. Dates will provide clarification and support for this.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: J Nowakowski (16 May 2007), the date is taken from the residue of the base of a grass-marked vessel. The date is good for the ceramic form and also confirms the original interpretation of the date of this major occupation horizon. The sample comes from a sealed deposit (2238) which is associated with the abandonment of structure 2241.

SUERC–6167 3180 ±35 BP

δ¹³C: -26.2‰

Sample: GMXV (19), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, base sherd)

Initial comment: during phase 3, the main layer 5 horizon at Gwithian was principally characterised by a field system. Associated with this were the ruinous remains of a stone and wooden building (1503) built on a terrace at GMXV overlying the exact location of an earlier wooden building which belonged to phase 1. The sample came from the area of the ruinous structure (1503). The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: to provide a spot date for dating the layer 5 horizon – that is phase 3 – at GM XV.

Calibrated date: *1σ:* 1500–1410 cal BC
2σ: 1520–1400 cal BC

Final comment: J Nowakowski (16 May 2007), the sample dated is interior residue on the base of a vessel which is diagnostic to the middle Bronze Age to late Bronze Age. The date is good for the vessel and also for dating this major occupation horizon (that is layer 5) phase 3 at Gwithian.

Gwithian: prehistoric, Cornwall

Location: SW 59084232
Lat. 50.13.52 N; Long. 05.22.43 W

Project manager: J Nowakowski (Historic Environment Service, Cornwall County Council)

Archival body: Royal Cornwall Museum, Truro, Cornwall

Description: archaeological investigations of a tract of a Bronze Age farming landscape became a set-piece excavation during the Gwithian campaign. Excavations started in 1955 with the investigation of a mound (GMV) which was initially interpreted as a Bronze Age barrow (Thomas 1958). This site was later shown to be within the area of a Bronze Age field system where well-preserved remains of linear and criss-cross plough marks (traces of ard cultivation) were found. Investigations on a number of major linked "sites"; GMIX, GMX and GMXV and other smaller sites, continued until 1961. An area approximately 100m2 was excavated providing a major overview of the development through time of a complex (multi-phased) landscape dating to the second millennium BC. All the residues submitted for dating came from a selection of distinctive sherds and were taken from the main proposed occupation phases recorded at Gwithian.

Objectives: to test whether the proposed Bronze Age sequence of ′Layers′ (eight principal archaeological horizons or banded phases of archaeological activity (1–8) identified across the site in the 1950's and 1960's can be verified by dating the carbonised residues surviving on the internal surfaces of pottery sherds.

Final comment: J Nowakowski and P Marshall (16 May 2007), in general five of the six dates are good for dating horizon "layer 3". The overall date range for "layer 3" is 1380–900 cal BC, which confidently situates the date of events occurring within phase 5 to the latter part of the middle Bronze Age extending into the earlier later Bronze Age. This is largely what has been expected although now that Plain Wares of late Bronze Age date have been identified in Cornwall, this does raise the question of whether two ceramic traditions may have existed alongside each other in the South-West (Henrietta Quinnell, pers. com). Date SUERC-6161 comes from a sherd with unusual decoration, with no immediate parallels. There appears no reason why the date should not be accurate for the sherd, but the sherd must be regarded as intrusive within the midden deposit in which it was found.

References: Thomas 1958

OxA–14488 3245 ±40 BP

$\delta^{13}C$: -27.3‰

Sample: GMXV (22), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: layer 7 was identified as a cultivation horizon during excavations in the 1950s and more recently at site GMXVII in June 2005. It was not evenly exposed across the linked Bronze Age sites during excavation at Gwithian, although it is likely to have been the upper part of the main lowest occupation horizon (layer 8) and therefore is part of the major phase 1 settlement. The major feature of this early phase – that is phase 1 – is a circular wooden building (1642) which lay within an early terraced field system. The sample was recorded a general context at GMXV. The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: to provide a spot date for phase 1 (layer 8).

Calibrated date: *1σ:* 1610–1450 cal BC
2σ: 1620–1430 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from an interior residue on a body sherd and is much later than expected for this horizon. It is likely therefore that the sherd did not derive from a secure context, but derived from an upper layer associated with phase 3 activities.

References: Nowakowski *et al* 2006

OxA–14489 3039 ±37 BP

$\delta^{13}C$: -26.5‰

Sample: GMXV (20), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, decorated rimsherd)

Initial comment: during phase 3, the main layer 5 horizon at Gwithian was principally characterised by a field system. Associated with this were the ruinous remains of a stone and wooden building (1503) built on a terrace at GMXV, overlying the exact location of an earlier wooden building which belonged to phase 1. The sample came from the area of the ruinous structure (1503). The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: to provide a spot date for dating the layer 5 horizon (phase 3) at GM XV.

Calibrated date: *1σ:* 1390–1260 cal BC
2σ: 1420–1130 cal BC

Final comment: J Nowakowski (16 May 2007), the sample dated is residue on the interior of a decorated rimsherd which is diagnostic to the middle to late Bronze Age. The date is good for the vessel and also for dating this major occupation horizon (layer 5, phase 3) at Gwithian.

OxA–14490 2961 ±36 BP

$\delta^{13}C$: -26.2‰

Sample: GMXV (25B), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: at GMXV a ′layer 8′ horizon was found. This is the earliest old land surface recorded during work on the Gwithian Bronze Age sites. The major feature of this early phase (phase 1) is a circular wooden building (1642), which lay within an early terraced field system. In 1960 an early archaeomagnetic date from the central hearth, centred on 1700 BC, was obtained. This radiocarbon sample came from a sherd found on the house floor (1507). Following the abandonment of the area, the site was sealed by sand and later cultivation layers in antiquity. The geology is slate bedrock and layer 8 has been described as a brown clay-loam immediately above the natural. In June 2005, layer 8 was re-exposed at site GMXVII when plough marks were found.

Objectives: to provide a spot date for phase 1 (layer 8) and to provide a date for house (1642).

Calibrated date: *1σ:* 1270–1120 cal BC
2σ: 1310–1040 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from interior residue on a body sherd of probable early Bronze Age form. The date is too late for this horizon and it is therefore likely to have been intrusive, perhaps derived from an upper overlying layer at GMXV. This date is not useful to date this horizon (layer 8), the earliest phase of occupation found at site GMXV.

OxA–14525 2946 ±29 BP

$\delta^{13}C$: -26.5‰

Sample: GMX (27B), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, decorated rimsherd)

Initial comment: the stratigraphy for the Gwithian Bronze Age sites (GMIX, GMX, and GMXV) was recorded as three broad sandy-soil occupation layers (3, 5, 7, and 8), each separated by blown sand. Layer 3 (phase 5) was the uppermost occupation horizon. It comprised a small farming settlement of wooden circular buildings located and surrounded by fields. There was evidence for stock and arable farming alongside pottery, shale, and stonework manufacture, as well as metalworking. The sample was recorded from a midden deposit (433) which is associated with the layer 3 horizon and which represents a major occupation horizon (phase 5). The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: to provide a spot date for phase 5 (layer 3).

Calibrated date: 1σ: 1260–1110 cal BC
2σ: 1270–1040 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from interior residue on a rimsherd of diagnostic middle to late Bronze Age form and so the date is good for the vessel type. The date also confirms the middle to late Bronze Age horizon for this major phase.

Laboratory comment: English Heritage (2007), the two results (OxA-14525 and SUERC-6162) on the carbonised residue from this sherd are not statistically consistent (T′=5.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–14527 2878 ±29 BP

$\delta^{13}C$: -26.2‰

Sample: GMX (16), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: the stratigraphy for the Gwithian Bronze Age sites (GMIX, GMX, and GMXV) was recorded as three broad sandy-soil occupation layers (3, 5, 7, and 8) each separated by blown sand. Layer 3 (phase 5) was the uppermost occupation horizon. It comprised a small farming settlement of wooden circular buildings located and surrounded by fields. There was evidence for stock and arable farming alongside pottery, shale, and stonework manufacture, as well as metalworking. The sample was recorded from a general deposit (576) which is associated with the layer 3 horizon and which represents a major occupation horizon (Phase 5). The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: as OxA-14525

Calibrated date: 1σ: 1120–1000 cal BC
2σ: 1190–930 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from interior residue on a body sherd of diagnostic middle-late Bronze Age form and so the date is good for the vessel type. The date also confirms the middle to late Bronze Age horizon for this major phase.

OxA–14568 3430 ±50 BP

$\delta^{13}C$: -28.0‰

Sample: GMXV (25A), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated body sherd)

Initial comment: at GMXV a ′layer 8′ horizon was found. This is the earliest old land surface recorded during work on the Gwithian Bronze Age sites. The major feature of this early phase (phase 1) is a circular wooden building (1642) which probably lay within a terraced field system. In 1960 an early archaeomagnetic date from the central hearth, centred on 1700 BC, was obtained. This radiocarbon sample came from a sherd found on the house floor (1507). Following the abandonment of the area the site was sealed by sand and later cultivation layers in antiquity. The geology is slate bedrock and layer 8 has been described as a brown clay loam immediately above the natural. In June 2005, layer 8 was re-exposed at site GMXVII when plough marks were found.

Objectives: to provide a spot date for phase 1 (layer 8) and to provide a date for house (1642).

Calibrated date: 1σ: 1870–1680 cal BC
2σ: 1890–1610 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from interior residue on a body sherd of probable early Bronze Age form. The result confirms an early date for this major occupation horizon – which is the earliest identified at Gwithian during the excavations in 1961.

Laboratory comment: English Heritage (2007), this sample is from a different sherd, and a different vessel, to OxA-14490 from the same deposit.

OxA–14589 2944 ±33 BP

$\delta^{13}C$: -25.0‰

Sample: GMX (17), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, base sherd with matting impressions on exterior of base)

Initial comment: the stratigraphy for the Gwithian Bronze Age sites (GMIX, GMX, and GMXV) was recorded as three broad sandy-soil occupation layers (3, 5, 7, and 8) each separated by blown sand. Layer 3 (phase 5) was the uppermost occupation horizon. It comprised a small farming settlement of wooden circular buildings located and surrounded by fields. There was evidence for stock and arable farming alongside pottery, shale, and stonework manufacture, as well as metalworking. The sample was recorded from a general deposit (546) which is associated with the layer 3 horizon and which represents a major occupation horizon: phase 5. The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: as OxA-14525

Calibrated date: 1σ: 1260–1110 cal BC
2σ: 1290–1020 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from interior residue on a base sherd of diagnostic middle to late Bronze Age form and so the date is good for the vessel type. The date also confirms the middle to late Bronze Age horizon for this major phase.

OxA–14590 2836 ±32 BP

δ¹³C: -27.1‰

Sample: GMIX (30), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, undecorated rimsherd)

Initial comment: the stratigraphy for the Gwithian Bronze Age sites (GMIX, GMX, and GMXV) was recorded as three broad sandy-soil occupation layers (3, 5, 7, and 8) each separated by blown sand. Layer 3 (phase 5) was the uppermost occupation horizon. It comprised a small farming settlement of wooden circular buildings located and surrounded by fields. Evidence for stock and arable farming alongside pottery, shale, and stonework manufacture, as well as metalworking. The sample was recorded from 'cleaning of hearth' (the central hearth (1088) in posthole structure (1134)). The geology consists of slate bedrock beneath blown calcareous sand layers. Layer 3 represents a major occupation horizon: phase 5.

Objectives: as OxA-14525

Calibrated date: *1σ:* 1030–930 cal BC
2σ: 1120–900 cal BC

Final comment: see OxA-14525

SUERC–6161 3430 ±35 BP

δ¹³C: -28.3‰

Sample: GMX (26), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, sherd with incised herringbone decoration)

Initial comment: the stratigraphy for the Gwithian Bronze Age sites (GMIX, GMX, and GMXV) was recorded as three broad sandy-soil occupation layers (3, 5, 7, and 8) each separated by blown sand. Layer 3 (phase 5) was the uppermost occupation horizon. It comprised a small farming settlement of wooden circular buildings located and surrounded by fields. Evidence for stock and arable farming alongside pottery, shale, and stonework manufacture, as well as metalworking. The sample was recorded from a general deposit (433) which is associated with the layer 3 horizon and which represents a major occupation horizon: phase 5. The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: as OxA-14525

Calibrated date: *1σ:* 1770–1680 cal BC
2σ: 1880–1630 cal BC

Final comment: J Nowakowski (16 May 2007), the date comes from interior residue on a decorated body sherd. The decoration is unusual and has no immediate parallels. While the date for the vessel may be accurate, the date for the context is too early given its position within the overall stratigraphic sequence. It is therefore agreed that this sample is intrusive as it does not comfortably fit with the overall series of samples and dates obtained for this major layer (layer 3) and occupation horizon phase 5.

SUERC–6162 2835 ±35 BP

δ¹³C: -27.4‰

Sample: GMX (27), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, decorated rimsherd)

Initial comment: replicate of OxA-14525

Objectives: as OxA-14525

Calibrated date: *1σ:* 1050–920 cal BC
2σ: 1120–900 cal BC

Final comment: see OxA-14525

Laboratory comment: see OxA-14525

SUERC–6163 2980 ±35 BP

δ¹³C: -26.6‰

Sample: GMX (28), submitted on 16 March 2005 by J Nowakowski

Material: carbonised residue (internal, decorated body sherd)

Initial comment: the stratigraphy for the Gwithian Bronze Age sites (GMIX, GMX, and GMXV) was recorded as three broad sandy-soil occupation layers (3, 5 ,7, and 8) each separated by blown sand. Layer 3 (phase 5) was the uppermost occupation horizon. It comprised a small farming settlement of wooden circular buildings located and surrounded by fields. There was evidence for stock and arable farming alongside pottery, shale and stonework manufacture, as well as metalworking. The sample was recorded from the fill of a gully (343) which lay to the south of strcture (724/725). This structure is associated with the layer 3 horizon which represents a major occupation horizon: phase 5. The geology is slate bedrock with old land surfaces preserved beneath layers of sand and later occupation horizons.

Objectives: as OxA-14525

Calibrated date: *1σ:* 1290–1120 cal BC
2σ: 1380–1110 cal BC

Final comment: J Nowakowski (16 May 2007), the date came from interior residue on a rimsherd of diagnostic middle to late Bronze Age form and so the date is good for the vessel type. The date also confirms the middle to late Bronze Age horizon for this major phase.

Latton Lands, Wiltshire

Location: SU 094953
Lat. 51.39.21 N; Long. 01.51.51 W

Project manager: R Nicholson (Oxford Archaeology), 2001–4

Description: work undertaken by Oxford Archaeology in advance of gravel extraction allowed the excavation of prehistoric and Roman remains. An isolated oval enclosure of probably late Neolithic/early Bronze Age date was discovered. A widespread early Iron Age settlement comprised a number of roundhouses in association with groups of pits and postholes, including several articulated animal burials. Middle Iron Age activity included a series of penannular gullies, possibly representing structures. These were overlain by a later middle Iron Age boundary ditch and field system, including a number of enclosures. Features dating to the late Iron Age to early Roman period include two further penannular gullies and a large enclosure, in addition to an alteration to the middle Iron Age boundary ditch. Later in this period a number of burials, including a failed anomalous (possibly bustum) burial, were interred into the late Iron Age enclosure, and possible depositions were made into other Iron Age features. A Roman trackway, enclosures, and pits, in addition to a small number of burial deposits, were discovered in the eastern area of the site and may have formed the northern part of settlement SAM899 to the south. Ridge and furrow and ditches of post-medieval date overlay the prehistoric and Roman activity.

Objectives: to date the use of the ditch and to date the anomalous burial. The Iron Age enclosure ditch is dated on the basis of late Iron Age pottery in the ditch. Three cremations, and one potential bustum burial cut into the enclosure ditch, are dated to the late Iron Age/early Roman period on the basis of this *terminus post quem* and the material culture associated with one of the graves (grave 1100). The skeleton was prone (face down) and partially cremated *in situ*. It was dated by association with late Iron Age pottery and a late Iron Age knife found within the grave. Grave 1100 is of interest because of the evidence for partial cremation and partial burial. It is possible that this represents a 'bustum burial'. Bustum burials are reasonably rare, with most British examples being from the north. The bustum burial rite is believed to have been introduced to Britain by the Romans (Philpott 1991, 48–9; Struck 1993, 81) and be related to the army. However, *in situ* cremation burials are known outside the Roman world: two examples from Puddlehill in Bedfordshire are known from Iron Age Britain (Whimster 1981, 154) and they are known throughout the entire Iron Age in Scandinavia (500 BC – AD 1050) (Gräslund 1978). Dating this burial would inform on the arrival and spread of the phenomenon in southern England, and would be important in providing a *terminus ante quem* for the ditch.

Final comment: L Brown and S Griffiths (14 September 2007), six samples, including one from the terminus, were submitted from the fills of one of the ditches. One sample came from a lower fill (context 2547) below a possible recut. There were five samples from secondary fills. There is good agreement between the stratigraphy and the radiocarbon measurements. This provides a *terminus ante quem* for the digging of the causewayed enclosure ditch. Infilling of the ditch probably occured very rapidly. The dating for the infilling of the ditch is consistent with the late Neolithic/early Bronze Age date anticipated by Oxford Archaeology on the basis of morphology of the feature and the artefacts recovered, including a pygmy pot. The burial was originally referred to as the bustum burial, but is probably better referred to as an 'anomalous' burial as it does not strictly fulfil all criteria of a bustum burial. On stratigraphic grounds it was expected that the burial would date to the late Iron Age or early Roman period. The calibrated date of 400–190 cal BC (Reimer *et al* 2004) seems early but, taken in tandem with the charcoal sample from the burial (165) which produced an earlier date of 160 cal BC – cal AD 70 (Reimer *et al* 2004), a late Iron Age date seems likely and broadly conforms to our expectations.

References: Gräslund 1978
McKinley 2000
Philpott 1991
Reimer *et al* 2004
Struck 1993
Whimster 1981

Latton Lands: double causewayed enclosure, Wiltshire

Location: SU 094953
Lat. 51.39.21 N; Long. 01.51.51 W

Project manager: R Nicholson (Oxford Archaeology), 2001–4

Archival body: Wiltshire Museum (Devizes)

Description: four samples from the enclosure ditch yielded charcoal. Only one basal fill contained charcoal. The other samples were upper fills and contained Maloideae charcoal (199), *Prunus* and Maloideae (190), Maloideae and *Alnus/Corylus* charcoal (196).

Objectives: to date the use of the ditch.

Final comment: L Brown and S Griffiths (14 September 2007), six samples, including one from the terminus, were submitted from the fills of one of the ditches. One sample came from a lower fill (context 2547) below a possible recut. Five samples came from secondary fills. The radiocarbon determinations provide a *terminus ante quem* for the digging of the causewayed enclosure ditch. Infilling of the ditch probably occurred rapidly. The dating for the infilling of the ditch is consistent with the late Neolithic/early Bronze Age date anticipated by Oxford Archaeology on the basis of morphology of the feature and the artefacts recovered, including a pygmy pot.

References: Philpott 1991

GrA–33508 3245 ±40 BP

$\delta^{13}C$: -26.6‰

Sample: LALA02-2545-196B, submitted on 18 September 2006 by R Nicholson

Material: charcoal: cf *Corylus/Alnus* sp., single fragment (D Challinor 2006)

Initial comment: the sample was recovered from the penultimate ditch fill and represents a deliberate deposit of charred remains. Overlain by further deliberate deposit 2544, and seals fill 2546 which contained a complete pot. A degree of intrusion is possible; no rooty material was found but several modern seeds were found. The fill was gravel-rich, but this sample comprised almost pure charcoal. There was no evidence of rootlet penetration or waterlogging, but elsewhere in the ditch there was evidence of seasonal flooding. Abundant snail shells indicate a calcareous burial environment.

Objectives: to date the end of use of the ditch and so provide a *terminus ante quem* for the causewayed enclosure.

Calibrated date: 1σ: 1610–1450 cal BC
2σ: 1620–1430 cal BC

Final comment: L Brown and S Griffiths (14 September 2007), infilling of the ditch probably occurred rapidly. *See* GrA 33710.

Laboratory comment: English Heritage (2007), the two measurements from this deposit (GrA-33508 and SUERC-12230) are not statistically consistent (T′=12.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

GrA–33509 3440 ±40 BP

δ^13^C: -25.7‰

Sample: LALA02-2382-199, submitted on 18 September 2006 by R Nicholson

Material: charcoal (Maloideae, single fragment) (D Challinor 2006)

Initial comment: the sample was recovered from the silty clay upper fill of the terminus, overlying sandy silt fill 2383. A degree of intrusion is possible, but no rooty material or modern seeds were found. The fill was gravel-rich. There was no evidence of rootlet penetration or waterlogging, but elsewhere in the ditch there was evidence of seasonal flooding. Abundant snail shells indicate a calcareous burial environment.

Objectives: as GrA-33508

Calibrated date: 1σ: 1870–1680 cal BC
2σ: 1890–1630 cal BC

Final comment: L Brown and S Griffiths (14 September 2007), *see* GrA-33710. The radiocarbon dates for the infilling of the causewayed enclosure ditches are consistent with the broad late Neolithic/early Bronze Age date anticipated by the artefactual and morphological evidence.

GrA–33710 3455 ±35 BP

δ^13^C: -25.8‰

Sample: LALA02-2365-190B, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Prunus* sp., single fragment (D Challinor 2006)

Initial comment: the sample was recovered from what appeared to be a deliberate deposit of charcoal within one of the lower fills of the causewayed enclosure ditch. Intrusion is unlikely, but some rooty material was found. Context 2365 was a charcoal deposit overlying the primary fill of the ditch terminus (redeposited natural), context 2365 was sealed by seasonal flooding deposit context 2262. Residuality is considered unlikely. The fill was gravel-rich. But this sample contained abundant charcoal. There was some, minimal, rootlet penetration and evidence of seasonal flooding. Snail shells were well-preserved, indicating a calcareous sediment.

Objectives: as GrA-33508

Calibrated date: 1σ: 1880–1690 cal BC
2σ: 1890–1680 cal BC

Final comment: L Brown and S Griffiths (14 September 2007), determinations were made on five samples from secondary fills of the causewayed enclosure; the two determinations from context 2365 (GrA-33710 and SUERC-12229) are consistent. There is good agreement between the stratigraphy and the radiocarbon measurements for the infilling of the ditch terminus in the early Bronze Age, and is consistent with the artefacts in the main ditch fill.

Laboratory comment: English Heritage (2007), the two determinations (GrA-33710 and SUERC-12229) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1;Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–12229 3430 ±35 BP

δ^13^C: -25.6‰

Sample: LALA02-2365-190A, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Prunus* sp., single fragment (D Challinor 2006)

Initial comment: as GrA-33710

Objectives: as GrA-33710

Calibrated date: 1σ: 1770–1680 cal BC
2σ: 1880–1630 cal BC

Final comment: see GrA-33710

Laboratory comment: see GrA-33710

SUERC–12230 3430 ±35 BP

δ^13^C: -25.9‰

Sample: LALA02-2545-196A, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Prunus* sp., single fragment (D Challinor 2006)

Initial comment: as GrA-33508

Objectives: as GrA-33508

Calibrated date: 1σ: 1770–1680 cal BC
2σ: 1880–1630 cal BC

Final comment: L Brown and S Griffiths (14 September 2007), this fragment of charcoal may be residual. *See* GrA-33508.

Laboratory comment: see GrA-33508

SUERC–12231 3410 ±40 BP

δ^13^C: -24.9‰

Sample: LALA02-2547-197, submitted on 18 September 2006 by R Nicholson

Material: charcoal (Maloideae, single fragment) (D Challinor 2006)

Initial comment: the sample was recovered from what appeared to be a deliberate deposit of charcoal within one of the lower fills of the causewayed enclosure ditch. Intrusion is unlikely, but some modern weed seeds were found. Context 2547 was sealed by context 2546. The fill was gravel-rich, but this sample comprised almost pure charcoal. Context 2547 was sealed by context 2546. Rootlet penetration and position of the watertable are not known, but the sample did not contain much rooty material and the deposit did not appear to have been waterlogged. Snail shells were well preserved, indicating calcareous sediment.

Objectives: to date the end use of the ditch and so provide a *terminus ante quem* for the causewayed enclosure.

Calibrated date: *1σ*: 1750–1660 cal BC
2σ: 1880–1610 cal BC

Final comment: L Brown and S Griffiths (14 September 2007), the date of the primary fill of the causewayed enclosure is in good agreement with the date of the secondary fills, indicating that the ditches were filled within a relatively short space of time. Artefact deposition of a flint, pygmy pot, and Aldbourne cup within the secondary fills provides some evidence for structured deposition in these ditch features, perhaps rapid and deliberate backfill.

Latton Lands: Iron Age enclosure, Wiltshire

Location: SU 094953
Lat. 51.39.21 N; Long. 01.51.51 W

Project manager: R Nicholson (Oxford Archaeology), 2001–4

Archival body: Wiltshire Museum (Devizes)

Description: this series consists of cremated bone, two pieces of charcoal from a potential bustum burial (grave 1100), and two emmer wheat grains from the Iron Age enclosure ditch the burial was cut into. The burial is dated to the late Iron Age on this *terminus post quem* and material culture.

Objectives: to date the use of the ditch and to date the anomalous burial. The Iron Age enclosure ditch is dated on the basis of late Iron Age pottery in the ditch. Three cremations and one potential bustum burial cut into the enclosure ditch are dated to the late Iron Age/early Roman period on this *terminus post quem* and material culture associated with one of the graves (grave 1100). The skeleton was prone (face down) and partially cremated *in situ*. It was dated by association with late Iron Age pottery and a late Iron Age knife found within the grave. Grave 1100 is of interest because of the evidence for partial cremation and partial burial. It is possible that this represents a 'bustum burial'. Bustum burials are reasonably rare, with most British examples being from the north. The bustum burial rite is believed to have been introduced to Britain by the Romans (Philpott 1991, 48–9, Struck 1993, 81) and be related to the army. However, *in situ* cremation burials are known outside the Roman world: two examples from Puddlehill in Bedfordshire are known from Iron Age Britain (Whimster 1981, 154) and they are known throughout the entire Iron Age in Scandinavia (500 BC–AD 1050) (Gräslund 1978). Dating this burial would inform on the arrival and spread of the phenomenon in southern England, and would be important in providing a *terminus ante quem* for the ditch.

Final comment: L Brown and S Griffiths (14 September 2007), on stratigraphic grounds it was expected that the burial would be dated to the late Iron Age or early Roman period. The calibrated date of 400–190 cal BC (Reimer *et al* 2004) seems early but, taken in tandem with the charcoal sample from the burial (165), which produced a later date of 160 cal BC – cal AD 70 (Reimer *et al* 2004), a late Iron Age date seems likely and broadly conforms to our expectations. The calibrated dates for the emmer wheat results both fall within the Iron Age period.

References: Gräslund 1978
McKinley 2000
Philpott 1991
Reimer *et al* 2004
Struck 1993
Whimster 1981

GrA–33707 2020 ±35 BP

$\delta^{13}C$: -23.2‰

Sample: LALA01-1104-165, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Prunus spinosa*, single fragment (D Challinor 2006)

Initial comment: the charcoal sample was part of a part cremation, part inhumation, *in situ* burial. The burial (1100) contained a relatively complete articulated skeleton that was above most of the charcoal, including a charred plank. Sample 165 was taken from this charcoal layer in the base of the grave, beneath skeleton 1100. Grave 1095 was cut into the western enclosure ditch. The sides of the cut had been burnt, indicating the body had been burned *in situ*. The fills of all features had a high gravel content. The sample did not contain rootlets or any modern material (eg burrowing snails or modern weed seeds). There was no indication of disturbance. Snail preservation overall at Latton Lands was good, as a result of the calcareous soils. The position of the water table is unknown; although some features at the site were waterlogged, this grave cut was fairly shallow and there was no indication of any seasonal waterlogging.

Objectives: to date the charcoal within grave 1100; to test the theory that the charcoal was part of the cremation pyre for the anomalous burial; to establish when the grave was constructed and to compare with the absolute date of the body itself; and to allow better precision in dating the burial.

Calibrated date: *1σ*: 50 cal BC–cal AD 30
2σ: 160 cal BC–cal AD 70

Final comment: L Brown and S Griffiths (14 September 2007), this is charcoal from the feature containing the anomalous burial. This sample provides the best estimate for the date of the burial, with a 93.2% probability that the burial occurred before the Roman invasion of AD 43. The burial is no longer considered to be a true 'bustum burial' but the dating of this activity to the period prior to the Roman invasion is significant, in that it provides evidence of continuing activity following the decommissioning of the major enclosure but prior to the construction of Ermin Street and the establishment of the Romano-British settlement, now a Scheduled Ancient Monument (SAM899). It had been viewed as a possibility that the burial was contemporary with an early phase of the Roman settlement.

Laboratory comment: English Heritage (2007), the three measurements from this burial (GrA-33707, SUERC-12228, and GrA-33713) are not statistically consistent (T′=18.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and therefore represent material of different ages. The two charcoal samples (GrA-33707 and SUERC-12228) are statistically consistent (T′=2.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The measurement on the cremated bone may therefore simply represent one of the one in twenty cases where a radiocarbon result lies outside the 'true age' of the sample (Bowman 1990).

References: Bowman 1990
Ward and Wilson 1978

GrA–33708 2075 ±40 BP

$\delta^{13}C$: -22.4‰

Sample: LALA01-1700-159B, submitted on 17 October 2006 by R Nicholson

Material: grain: *Triticum dicoccum*, carbonised, single grain (M Robinson 2006)

Initial comment: this sample derives from the lower fill (context (1700) – a dense layer of charred plant material below fill 1290 and above 1701 (primary fill).

Objectives: the identified emmer wheat sample in 159 suggestsan earlier date than the other Iron Age features in the LALA01 excavation. Emmer wheat is the common cereal grain until the middle Bronze Age but in the Iron Age spelt wheat dominated the diet of settlement in the Upper Thames Valley. It is of great importance that this pit feature [1289] is dated.

Calibrated date: *1σ*: 170–40 cal BC
2σ: 200 cal BC–cal AD 20

Final comment: L Brown and S Griffiths (14 September 2006), the two determinations made on samples of emmer wheat (SUERC-12226 and GrA-33708) from pit 1289 confirm a late Iron Age date for the presence of emmer wheat at the site. The presence of emmer wheat in an Iron Age context from north Wiltshire would be unusual though not unprecedented. The subspecies is generally regarded as a contaminant rather than a cultivar at this time. This is likely to represent regional variations in farming practice and might be taken as further evidence to suggest agriculture at the site in the Iron Age which is atypical and/or specialised for the region and the period. The anticipated date of the pit was Iron Age on morphological, stratigraphic, and artefact evidence.

Laboratory comment: English Heritage (2007), the two determinations made on samples of emmer wheat (SUERC-12226 and GrA-33708) from pit 1289 are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1;Ward and Wilson 1978).

References: Ward and Wilson 1978

GrA–33713 2230 ±35 BP

Sample: LALA01-1104-SK1100, submitted on 18 September 2006 by R Nicholson

Material: cremated human bone (shaft fragments from lower limb bones) (S Coulgh and J Geber 2006)

Initial comment: the bone sample was part of a part cremation, part inhumation, and *in situ* burial of a mature male age 40–44 years. Generally the lower and some of the upper limbs were fully cremated, with areas of charring also evident on the torso and skull. The burial (1100) contained a relatively complete articulated skeleton that was above most of the charcoal, including the remains of a charred plank; this is thought to represent the remains of the pyre. The cremated bone was recovered from the charcoal deposit (1104), directly below the main body. The cremated bone is thought to comprise fragments from the lower arms, hands and sternum. The cut for the burial was larger than those associated with standard cremation burials. It was also shallow and the skeleton survived close to the surface. The soil surrounding the burial contained fragments of cremated bone, especially vertebrae and teeth. Grave 1095 was cut into the western enclosure ditch. The sides of the cut had been burnt, indicating the body had been burned *in situ*.

Objectives: as GrA-33707

Calibrated date: *1σ*: 390–200 cal BC
2σ: 400–190 cal BC

Final comment: see GrA-33707

Laboratory comment: see GrA-33707

SUERC–12226 2100 ±35 BP

$\delta^{13}C$: -23.1‰

Sample: LALA01-1700-159A, submitted on 18 September 2006 by R Nicholson

Material: grain: *Triticum dicoccum*, carbonised, single grain (D Challinor 2006)

Initial comment: as GrA-33708

Objectives: as GrA-33708

Calibrated date: *1σ*: 180–50 cal BC
2σ: 340–40 cal BC

Final comment: see GrA-33708

Laboratory comment: see GrA-33708

SUERC–12228 2105 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: LALA01-1104-157, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Hedera* sp., single fragment (D Challinor 2006)

Initial comment: as GrA-33707

Objectives: as GrA-33707

Calibrated date: *1σ*: 190–50 cal BC
2σ: 350–40 cal BC

Final comment: see GrA-33707

Laboratory comment: see GrA-33707

Latton Lands: metalworking pits, Wiltshire

Location: SU 094953
Lat. 51.39.21 N; Long. 01.51.51 W

Project manager: R Nicholson (Oxford Archaeology), 2001–4

Archival body: Wiltshire Museum (Devizes)

Description: two pits associated with metalworking, one has a neonate skeleton interred within it.

Objectives: to provide a precise date for the potentially early Iron Age metalworking activity.

Final comment: L Brown and S Griffiths (14 September 2007), two fragments of charcoal from two metalworking pits produced statistically consistent results (SUERC-12227 and GrA-33510) (T′=1.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and therefore could be of the same age. The results indicate a middle Iron Age date for the metalworking.

References: Philpott 1991
Ward and Wilson 1978

GrA–33510 2215 ±35 BP

$\delta^{13}C$: -26.5‰

Sample: LALA04-3672-218, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Prunus* sp., single fragment (D Challinor 2006)

Initial comment: the sample was recovered from context (3672), fill of pit [3674], and comprised a dark upper fill containing lots of metalworking debris, charcoal, burnt limestone, middle Iron Age pot, and bone. It overlies primary fill 3673. There is some possibility of intrusion.

Objectives: the aim was to obtain a more precise date within the Iron Age for the metalworking activity and for the chronological sequence of this activity within the Iron Age settlement and field enclosures.

Calibrated date: *1σ:* 380–200 cal BC
2σ: 390–170 cal BC

Final comment: L Brown and S Griffiths (14 September 2007), the middle Iron Age date obtained provides a position within the sequence of Iron Age activity in the northern part of the site which was absent from the artefact evidence.
It had been anticipated that the metalworking activity may have been slightly earlier in the Iron Age but is useful in providing evidence of metalworking activity within the middle Iron Age field system.

SUERC–12227 2280 ±35 BP

$\delta^{13}C$: -26.0‰

Sample: LALA04-3872-225, submitted on 18 September 2006 by R Nicholson

Material: charcoal: *Prunus* sp., single fragment (D Challinor 2006)

Initial comment: the sample was recovered from pit 3869 and comprised an upper fill in a largely silted-up pit containing a dump of burnt material. This fill also contained a neonate skeleton and metal finds as well as metalworking debris, burnt stone, middle Iron Age pot, and bone. There is some possibility of intrusion. Rootlet penetration and the position of the watertable are not known, but the sample did not contain much rooty material and the deposit did not appear to have been waterlogged. Snail shells were well preserved, indicating a calcareous sediment.

Objectives: as GrA-33510

Calibrated date: *1σ:* 400–360 cal BC
2σ: 410–200 cal BC

Final comment: see GrA-33510

Nene Valley, Northamptonshire

Location: SP 72235815to TL 1981 9793
Lat. 52.12.59 N; Long. 00.56.34 W, to
Lat. 52.33.56N; Long. 00.13.56W

Project manager: A G Brown (University of Exeter), 1987–2006

Description: the aim of the project is to complete a survey of the published, partially published (grey literature), and where possible entirely unpublished environmental data on the Nene Valley in order to identify both common trends and also gaps in the coverage and to place the environmental information in context with the known settlement and artefactual data for the Nene Valley. This will be used to identify, if any, environmental trends within a spatial context throughout the valley and also highlight gaps in the coverage.

Objectives: to construct a chronology for periods of geomorphic activity and to integrate the palaoeo-environmental and archaeological records.

Final comment: P Marshall (9 November 2007), the results of the radiocarbon programme are very disappointing, as the measurements obtained on the sediment fractions and associated macrofossils are not in agreement.

Laboratory comment: English Heritage (31 October 2007), the results of the radiocarbon programme clearly show the lack of consistency amongst the measurements obtained on both the sediment fractions and the closely associated macrofossils. In every case the humic acid fraction is younger than the humin fraction, and where there was a macrofossil that date is still younger. A chi-square test on any combination of the matched results fails in all cases (Ward and Wilson 1978). This raises a few possible and non-exclusive explanations regarding the material from these four monoliths: 1) the humin fractions are contaminated/contain reworked mineral carbon, 2) the humic acid fractions reflect a small, but significant, component from older mineral carbon, or contain humic acid from the breakdown of older plant material, 3) the macrofossil material is intrusive. We can discount the possibility of modern contamination through the possible effects of long-term storage, as Beta-87442 was made shortly after monolith WS1013 was removed and yet still follows the same pattern as all of the other measurements. The individual sets of measurements might suggest a systematic offset of the results. However, even if this were the case, the inability to draw any conclusions as to the correct date for any given set of samples makes it impossible to both corroborate this and calculate an offset value. For all of these reasons these four monoliths must remain 'undated', with the radiocarbon measurements providing no means to correlate the changes in land-use evident in the pollen record to the existing archaeological record from the area.

References: Allen *et al* 2007
Ward and Wilson 1978

Nene Valley: Irthlingborough Island, Northamptonshire

Location: SP 945705
Lat. 52.19.27 N; Long. 00.36.48 W

Project manager: P Allen (University of Exeter), 1987–2006

Archival body: Department of Geography, University of Exeter

Description: a long section across the floodplain. At the southern end this showed a domed gravel surface with a palaeochannel containing an organic fill. The northern end of the section showed the scar of a palaeochannel. This series consists of two bulk sediment samples removed from organic-rich horizons. The organic material is too degraded for identification.

Objectives: to determine if radiocarbon dates can be gained from a monolith that has been in uniform storage conditions for over 10 years. These dates will complement a high-resolution palynological study (5mm resolution) of the same monolith. The monoliths are thought to cover the late Glacial to early Roman periods. Dating these changes in vegetation composition and land-use will complement the existing environmental and archaeological record from the area.

References: Allen *et al* 2007

SUERC–10037 8445 ±40 BP

$\delta^{13}C$: -28.8‰

Sample: RAP E NV005, submitted on 31 January 2006 by P Allen

Material: sediment (4.10g) (humic acid fraction, bulk sample; *c* +49.55m OD)

Initial comment: the monolith was removed from a shallow gravel-bottomed palaeochannel with a sandy in-fill containing wood fragments. It is thought that the palaeochannel dates to the late Glacial. The monolith was taken within 2.26m (below the surface) from the channel infill section. The channel infill consisted of clay and crudely bedded sand, with occasional cobbles present.

Objectives: the dates are to support previous low-resolution pollen analysis (undertaken in the 1980s) and more recent additional pollen assessments from RAP E(b). The pollen data may be used to provide landscape and vegetation composition histories that predate the detailed archaeological record from the West Cotton sites, and surrounding area. The palaeocecological data will allow an enhanced understanding of the local/regional vegetation history with specific relevance to the post-glacial and pre-human settlement environment.

Calibrated date: *1σ:* 7550–7500 cal BC
2σ: 7590–7470 cal BC

Final comment: P Allen (15 October 2007), the early Mesolithic date is in agreement with the pollen, which is dominated by open ground grasses and herbs. It is also not significantly later than the humin fraction date (SUERC-10038) which suggests a minimal reservoir effect.

Laboratory comment: English Heritage (31 October 2007), the two measurements from this level (SUERC-10037 and SUERC-10038) are not statistically consistent (T′=40.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10038 8575 ±35 BP

$\delta^{13}C$: -29.3‰

Sample: RAP E NV005, submitted on 31 January 2006 by P Allen

Material: sediment (4.10g) (humin fraction, bulk sample; *c* +49.55m OD)

Initial comment: as SUERC-10037

Objectives: as SUERC-10037

Calibrated date: *1σ:* 7600–7580 cal BC
2σ: 7610–7570 cal BC

Final comment: see SUERC-10037

Laboratory comment: see SUERC-10037

SUERC–10042 4745 ±35 BP

$\delta^{13}C$: -29.4‰

Sample: RAP E NV006, submitted on 31 January 2006 by P Allen

Material: sediment (7.30g) (humic acid fraction, bulk sample; *c* +49.83m OD)

Initial comment: as SUERC-10037

Objectives: as SUERC-10037

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: P Allen (15 October 2007), the early Mesolithic date is in agreement with the pollen, which is dominated by open ground grasses and herbs. It is also not significantly later than the humin fraction date (SUERC-10043) which suggests a minimal reservoir effect.

Laboratory comment: English Heritage (31 October 2007), the two measurements from this level (SUERC-10042 and SUERC-10043) are not statistically consistent (T′=33.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10043 5030 ±35 BP

$\delta^{13}C$: -29.0‰

Sample: RAP E NV006, submitted on 31 January 2006 by P Allen

Material: sediment (7.30g) (bulk sample, humin fraction; *c* +49.83m OD)

Initial comment: as SUERC-10042

Objectives: as SUERC-10042

Calibrated date: *1σ:* 3940–3770 cal BC
2σ: 3960–3700 cal BC

Final comment: see SUERC-10042

Laboratory comment: see SUERC-10042

SUERC–10044 6760 ±35 BP

δ¹³C: -28.8‰

Sample: RAP E NV007, submitted on 31 January 2006 by P Allen

Material: sediment (4.90g) (humic acid fraction, bulk sample; *c* +49.71m OD – +49.69m OD)

Initial comment: as SUERC-10037

Objectives: as SUERC-10037

Calibrated date: 1σ: 5710–5630 cal BC
2σ: 5730–5620 cal BC

Final comment: P Allen (15 October 2007), the mid Mesolithic date is in agreement with the pollen, which is dominated by open ground grasses and herbs but with pine as the only tree present. It is also significantly later than the humin fraction date (SUERC-10045) which suggests a small reservoir effect.

Laboratory comment: English Heritage (31 October 2007), the two measurements from this level (SUERC-10044 and SUERC-10045) are not statistically consistent (T′=40.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Allen *et al* 2007
Ward and Wilson 1978

SUERC–10045 7075 ±35 BP

δ¹³C: -28.7‰

Sample: RAP E NV007, submitted on 31 January 2006 by P Allen

Material: sediment (4.90g) (humin fraction, bulk sample; *c* +49.71m OD – +49.69m OD)

Initial comment: as SUERC-10044

Objectives: as SUERC-10044

Calibrated date: 1σ: 6010–5910 cal BC
2σ: 6020–5880 cal BC

Final comment: see SUERC-10044

Laboratory comment: see SUERC-10044

Nene Valley: near West Cotton, Northamptonshire

Location: SP 973724
Lat. 52.20.26 N; Long. 00.34.18 W

Project manager: P Allen (University of Exeter), 1987–2006

Archival body: Department of Geography, University of Exeter

Description: a long section across the floodplain. At the southern end this showed a domed gravel surface with a palaeochannel containing an organic fill. The northern end of the section showed the scar of a palaeochannel. Three macrofossil samples were removed from the same monolith, from different levels. There are also three bulk samples that were removed from organic rich horizons. The organic material is too degraded for identification.

Objectives: to determine if radiocarbon dates can be gained from a monolith that has been in uniform storage conditions for over 10 years. These dates will complement a high-resolution palynological study (5 mm resolution) of the same monolith. The monolith is thought to cover the Bronze Age to early Roman periods, where a change in land-use occurred. Dating these changes in land-use will complement the existing archaeological record from the area.

References: Allen *et al* 2007

SUERC–10056 4185 ±45 BP

δ¹³C: -26.3‰

Sample: RAP C NV001A, submitted on 31 January 2006 by P Allen

Material: waterlogged plant macrofossil (unidentified twig; +33.66m OD – +33.64m OD) (R Gale)

Initial comment: the monolith was removed from a section of a palaeochannel and is thought to cover the time period that includes the Neolithic to medieval periods. The monolith was extracted from a deposit overlying the basal sands and gravels at *c* 2m depth. The section consisted of intercalated sands, gravels, silts, and clays.

Objectives: the dates are to support 5mm fine resolution pollen analysis (FRPA) from RAP C that may be used to support the very detailed archaeological record from the West Cotton sites, and surrounding area (Raunds Area Project). The palaeoecological data will allow an enhanced understanding of the local/regional vegetation history, with specific relevance to land-use changes from the Neolithic to medieval periods.

Calibrated date: 1σ: 2890–2670 cal BC
2σ: 2900–2620 cal BC

Final comment: P Allen (15 October 2007), the late Neolithic age of this sample is in broad agreement with the pollen data, which reveal a partially wooded environment but with clearings. The systematic offsets of the macrofossil, humic acid, and humin fraction dates suggest a significant reservoir effect, with the macrofossil date most closely approximating the true age of the sample.

Laboratory comment: English Heritage (31 October 2007), the three measurements from this level (SUERC-10056, SUERC-10057, and SUERC-10058) are not statistically consistent (T′=74.6 T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10057 4645 ±35 BP

δ¹³C: -28.7‰

Sample: RAP C NV001B, submitted on 31 January 2006 by P Allen

Material: sediment (3.30g) (humic acid fraction, bulk sample; +33.66m OD – +33.64m OD)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: 1σ: 3500–3360 cal BC
2σ: 3520–3350 cal BC

Final comment: see SUERC-10056

Laboratory comment: see SUERC-10056

References: Allen *et al* 2007

SUERC–10058 5380 ±35 BP

$\delta^{13}C$: -28.4‰

Sample: RAP C NV001B, submitted on 31 January 2006 by P Allen

Material: sediment (3.30g) (humin fraction, bulk sample; +33.66m OD – +33.64m OD)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 4330–4170 cal BC
2σ: 4340–4060 cal BC

Final comment: see SUERC-10056

Laboratory comment: see SUERC-10056

SUERC–10062 4180 ±35 BP

$\delta^{13}C$: -27.5‰

Sample: RAP C NV002A, submitted on 31 January 2006 by P Allen

Material: waterlogged plant macrofossil (+33.76m OD – +33.73m OD): cf Salicaceae, roundwood, 240–270mm (R Gale)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 2880–2690 cal BC
2σ: 2890–2630 cal BC

Final comment: P Allen (15 October 2007), the late Neolithic age of this sample is in broad agreement with the pollen data, which reveal a partially wooded environment but with clearings. The systematic offsets of the macrofossil, humic acid, and humin dates suggest a significant reservoir effect, with the macrofossil date most closely approximating the true age of the sample.

Laboratory comment: English Heritage (31 October 2007), the three measurements from this level (SUERC-10062, SUERC-10063, and SUERC-10064) are not statistically consistent (T′=549.8; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Allen *et al* 2007
Ward and Wilson 1978

SUERC–10063 4625 ±35 BP

$\delta^{13}C$: -28.4‰

Sample: RAP C NV002B, submitted on 31 January 2006 by P Allen

Material: sediment (4.40g) (bulk sample, humic acid fraction; +33.76m OD – +33.73m OD)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 3500–3360 cal BC
2σ: 3520–3340 cal BC

Final comment: see SUERC-10062

Laboratory comment: see SUERC-10062

SUERC–10064 5325 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: RAP C NV002B, submitted on 31 January 2006 by P Allen

Material: sediment (4.40g) (bulk sample, humin fraction; +33.76m OD – +33.73m OD)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 4240–4050 cal BC
2σ: 4320–4040 cal BC

Final comment: see SUERC-10062

Laboratory comment: see SUERC-10062

SUERC–10065 4225 ±35 BP

$\delta^{13}C$: -26.4‰

Sample: RAP C NV008A, submitted on 31 January 2006 by P Allen

Material: waterlogged plant macrofossil (unidentified roundwood; +33.56m OD – +33.54m OD) (R Gale)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 2900–2870 cal BC
2σ: 2910–2690 cal BC

Final comment: P Allen (15 October 2007), the late Neolithic age of this sample is in broad agreement with the pollen data, which reveal a partially wooded environment but with clearings. The systematic offsets of the macrofossil, humic acid, and humin dates suggest a significant reservoir effect, with the macrofossil date most closely approximating the true age of the sample.

Laboratory comment: English Heritage (31 October 2007), the three measurements from this level (SUERC-10065, SUERC-10066, and SUERC-10067) are not statistically consistent (T′=288.1; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10066 4625 ±35 BP

$\delta^{13}C$: -27.5‰

Sample: RAP C NV008B, submitted on 31 January 2006 by P Allen

Material: sediment (5.20g) (humic acid fraction, bulk sample; +33.56m OD – +33.54m OD)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 3500–3360 cal BC
2σ: 3520–3340 cal BC

Final comment: see SUERC-10065

Laboratory comment: see SUERC-10065

SUERC–10067 5055 ±35 BP

$\delta^{13}C$: -27.7‰

Sample: RAP C NV008B, submitted on 31 January 2006 by P Allen

Material: sediment (5.20g) (humin fraction, bulk sample; +33.56m OD – +33.54m OD)

Initial comment: as SUERC-10056

Objectives: as SUERC-10056

Calibrated date: *1σ*: 3950–3790 cal BC
2σ: 3960–3710 cal BC

Final comment: see SUERC-10065

Laboratory comment: see SUERC-10065

Nene Valley: south-west of West Cotton, Northamptonshire

Location: SP 973724
Lat. 52.20.26 N; Long. 00.34.18 W

Project manager: P Allen (University of Exeter), 1987–2006

Archival body: Department of Geography, University of Exeter

Description: this series consists of two macrofossil samples, removed from the same monolith, from different levels. Two bulk samples removed from organic-rich horizons. The organic material is too degraded for identification.

Objectives: to determine if radiocarbon dates can be gained from a monolith that has been in uniform storage conditions for over ten years. These dates will compliment a high-resolution palynological study (5mm resolution) of the same monolith. The monoliths are thought to cover the late Roman period. Dating these changes in vegetation composition and land-use will complement the existing environmental and archaeological record from the area.

References: Allen *et al* 2007

SUERC–10046 1005 ±35 BP

$\delta^{13}C$: -28.8‰

Sample: RAP D NV003A, submitted on 31 January 2006 by P Allen

Material: waterlogged plant macrofossil (unidentified bark; *c* +33.45m OD – +33.3m OD) (R Gale)

Initial comment: the monolith was removed from underlying sands and fine gravel from a palaeochannel and is thought to cover the time period that includes the Roman period. The monolith was taken within 2.2m of the surface, from the channel infill section. The channel infill consisted of clay and crudely bedded sand, with occasional cobbles present.

Objectives: the dates are to support previous low-resolution pollen analysis and more recent additional pollen assessments from RAP D. The pollen data may be used to support the very detailed archaeological record from the West Cotton sites, and surrounding area. The palaeoecological data will allow an enhanced understanding of the local/regional vegetation history with specific relevance to land-use changes during the Roman period periods.

Calibrated date: *1σ*: cal AD 990–1040
2σ: cal AD 980–1160

Final comment: P Allen (15 October 2007), the date is younger than expected on the basis of the pollen, as the environment is open (cleared) but there is still some alder on the valley floor. On the pollen data a Romano-British period date would be expected. The date is also far younger than the humic acid and humin fraction dates. It is suggested that there may have been post-depositional mixing of intrusive bark into the palaeochannel fill.

Laboratory comment: English Heritage (31 October 2007), the three measurements from this level (SUERC-10046, SUERC-10047, and SUERC-10048) are not statistically consistent (T'=1288.1; $T'(5\%)$=6.0; ν=2; Ward and Wilson 1978)

References: Ward and Wilson 1978

SUERC–10047 1680 ±35 BP

$\delta^{13}C$: -29.3‰

Sample: RAP D NV003B, submitted on 31 January 2006 by P Allen

Material: sediment (humic acid fraction, bulk sample; *c* +33.45m OD – +33.3m OD)

Initial comment: as SUERC-10046

Objectives: as SUERC-10046

Calibrated date: *1σ*: cal AD 260–420
2σ: cal AD 250–430

Final comment: P Allen (15 October 2007), the date is consistent with what would be expected on the basis of the pollen, as the environment is open (cleared), but there is still some alder on the valley floor. Based on the pollen data, a Romano-British period date was expected. The date is also far older than the macrofossil date (SUERC-10046) and younger than the humin fraction date. It is suggested that there may have been post-depositional mixing of intrusive bark into the palaeochannel fill and that the sediment also had a significant reservoir effect.

Laboratory comment: see SUERC-10046

SUERC–10048 2755 ±35 BP

$\delta^{13}C$: -28.3‰

Sample: RAP D NV 003B, submitted on 31 January 2006 by P Allen

Material: sediment (humin fraction, bulk sample; *c* +33.45m OD – +33.3m OD)

Initial comment: as SUERC-10046

Objectives: as SUERC-10046

Calibrated date: *1σ*: 930–840 cal BC
2σ: 1000–810 cal BC

Final comment: see SUERC-10046

Laboratory comment: see SUERC-10046

SUERC–10052 1355 ±35 BP

δ^13^C: -31.3‰

Sample: RAP D NV004, submitted on 31 January 2006 by P Allen

Material: sediment (humic acid fraction, bulk sample; *c* +33.63m OD – +33.62m OD)

Initial comment: as SUERC-10046

Objectives: as SUERC-10046

Calibrated date: *1σ:* cal AD 650–680
2σ: cal AD 630–770

Final comment: P Allen (15 October 2007), the date is consistent with what would be expected on the basis of the pollen, as the environment is open (cleared), but there is still some alder on the valley floor. However, based on the pollen data a Romano-British period date was expected. The date is also significantly younger than the humin fraction date, suggesting that the sediment also had a significant reservoir effect.

Laboratory comment: English Heritage (31 October 2007), the two measurements from this level (SUERC-10052 and SUERC-10053) are not statistically consistent (T′=60.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10053 1740 ±35 BP

δ^13^C: -30.3‰

Sample: RAP D NV004, submitted on 31 January 2006 by P Allen

Material: sediment (bulk sample, humin fraction; *c* +33.63m OD – +33.62m OD)

Initial comment: as SUERC-10046

Objectives: as SUERC-10046

Calibrated date: *1σ:* cal AD 240–350
2σ: cal AD 220–400

Final comment: see SUERC-10052

Laboratory comment: see SUERC-10052

References: Allen *et al* 2007

Nene Valley: Wollaston, Northamptonshire

Location: SP 900629
Lat. 52.15.23 N; Long. 00.40.53 W

Project manager: P Allen (University of Exeter), 1987–2006

Archival body: Department of Geography, University of Exeter

Description: 35 hectares of the valley bottom were investigated and excavated. A Roman villa is close by and visible on aerial photographs. The ditches are 0.85m wide, 0.3m deep, flat with sharp vertical sides. The postholes are each about 0.15m in diameter and up to 0.15m deep on the outside of the ditches. Root balls were found in the centre of the ditches, which were laid out in parallel rows 5m apart. The trenches were a system for the cultivation of vines, or pastinatio. Over six km (four miles) of trench were dug. One bulk organic sediment was dated to explore the possible problems of 'storage effect'.

Objectives: to determine if radiocarbon dates can be gained from a monolith that has been in uniformed storage conditions for over ten years.

Final comment: P Allen (15 October 2007), the significant difference between the macrofossil, humic acid, and humin fraction dates suggests there is a reservoir effect present.

References: Allen *et al* 2007
Meadows 1996

SUERC–10054 5445 ±35 BP

δ^13^C: -28.7‰

Sample: WS1013 NV009, submitted on 31 January 2006 by P Allen

Material: sediment (9.20g) (humic acid fraction, bulk sample; +43.92m OD)

Initial comment: the monolith was removed from vertical exposures of poorly consolidated deposits from the river Nene floodplain. The location of the sampled section was close to a multi-period archaeological site with evidence from the Mesolithic to the Saxon periods. The monolith S1013 (M3) was taken from a palaeochannel deposit that is thought to include the Neolithic period. The monolith was taken 3m from the surface, from the channel infill section. This channel infill consisted of black organic silts.

Objectives: the sample from S1013 M 3 has been previously dated (Beta-87442; 5000 ±70 BP; 3970–3640 cal BC; Reimer *et al* 2004). The duplicate sample was submitted in order to determine if there is a 'storage effect' on the organic material that may influence new dates.

Calibrated date: *1σ:* 4340–4260 cal BC
2σ: 4360–4230 cal BC

Final comment: P Allen (15 October 2007), the very late Mesolithic/early Neolithic date is broadly compatible with the pollen data, which are of still a largely wooded environment (alder, oak, and hazel) but some with open areas or clearings. The slight presence of cereal type pollen would support an early Neolithic date closer to the macrofossil date. The significant difference between the macrofossil, humic acid, and humin fraction dates suggests that there is a reservoir effect present.

Laboratory comment: English Heritage (31 October 2007), the three measurements from this level (SUERC-10054, SUERC-10055, and Beta-87442) are not statistically consistent (T′=96.4; T′(5%)=6.0; ν=2; Ward and Wilson 1978).

References: Reimer *et al* 2004
Ward and Wilson 1978

SUERC–10055 5740 ±35 BP

δ^13^C: -28.9‰

Sample: WS1013 NV009, submitted on 31 January 2006 by P Allen

Material: sediment (9.20g) (humin fraction, bulk sample; +43.92m OD)

Initial comment: as SUERC-10054

Objectives: as SUERC-10054

Calibrated date: 1σ: 4670–4530 cal BC
2σ: 4690–4490 cal BC

Final comment: see SUERC-10054

Laboratory comment: see SUERC-10054

North Park Farm, Bletchingley, Surrey

Location: TQ 329203
Lat. 50.58.00 N; Long. 00.06.31 W

Project manager: N Branch (Royal Holloway College), 2005–7

Archival body: Surrey County Archaeological Unit

Description: North Park Farm is a sand quarry located on the Folkestone beds, between the chalk escarpment of the North Downs and the lower Greensand escarpment. The archaeological site occupies a wide, shallow depression within a low-lying valley. Excavation in 2005 uncovered a unique sequence of natural and archaeological deposits, including high concentrations of flint artefacts, burnt flint and charcoal of Mesolithic age. *In situ* evidence of flint working was revealed in several of the excavated areas, an evidence of fire sand/or cooking activities was found in the form of numerous hearth features. Radiocarbon dates have been obtained from four of these hearths, [160], [161], [122], and [126].

Objectives: it is hoped dating will help to determine: the timing and duration of on-site activity. Dating hearth [122] will provide a date for its use and also establish its temporal relationship with other hearth features present on the site, particularly hearth [160], which is in a similar stratigraphic position. Hearth function; evidence from the excavation shows that [122] was a shallow surface feature, with associated hearth stones, and had a different construction to hearth [160], which was deeply cut into the underlying deposits; this suggests that the hearths may have had different functions and dating the feature may help to explain the relationship between hearth function and other contemporaneous activity represented by the lithic assemblage. Bioarchaeological modelling: dating the hearth will also contribute to building a robust temporal framework for the bioarchaeological data from North Park Farm, eg charcoal analysis. This will permit chronologically defined vegetation reconstructions and resource-exploitation models to be developed. This aspect of the dating programme is particularly important in relation to feature [122], where stratigraphically the hearth appears to be one of the latest features on-site. Preliminary assessment of the charcoal samples from the feature [122] has provided evidence for the exploitation of oak and hazel for firewood. In comparison, pollen records from Elstead Bog (Branch and Green 2004), which is located on the lower Greensand, record relatively low amounts of these species until the later Mesolithic. Radiocarbon dating is therefore very important to provide synchronous collaborative evidence of local vegetation during the Mesolithic period.

Final comment: N Branch and P Marshall (16 November 2007), the probable hearth [160] was unlike any of the others found on-site, because the seat of burning seemed to have been at the base of its 0.38m deep pit, at least from the evidence of the fire-reddened hardening of the otherwise 'clean' sand below it. The only alternative explanation would be that the small area of primary fill [203], which was comprised of burnt flints and hearthstone fragments, had been secondarily-deposited in the pit when still hot, although there are Dutch parallels for such deep-seated hearths (Groenendijk 1987, 98). The rest of the fill was predominantly of black sand, but with some burnt flints and uncommon struck flints. Hearths [161] and [122] also produced dates which confirm that these features were the focus of early Mesolithic activity. The single result from hearth [126] is on a fragment of charcoal which must be intrusive.

Laboratory comment: English Heritage (8 December 2007), the five measurements from hearth [160] are not statistically consistent (T′=50.3; T′(5%)=9.5; v=4; Ward and Wilson 1978). Further radiocarbon dates from this site are reported by Bayliss *et al* (2007a, 42–3). Luminesence dating is discussed by Toms (2005) and Bailey *et al* (2007).

References: Bailey *et al* 2007
Bayliss *et al* 2007a
Branch *et al* 2003 unpubl
Branch and Green 2004
Groenendiijk 1987
Toms 2005
Ward and Wilson 1978

OxA–16904 7762 ±40 BP

$\delta^{13}C$: -23.9‰

Sample: 319.CH/368, submitted on 5 January 2007 by N Branch

Material: charcoal: *Corylus avellana*, single fragment (L Farr 2006)

Initial comment: the charcoal sample comes from hearth feature [122] in Area 9, excavated spit I5-99-6. Hearth [122] lies at a depth of *c* 1m from the modern surface, prior to machining, between contexts [18] and [121]. There is a small chance of environmental contamination from earlier [121] and later deposits [18], owing to the fact that the hearth appears to be an exposed surface feature and not an immediately sealed context. This is, however, unlikely due to the very low concentrations of charcoal found in these deposits. Prior to machine stripping the surface deposit consisted of a compacted dark greyish brown plough layer (*c* 0.3m). This overlay *c* 0.5m of reddish brown compacted gritty fine sand with scattered pieces of chalk and flint and a variety of post-Mesolithic archaeological matter. This horizon is underlain by a similar but slightly darker and greyer horizon, up to 0.2m in thickness [18]. Below this level the sand is much less compacted and often free-running and predominantly light grey or white, with very variable and localised patterns of dark greyish or reddish brown staining [121]. The thickness of this horizon is variable and it passes down into unweathered lower Greensand.

Objectives: the large hearth in Area 9 is a very important feature and dating [122] is essential to understanding when the feature was in use, and a sequence of dates through the hearth is necessary to determine whether the hearth represents one or more periods of activity.

Calibrated date: *1σ*: 6650–6530 cal BC
2σ: 6660–6470 cal BC

Final comment: N Branch and P Marshall (16 November 2007), the result confirms the Mesolithic date of the hearth as suggested by a series of OSL measurements (Bailey *et al* 2007) from above and below the feature.

Laboratory comment: English Heritage, the two results (OxA-16904 and SUERC-12922) from hearth [122] excavated spit I5-99-6 are not statistically consistent (T′=6.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Bailey *et al* 2007
Ward and Wilson 1978

OxA–16905 8275 ±40 BP

$\delta^{13}C$: -25.9‰

Sample: 436.CH/382, submitted on 5 January 2007 by N Branch

Material: charcoal (unidentified twig) (L Farr 2006)

Initial comment: the charcoal sample comes from hearth feature [161] in Area 6, excavated spit F5-58-3. Hearth [161] lies at a depth of *c* 0.9m from the modern surface, prior to machining, between contexts [18] and [106]. The hearth feature is characterised by a very dark charcoal-rich deposit with a thinner grey spread [157] surrounding it. There is a small chance of environmental contamination from earlier [106] and later deposits [18], owing to the fact that the hearth appears to be an exposed surface feature and not an immediately sealed context. Prior to machine stripping, the surface deposit consisted of a compacted dark greyish brown plough layer (*c* 0.3m). This overlay *c* 0.5m of reddish brown compacted gritty fine sand with scattered pieces of chalk and flint and a variety of post-Mesolithic archaeological matter. This horizon is underlain by a similar but slightly darker and greyer horizon, up to 0.2m in thickness [18]. Below this level the sand is much less compacted and often free-running and predominantly light grey or white, with very variable and localised patterns of dark greyish or reddish brown staining [106]. The thickness of this horizon is variable and it passes down into un-weathered lower Greensand.

Objectives: the large hearth in Area 6 is a very important feature and dating [161] is essential to understanding when the feature was in use, and a sequence of dates through the hearth is necessary to determine whether the hearth represents one or more periods of activity.

Calibrated date: *1σ*: 7450–7190 cal BC
2σ: 7480–7170 cal BC

Final comment: N Branch and P Marshall (16 November 2007), the result confirms the impression from the lithic assemblage that the hearth was the focus of early Mesolithic activity.

Laboratory comment: English Heritage (2007), the two measurements (OxA-16905 and SUERC-13955) from hearth [161] are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16933 1510 ±27 BP

$\delta^{13}C$: -26.3‰

Sample: 597.CH/701, submitted on 5 January 2007 by N Branch

Material: charcoal: *Acer* sp., single fragment (L Farr 2006)

Initial comment: the charcoal sample comes from hearth feature [126] in Area 10, excavated spit I4-56-5. Hearth [126] lies at a depth of *c* 1m from the modern surface, prior to machining, between contexts [159] and [121]. There is a small chance of environmental contamination from earlier [121] and later deposits [159] into the hearth feature [126], owing to the fact that the hearth appears to be an exposed surface and not an immediately sealed context. Prior to machine stripping, the surface deposit consisted of a compacted dark greyish brown plough layer (*c* 0.3m). This overlay *c* 0.5m of reddish brown compacted gritty fine sand with scattered pieces of chalk and flint and a variety of post-Mesolithic archaeological matter. This horizon is underlain by a similar but slightly darker and greyer horizon, up to 0.2m in thickness [159]. Below this level the sand is much less compacted and often free-running and predominantly light grey or white with very variable and localised patterns of dark greyish or reddish brown staining [121]. The thickness of this horizon is variable and it passes down into un-weathered lower Greensand.

Objectives: the hearth in Area 10 is a very important feature and dating is essential to understanding when the feature was in use, and a sequence of dates through the hearth is necessary to determine whether the hearth represents one or more periods of activity.

Calibrated date: *1σ*: cal AD 540–600
2σ: cal AD 440–620

Final comment: N Branch and P Marshall (16 November 2007), the dated charcoal clearly represents intrusive material that is not associated with the Mesolithic flintwork. It suggests that the flint assemblage from Area 10 might also represent a palimpsest of material from different periods that has accumulated at the bottom of the valley, given the occurrence of at least three different microlith assemblages.

Laboratory comment: English Heritage (2007), a second sample from this feature failed.

SUERC–12922 7940 ±40 BP

$\delta^{13}C$: -25.8‰

Sample: 319.CH/370, submitted on 5 January 2007 by N Branch

Material: charcoal: *Corylus avellana*, single fragment (L Farr 2006)

Initial comment: as OxA-16904

Objectives: as OxA-16904

Calibrated date: *1σ*: 7030–6690 cal BC
2σ: 7050–6650 cal BC

Final comment: *see* OxA-16904

Laboratory comment: *see* OxA-16904

SUERC–13955 8275 ±40 BP

δ¹³C: -25.4‰

Sample: 436.CH/815, submitted on 5 January 2007 by N Branch

Material: charcoal: *Quercus* sp., sapwood, single fragment (L Farr 2006)

Initial comment: as OxA-16905

Objectives: as OxA-16905

Calibrated date: *1σ*: 7450–7190 cal BC
2σ: 7480–7170 cal BC

Final comment: see OxA-16905

Laboratory comment: see OxA-16905

North Park Farm, Bletchingley: area 11, hearth [160], Surrey

Location: TQ 32965204
Lat. 51.15.05 N; Long. 00.05.41 W

Project manager: N Branch (Royal Holloway College), 2005–6

Archival body: Surrey County Archaeological Unit

Description: The hearth feature [160] was excavated by trowel in 50mm spits and a 100% sample taken and transferred to plastic bulk-sample tubs. NPF05/Area 11/160 is a series of charcoal samples from three of these spits. J6 refers to the 10x10m area of the site; number 46 (for example) is the metre square that was excavated and number 14 (for example) is the spit level from the excavated surface.629.CH/761 – uppermost spit of feature [160] in excavated area J6-45-8; 629.CH/375 – uppermost spit of feature [160] in excavated area J6-45-8; 655.CH/380 – middle spit of feature [160] in excavated area J6-46-11; 658.CH/297 – bottom spit of feature [160] in excavated area J6-46-14; 658.CH/297 – bottom spit of feature [160] in excavated area J6-46-14

Objectives: the large hearth [160] in Area 11 is a very important feature and a vertical sequence of dates through the deposit is necessary to determine whether the hearth represents one or more periods of activity.

Final comment: N Branch and P Marshall (16 November 2007), the probable hearth [160] was unlike any of the others found on site because the seat of burning seemed to have been at the base of its 0.38m deep pit, at least from the evidence of the fire-reddened hardening of the otherwise 'clean' sand below it. The only alternative explanation would be that the small area of primary fill [203] which was comprised of burnt flints and hearthstone fragments, had been secondarily-deposited in the pit when still hot, although there are Dutch parallels for such deep-seated hearths (Groenendijk 1987, 98). The rest of the fill was predominantly of black sand, but with some burnt flints and uncommon struck flints.

Laboratory comment: English Heritage (29 January 2008), the five measurements from hearth [160] are not statistically consistent (T′=50.3; v=4; T′(5%)=9.5; Ward and Wilson 1978).

References: Groenendiijk 1987
Ward and Wilson 1978

OxA–16921 8005 ±39 BP

δ¹³C: -28.4‰

Sample: 658.CH/378, submitted on 5 January 2007 by N Branch

Material: charcoal: *Corylus avellana*, single fragment (L Farr 2006)

Initial comment: the charcoal sample comes from the bottom spit of hearth feature [160] in Area 11, excavated spit J6-46-14. The hearth was deeply buried under *c* 0.5m of overlying deposits. Some rabbit-burrowing disturbance in the excavation area was noted, but this did not affect the integrity of the hearth feature and no contamination from this later activity is anticipated. Prior to machine stripping, the surface deposit consisted of a compacted dark greyish brown plough layer (*c* 0.3m). This overlay *c* 0.5m of reddish brown compacted gritty fine sand with scattered pieces of chalk and flint and a variety of post-Mesolithic archaeological matter. This horizon is underlain by a similar but slightly darker and greyer horizon, up to 0.2m in thickness [18]. Below this level the sand is much less compacted and often free-running and predominantly light grey or white with very variable and localised patterns of dark greyish or reddish brown staining [121]. The thickness of this horizon is variable and it passes down into un-weathered lower Greensand.

Objectives: the large hearth in Area 11 is a very important feature and dating [160] is essential to understanding when the feature was in use, and a sequence of dates through the hearth is necessary to determine whether the hearth represents one or more periods of activity.

Calibrated date: *1σ*: 7050–6820 cal BC
2σ: 7070–6760 cal BC

Final comment: N Branch and P Marshall (16 November 2007), the result confirms the Mesolithic date of the feature as suggested by the assemblage of microliths (very narrow straight backed bladelets and rods).

Laboratory comment: see SUERC-12927

Laboratory comment: English Heritage (2007), the two results from the bottom spit, J6-46-14 (OxA-16921 and SUERC-12927) are not statistically consistent (T′=25.5; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16934 7990 ±39 BP

δ¹³C: -27.7‰

Sample: 629.CH/375, submitted on 5 January 2007 by N Branch

Material: charcoal: *Corylus avellana*, single fragment (L Farr 2006)

Initial comment: the charcoal sample comes from the uppermost spit of hearth feature [160] in Area 11, excavated spit J6-45-8. Hearth was deeply buried under *c* 0.5m of overlying deposits. Some rabbit-burrowing disturbance in the excavation area was noted, but this did not affect the integrity of the hearth feature and no contamination from this later activity is anticipated. Prior to machine stripping, the surface deposit consisted of a compacted dark greyish brown plough layer (*c* 0.3m). This overlay *c* 0.5m of reddish brown compacted gritty fine sand with scattered pieces of chalk and flint and a variety of post-Mesolithic archaeological matter. This horizon is underlain by a similar but slightly darker and greyer horizon, up to 0.2m in thickness [18]. Below this level the sand is much less compacted and often free-running and predominantly light grey or white with very variable and localised patterns of dark greyish or reddish brown staining [121]. The thickness of this horizon is variable and it passes down into un-weathered lower Greensand.

Objectives: as OxA-16921

Calibrated date: *1σ*: 7050–6820 cal BC
2σ: 7060–6690 cal BC

Final comment: N Branch and P Marshall (16 November 2007), the result confirms the Mesolithic date of the feature, as suggested by the assemblage of microliths (very narrow straight backed bladelets and rods).

Laboratory comment: English Heritage (2007), the two results from the uppermost spit; J6-45-8 (OxA-16934 and SUERC-13207) are not statistically consistent (T′=21.8; T′(5%)=3.8; v=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–12926 8205 ±35 BP

δ¹³C: -27.0‰

Sample: 655.CH/380, submitted on 5 January 2007 by N Branch

Material: charcoal (Maloideae sp., single fragment) (L Farr 2006)

Initial comment: the charcoal sample comes from the middle spit of hearth feature [160] in Area 11, excavated spit J6-46-11. The hearth was deeply buried under *c* 0.5m of overlying deposits. Some rabbit-burrowing disturbance in the excavation area was noted, but this did not affect the integrity of the hearth feature and no contamination from this later activity is anticipated. Prior to machine stripping, the surface deposit consisted of a compacted dark greyish brown plough layer (*c* 0.3m). This overlay *c* 0.5m of reddish brown compacted gritty fine sand with scattered pieces of chalk and flint and a variety of post-Mesolithic archaeological matter. This horizon is underlain by a similar but slightly darker and greyer horizon, up to 0.2m in thickness [18]. Below this level the sand is much less compacted and often free-running and predominantly light grey or white with very variable and localised patterns of dark greyish or reddish brown staining [121]. The thickness of this horizon is variable and it passes down into un-weathered lower Greensand.

Objectives: as OxA-16921

Calibrated date: *1σ*: 7320–7080 cal BC
2σ: 7350–7070 cal BC

Final comment: see OxA-16934

SUERC–12927 8270 ±35 BP

δ¹³C: -27.3‰

Sample: 658.CH/297, submitted on 5 January 2007 by N Branch

Material: charcoal (Maloideae sp., single fragment) (L Farr 2006)

Initial comment: as OxA-16921

Objectives: as OxA-16921

Calibrated date: *1σ*: 7450–7190 cal BC
2σ: 7470–7170 cal BC

Final comment: see OxA-16934

Laboratory comment: see OxA-16921

SUERC–13207 8235 ±35 BP

δ¹³C: -27.1‰

Sample: 629.CH/761, submitted on 5 January 2007 by N Branch

Material: charcoal (Maloideae sp., single fragment) (L Farr 2006)

Initial comment: as OxA-16934

Objectives: as OxA-16934

Calibrated date: *1σ*: 7340–7170 cal BC
2σ: 7450–7080 cal BC

Final comment: N Branch and P Marshall (16 November 2007), the result confirms the Mesolithic date of the feature as suggested by the assemblage of microliths (very narrow straight backed bladelets and rods).

Laboratory comment: see OxA-16934

Ribble Valley, Lancashire and North Yorkshire

Location: SD 81516527; SD 8748 5431; SD 7774 4717; SD 4589 2794
Lat. 54.04.58 N; Long. 02.16.58 W, : Lat. 53.59.04 N; Long. 02.11.28 W: Lat. 53.55.12 N; Long. 02.20.20 W: Lat. 53.44.41 N; Long. 02.49.14 W

Project manager: R Chiverrell (Department of Geography, University of Liverpool), 2005–6

Description: the Ribble is the largest river system in Lancashire, covering some 1320km². The catchment extends from the headwaters of the Hodder in the Forest of Bowland to the headwaters of the Ribble in the western Yorkshire Dales. The current drainage network reflects the region's glacial legacy, with agressive erosion perhaps accentuated by glacial meltwaters capturing the Hodder headwaters at the expense of the formerly westward-draining Loud Valley. The study area was selected so as to concentrate on areas of greatest soft aggregate (sand and gravel) mineral potential, to follow on from the Lancashire Minerals and Waste Local Plan (LCC 2006), which targeted the post-Glacial river terraces of the Ribble as a principal area of study. In order to understand fully the sequence of fluvial landform development, detailed mapping and sediment studies were carried out at four study reaches within the lower Ribble, Calder, upper Ribble, and the Hodder sub-catchments. Within each study reach, the strategy was to characterise the geomorphology of all river terraces and to ascertain the timing of channel abandonment at one or more palaeochannel site on each river terrace. For the lower Ribble, a multi-site approach was adopted, thus allowing the investigation of within-reach differences in fluvial development. Additional hillslope alluvial fan studies were also carried out in the upper Ribble headwaters, with the aim of improving understanding of the timing of hillslope erosion in the catchment and characterising the coupling relationship between hillslope and fluvial-system response.

Objectives: to undertake a comprehensive GIS-based survey of the late Quaternary and Holocene geomorphology, using a combination of field survey and LiDAR elevation data, and, expanding on previous work, thereby to identify and clarify the fluvial and glaciofluvial landform sequence within the Ribble. The project aimed to characterise the late-Glacial and post-Glacial fluvial evolution of the Ribble river system, identifying and constraining the phases of aggradation and incision, significant switches in the sediment supply and transfer regime within the catchment, and linkages between the major components of the system.

Final comment: R Chiverrell and P Marshall (12 November 2007), the chronological model for the sequence in the Ribble, including evidence from the reaches in the Calder and Hodder systems shows broadly consistent timings of valley incision and aggradation activity that fit the anticipated evolutionary model of river-floodplain development consisting of: a) late-Glacial to early Holocene aggradation (Calder Terrace T1; no dated lower Ribble equivalent, but probably T1) related to the reworking of abundant glacigenic sediments under a cold climatic regime and a sparsely vegetated landscape; b) prolonged valley floor stability from the early to mid-Holocene, a time of climatic improvement and forest invasion; c) heightened rates of vertical and lateral instability during the late Holocene period of cultural expansion. However, the geochronological data also provide evidence for subtle between-reach differences in the timing of valley geomorphic responses. For example, there appears to have been a significant lag in the timing of incision into T2 deposits and the ending of aggradation between reaches. This evidence appears to show lag times that reflect early aggradation in downstream reaches and a possible upstream transmission of this early post-Glacial switch from an incising to aggrading regime. Sediment supply is not the only factor driving the system, and the periods of Ribble aggradation leading to the development of Terraces T3 and T4 were also, however, synchronous with hydro-climatic deterioration in north-west England and it therefore seems likely that the late Holocene fluvial system was also highly responsive to the combination of climatic and anthropogenic environmental change (Coulthard *et al* 2005). Significantly, this apparent in-phase relationship between climatic forcing and sediment response is only apparent during the last 3000 years. It is thus possible that human activity, by increasing the connectivity between the catchment slopes and channel systems, has heightened the sensitivity of the Ribble fluvial system to centennial scale hydro-climatic variability.

References: Chiverrell *et al* 2007a
Chiverrell *et al* 2007b
Coulthard *et al* 2005
Lancashire County Council (LCC) 2006

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, alluvial fan 5, North Yorkshire

Location: SD 841822
Lat. 54.14.06 N; Long. 02.14.38 W

Project manager: R Chiverrell (Department of Geography, University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas for example, the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16354 198 ±27 BP

$\delta^{13}C$: -28.6‰

Sample: OB 5 at the Alluvial Fan 5 confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: the material is a 0.2m thick *Molinea* (?)/Bryophyte peat deposit that is buried beneath 0.5m of alluvial fan fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels, and so the plant macrofossils in the buried peat can be regarded as entirely *in situ* regardless of whether they are root, leaf, or stem.

Objectives: this location is an upland alluvial fan in the Wharf headwaters. This is one of ten alluvial fans that have accumulated at the confluences between valley-sided gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck. Episodes of increased gullying and alluvial fan progradation often coincide or pre-date alluviation further downstream reflecting a response to the greater availability of sediment. Understanding the sequence of geomorphic change on the upland hillslopes of different parts of river catchments is crucial, because of the importance of anthropogenic activity (changes in farming intensity and woodland clearance) to hillslope stability. The main phases of hillslope instability are likely to be associated with Romano-British, Anglo-Saxon, Norse, and medieval expansions in rural population and agricultural activity in northwest England. Any spatial differences in the pattern and timing of increased delivery of sediment from upland hillslopes between the Hodder and upper Ribble would be important for understanding the evolution of the system.

Calibrated date: *1σ*: cal AD 1660–1955*
2σ: cal AD 1640–1955*

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas such as, the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

Laboratory comment: English Heritage (2007), the two radiocarbon measurements on this sample (OxA-16354 and OxA-16355 are statistically consistent (T'=0.4; T'(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean is 210 ±19 BP (cal AD 1640–1955*; Reimer *et al* 2004).

References: Chiverrell *et al* 2007a
Reimer *et al* 2004
Ward and Wilson 1978

OxA–16355 221 ±26 BP

δ¹³C: -28.1‰

Sample: OB 5 at the Alluvial Fan 5 confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: replicate of OxA-16354

Objectives: as OxA-16354

Calibrated date: *1σ*: cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: see OxA-16354

Laboratory comment: see OxA-16354

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, alluvial fan 6, North Yorkshire

Location: SD 839822
Lat. 54.14.06 N; Long. 02.14.49 W

Project manager: R Chiverrell (Department of Geography, University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas for example, the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16353 3170 ±31 BP

δ¹³C: -27.3‰

Sample: OB 6/1 at the Alluvial Fan 6 confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: the datable material is from a 10m thick woody organic-rich peat deposit that is buried beneath 0.45m of alluvial fan fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels, and so the plant macrofossils in the buried peat can be regarded as entirely *in situ* and to have died during the progradation of alluvial fan gravels.

Objectives: this location is an upland alluvial fan in the Wharf headwaters. This is one of ten alluvial fans that have accumulated at the confluence between valley-sided gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck. The episodes of increased gullying and alluvial fan progradation often coincide or pre-date alluviation further downstream, reflecting a response to the greater availability of sediment. Understanding the sequence of geomorphic change on the upland hillslopes of different parts of river catchments is crucial, because of the importance of anthropogenic activity (changes in farming intensity and woodland clearance) to hillslope stability. The main phases of hillslope instability are likely to be associated with Romano-British, Anglo-Saxon, Norse, and medieval expansions in rural population and agricultural activity in northwest England. Any spatial differences in the pattern and timing of increased delivery of sediment from upland hillslopes between the Hodder and upper Ribble would be important for understanding the evolution of the system.

Calibrated date: *1σ*: 1500–1410 cal BC
2σ: 1510–1390 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), although only providing a *terminus post quem* for increased gullying and alluvial fan progadation, the date broadly coincides with phases of hillslope instability in the wider North West during the Iron Age and into the Romano-British period (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, alluvial fan 7, North Yorkshire

Location: SD 838822
Lat. 54.14.06 N; Long. 02.14.55 W

Project manager: R Chiverrell (Department of Geography, University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas for example, the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16373 398 ±29 BP

$\delta^{13}C$: -29.7‰

Sample: OB 7/1 at the Alluvial Fan 7 confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: the material is from a 0.3m thick organic-rich peat deposit that is buried beneath 0.6m of alluvial fan fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels, and so the plant macrofossils in the buried peat can be regarded as entirely *in situ* and to have died during the progradation of alluvial fan gravels.

Objectives: to provide a *terminus post quem* for the deposition of alluvial fan 7.

Calibrated date: *1σ*: cal AD 1440–1610
2σ: cal AD 1430–1620

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas, such as the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

Laboratory comment: English Heritage (2007), the two measurements from this sample (OxA-16373 and OxA-16560) are not statistically consistent (T'=24.8; T'(5%)=6.0; ν=1; Ward and Wilson 1978).

References: Chiverrell *et al* 2007a
Ward and Wilson 1978

OxA–16560 201 ±27 BP

$\delta^{13}C$: -30.0‰

Sample: OB 7/1 at the Alluvial Fan 7 confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossils (monocot, leaves and ?stems) (R Chiverrell 2006)

Initial comment: as OxA-16373

Objectives: as OxA-16373

Calibrated date: *1σ*: cal AD 1660–1955*
2σ: cal AD 1640–1955*

Final comment: see OxA-16373

Laboratory comment: see OxA-16373

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, alluvial fan 8, North Yorkshire

Location: SD 837822
Lat. 54.14.06 N; Long. 02.15.00 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas for example, the Bowland and Howgill Fells (Chiverrell *et al* 2007a). Two of the sites, Oughtershaw Beck alluvial fans 8 and 6, provide evidence for earlier instability with alluvial fan progradation and coincident gully incision constrained to after cal AD 780–990 (OxA-16372) and after 1500–1390 cal BC (OxA-16353) respectively. Whilst these only provide *termini post quem* for increased gullying and alluvial fan progradation the timings broadly coincide with phases of hillslope instability in the wider North West during the Iron Age and into the Romano-British period at 800 cal BC–cal AD 250 and during the period cal AD 700–1250 (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16372 1138 ±30 BP

$\delta^{13}C$: -28.1‰

Sample: OB 8/2 at the Alluvial Fan 8 confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (sedge) (R Chiverrell 2006)

Initial comment: the material is from the top 50mm of a 0.75m thick monocotyledonous peat deposit that is buried beneath 0.4m of alluvial fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels, and so the plant macrofossils in the buried peat can be regarded as entirely *in situ* and to have died during the progradation of alluvial fan gravels.

Objectives: to provide a *terminus post quem* for the deposition of Alluvial fan 8.

Calibrated date: *1σ*: cal AD 880–970
2σ: cal AD 780–990

Final comment: R Chiverrell and P Marshall (12 November 2007), although only providing a *terminus post quem* for increased gullying and alluvial fan progadation the date broadly coincides with phases of hillslope instability in the wider North West during the early Medieval period (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, Cold Keld confluence, North Yorkshire

Location: SD 834822
Lat. 54.14.06 N; Long. 02.15.17 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas, such as the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16352 147 ±26 BP

$\delta^{13}C$: -27.6‰

Sample: OB 9/2 at the Cold Keld confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: the material is from a 0.1m thick peat deposit that is buried beneath 0.5m of alluvial fan fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels, and so the plant macrofossils in the buried peat can be regarded as entirely *in situ* and to have died during the progradation of alluvial fan gravels.

Objectives: as OxA-16560

Calibrated date: *1σ:* cal AD 1670–1955*
2σ: cal AD 1660–1955*

Final comment: see OxA-16560

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, Hazelbank Gill confluence, North Yorkshire

Location: SD 864820
Lat. 54.14.00 N; Long. 02.12.31 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: geomorphic mapping of the Cam Beck and Oughtershaw Beck interfluve identified ten coupled alluvial fan and gully settings where exposures showed organic deposits (peat and soils) underlying alluvial fan gravels. This series of alluvial fans offers an opportunity for characterising headwater hillslope instability in upper Ribblesdale and Wharfdale, and as such would be a wider barometer of hillslope erosion and sediment flux to both river systems. This in an area with a stronger record of Roman influence (Cam High Road) and Anglo-Saxon woodland clearances than in other parts of the catchment.

Objectives: in order to understand the timing of alluvial fan development at the end of gully networks incised into the hillslopes of the Upper Ribble, samples were submitted from nine alluvial fan sites at the Cam Beck and Oughtershaw Beck interfluve. As the samples all come from organic-rich peat deposits buried beneath alluvial fan gravels, they only provide *termini post quem* for increased gullying and alluvial fan progradation. Generating a chronology for this reach would also give an overview of hillslope instability phases and increased sediment transfer to the fluvial system for both the upper Ribble and upper Wharf, and highlight whether there are discrepancies in anthropogenic forcing of hillslope destabilisation between regions.

Final comment: R Chiverrell and P Marshall (12 November 2007), the results suggest that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas, such as the Bowland and Howgill Fells (Chiverrell *et al* 2007a). Two of the sites, Oughtershaw Beck alluvial fans 8 and 6, provide evidence for earlier instability, with alluvial fan progradation and coincident gully incision constrained to after cal AD 780–990 (OxA-16372) and after 1500–1390 cal BC (OxA-16353) respectively. Whilst these only provide *termini post quem* for increased gullying and alluvial fan progradation, the timings broadly coincide with phases of hillslope instability in the wider North West during the Iron Age and into the Romano-British period at 800 cal BC–cal AD 250 and during the period cal AD 700–1250 (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16600 348 ±27 BP

$\delta^{13}C$: -26.0‰

Sample: OB1 at the Hazelbank Gill confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged wood (unidentified twig) (R Chiverrell 2006)

Initial comment: the material is from an organic-rich peat deposit that is buried beneath alluvial fan fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels, and so the plant macrofossils in the buried peat can be regarded as entirely *in situ*.

Objectives: this location is an upland alluvial fan in the Wharf headwaters. This is one of ten alluvial fans that have accumulated at the confluences between valley-side gully networks and the axial streams of Cam and Oughtershaw Becks. The inception of alluvial fans at the end of gully networks incised into the drift-mantled hillslopes of upland north-west Britain have long been attributed to human activity. The episodes of increased gullying and alluvial fan progradation often coincide or pre-date alluviation further downstream, reflecting a response to the greater availability of sediment. Understanding the sequence of geomorphic change on the upland hillslopes of different parts of river catchments is crucial, because of the importance of anthropogenic activity (changes in farming and woodland clearance) to hillslope stability. The main phase of hillslope instability are likely to be associated with Romano-British, Anglo-Saxon, Norse, and medieval expansions in rural population and agricultural activity in north-west England. Any spatial differences in the pattern and timing of increased delivery of sediment from upland hillslopes between the Hodder and upper Ribble would be important for understanding the evolution of the system.

Calibrated date: *1σ*: cal AD 1470–1640
2σ: cal AD 1450–1650

Final comment: see OxA-16560

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, Mireing Gill confluence, North Yorkshire

Location: SD 860820
Lat. 54.14.00 N; Long. 02.12.53 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam and Oughtershaw Becks.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas, such as the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16559 357 ±27 BP

$\delta^{13}C$: -24.7‰

Sample: OB 2/2 at the Mireing Gill confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (moss) (R Chiverrell 2006)

Initial comment: as OxA-16600

Objectives: as OxA-16600

Calibrated date: *1σ*: cal AD 1460–1640
2σ: cal AD 1450–1640

Final comment: see OxA-16560

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, Pot Close Gill, North Yorkshire

Location: SD 831821
Lat. 54.14.03 N; Long. 02.15.34 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Becks.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation. In order to understand the timing of alluvial fan development at the end of gully networks incised into the hillslopes of the Upper Ribble, samples were submitted from nine alluvial fan sites at the Cam Beck and Oughtershaw Beck interfluve. As the samples all come from organic-rich peat deposits buried beneath alluvial fan gravels, they only provide *termini post quem* for increased gullying and alluvial fan progradation. Generating a chronology for this reach would also give an overview of hillslope instability phases and increased sediment transfer to the fluvial system for both the upper Ribble and upper Wharf, and highlight whether there are discrepancies in anthropogenic forcing of hillslope destabilisation between regions.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas, such as the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16351 620 ±28 BP

$\delta^{13}C$: -28.0‰

Sample: OB 10/1 at the Pot Close Gill confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: the materials from the top 50mm of a 0.75m thick monocotyledonous peat deposit that is buried beneath 0.25m of alluvial fan fluvial medium-coarse gravel. The buried peat is entirely separated from surface peat and soils, with no evidence of roots penetrating the fan gravels. Thus the plant macrofossils in the buried peat can be regarded as *in situ*, and as dying during the progradation of alluvial fan gravels.

Objectives: in order to understand the timing of alluvial fan development at the end of gully networks incised into the hillslopes of the Upper Ribble, samples were submitted from nine alluvial fan sites at the Cam Beck and Oughtershaw Beck interfluve. As the samples all come from organic-rich peat deposits buried beneath alluvial fan gravels, they only provide *termini post quem* for increased gullying and alluvial fan progradation. Generating a chronology for this reach would also give an overview of hillslope instability phases and increased sediment transfer to the fluvial system for both the upper Ribble and upper Wharf, and highlight whether there are discrepancies in anthropogenic forcing of hillslope destabilisation between regions.

Calibrated date: 1σ: cal AD 1290–1400
2σ: cal AD 1280–1410

Final comment: R Chiverrell and P Marshall (12 November 2007), although only providing a *terminus post quem* for increased gullying and alluvial fan progadation, the date broadly coincides with phases of hillslope instability in the wider North West during the early medieval period (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

Ribble Valley: Cam Beck and Oughtershaw Beck interfluve, Swarth Gill confluence, North Yorkshire

Location: SD 846823
Lat. 54.14.10 N; Long. 02.14.11 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the site is an upland alluvial fan in the Wharf headwaters, one of ten alluvial fans that have accumulated at the confluence between valley-side gully networks and the axial streams of Cam (Ribblesdale) and Oughtershaw (Wharfdale) Beck.

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that hillslope instability at the Cam Beck (Ribble) and Oughtershaw Beck interfluve is for the most part very recent, during the last 500 years, which corresponds to the most recent phase identified in other areas, such as the Bowland and Howgill Fells (Chiverrell *et al* 2007a).

References: Chiverrell *et al* 2007a

OxA–16371 90 ±27 BP

$\delta^{13}C$: -27.9‰

Sample: OB 4 at the Swarth Gill confluence, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: as OxA-16600

Objectives: to provide a *terminus post quem* for increased gullying and alluvial fan progradation.

Calibrated date: 1σ: cal AD 1690–1955*
2σ: cal AD 1680–1955*

Final comment: see OxA-16600

Ribble Valley: the Calder, terrace 1, core 5, Lancashire

Location: SD 728367
Lat. 53.49.32 N; Long. 02.24.48 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the Lancashire Calder rising in the Pennines is one of the three substantial headwater tributaries of the Ribble. The Calder meander loop at Whalley provided the opportunity to secure data on the rates of change within terraces 1 to 4. Core CAL/C5 from terrace 1 allowed the submission of a series of samples from a sequence through a palaeochannel. The sediments underlying terrace T1 (core CAL/C5) are a basal grey minerogenic clay rhythmite, interpreted as a deglaciation-stage glaciolacustrine deltaic bottom-set style deposit. The rhythmite gives way to a peaty alluvium, the upper part of which contains two discrete layers formed of sandy flood beds, in turn buried by bioturbated laminated silty clays, indicative of low-energy flood deposition.

Objectives: to provide a chronological framework for reconstruction of the fluvial history of the lower Calder.

Final comment: R Chiverell and P Marshall (12 November 2007), a late Devensian surface which aggraded to 7m above modern base level after incision into glaciolacustrine bottom-set deposits. The fluvial setting is likely to have been a cold-stage braided system. Post-T1 incision is estimated to have occurred in *8580–3720 cal BC* (*Event 1/2*; fig 94; Chiverrell *et al* 2007b). Terrace T1 appears to be a correlative of lower Ribble Terrace T1.

References: Chiverrell *et al* 2007b

OxA–15709 9955 ±50 BP

$\delta^{13}C$: -26.8‰

Sample: CAL/C5 25.0–2.45m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood (unidentified twigs) (E Huckerby and R Chiverrell 2006)

Initial comment: the material is organic detritus from peaty sand-rich alluvium overlying a 0.75m thick peat deposit. The sequence was sampled from a core (CAL/C5) on Calder Terrace 1. The surface geomorphology suggests the setting is a palaeochannel. The sedimentary sequence comprises a thick sequence of glacio-lacustrine rhythmites, which are buried by 0.75m of woody peat. Overlying the peat are 0.45m of sandy organic-rich flood laminations, which in turn are buried by finer grained overbank-style flood-laminated alluvium. The sample is taken from the basal peat deposits at 2.50–2.45m. The peat deposit overlies a thick sequence of glacio-lacustrine rhythmites and is buried by a further 1.75m of flood-laminated sands, silts, and clays. Downwards root penetration is possibly within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acids. At the time of sampling the water table was at 0.5m beneath the surface, and based on iron and manganese discolouration probable oscillates around 0.5–0.75m below the surface. Materials are locally derived and equivalent in age to the deposit.

Objectives: the datable material was sampled from core CAL/C5 of Clader Terrace 1. The materials are peat deposit that underlies a sequence of flood-laminated sands. The samples are *in situ* organic materials from the base of the peat sequence. The age estimate is a range-finder date to secure the age of the base of the peat sequence.

Calibrated date: 1σ: 9460–9310 cal BC
2σ: 9740–9290 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides an estimate for the date of the base of the peat sequence.

Laboratory comment: English Heritage (2007), the three measurements from this sample (OxA-15709, OxA-15710, and SUERC-10645) are statistically consistent (T'=0.6; ν=2; T'(5%)=6.0; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15710 9935 ±50 BP

$\delta^{13}C$: -27.1‰

Sample: CAL/C5 2.50–2.45m, submitted in February 2006 by R Chiverrell

Material: waterlogged wood (unidentified twigs)
(E Huckerby and R Chiverrell 2006)

Initial comment: replicate of OxA-15709

Objectives: as OxA-15709

Calibrated date: 1σ: 9450–9300 cal BC
2σ: 9660–9280 cal BC

Final comment: see OxA-15709

Laboratory comment: see OxA-15709

OxA–15749 9450 ±45 BP

$\delta^{13}C$: -26.9‰

Sample: CAL/C5 1.7–1.75m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Salix/Populus* sp., single fragment (R Gale 2006)

Initial comment: the material is organic detritus from peaty sand-rich alluvium overlying a 0.75m thick peat deposit. The sequence was sampled from a core (CAL/C5) on Calder Terrace 1. The surface geomorphology suggests the setting is a palaeochannel. The sedimentary sequence comprises a thick sequence of glacio-lacustrine rhythmites, which are buried by 0.75m of woody peat. Overlying the peat are 0.45m of sandy organic-rich flood-laminations, which in turn are buried by finer grained overbank style flood laminated alluvium. The sample is taken from the uppermost peat deposits at 1.75–1.70m, which was sealed beneath 0.45m of flood laminated sands. The peat deposit overlies a thick sequence of glacio-lacustrine rhythmites and is buried by a further 1.75m of flood-laminated sands, silts and clays. Downwards root penetration is possible within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acids. At the time of sampling the water table was at 0.50m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.50–0.75m below the surface. The sample is *in situ*, locally derived and equivalent in age to the deposit.

Objectives: the datable material was sampled from core CAL/C5 of Calder Terrace 1. The materials are peat deposit that underlies a sequence of flood-laminated sands. The samples are *in situ* organic materials from the top of the peat sequence. The age estimate is a range-finder date to secure the age of the top of the peat sequence.

Calibrated date: 1σ: 8800–8650 cal BC
2σ: 9110–8620 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the top of the peat sequence.

OxA–15883 7685 ±50 BP

$\delta^{13}C$: -28.2‰

Sample: CAL/C5 1.12–1.17m, submitted in February 2006 by R Chiverrell

Material: sediment (humin fraction, bulk sample)
(E Huckerby 2006)

Initial comment: the materials are a thin palaeosoil from sand-rich alluvium overlying a 0.75m thick peat deposit. The sequence was sampled from a core (CAL/C5) on Calder Terrace 1. The surface geomorphology suggests the setting is a palaeochannel. The sedimentary sequence comprises a thick sequence of glacio-lacustrine rhythmites, which are buried by 0.75m of woody peat. Overlying the peat are 0.45m of sandy organic-rich flood laminations, which in turn are buried by finer overbank-style flood-laminated alluvium. The sample is taken from a soil overlying the uppermost sand flood layer at 1.12–1.17m. The materials are *in situ*, and so are locally derived and are likely to be similar in age to the flood deposit. The overlying fine-grained flood laminations are intact, which denotes little or no downwards penetration of organic materials. The datable material comes from the uppermost flood layer of a sequence of floods, which is buried by 0.75m of flood laminated silts and clays. At the time of sampling the water table was 0.50m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.50–0.75m below the surface.

Objectives: at this location the setting, a river terrace, and the sediments reveal a sequence of flooding probably related to active channel flow. The sequence of flood laminations overlies a peat deposit, which reflects an episode of stability. The dated horizon provides the latest age estimate for active channel sediment transport to affect this fluvial surface. The samples are a buried soil immediately overlying the uppermost sandy flood layers of the first terrace of the Calder river terrace sequence at Whalley, prior to the switch to finer-grained alluvial overbank-style flooding. The radiocarbon date will secure flood activity immediately prior to terrace abandonment and so provides a latest age estimate for terrace abandonment.

Calibrated date: 1σ: 6600–6460 cal BC
2σ: 6640–6440 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result, from the upper dated horizon from the base of the silty-clays, provides a constraint for the end of peat accumulation and date for the the last flood inundation of *c* 6640–6440 cal BC (Reimer *et al* 2004).

Laboratory comment: English Heritage (2007), the two measurements (OxA-15883 and OxA-15884) are not statistically consistent (T′=33.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15884 7315 ±40 BP

$\delta^{13}C$: -27.5‰

Sample: CAL/C5 1.12–1.17m, submitted in February 2006 by R Chiverrell

Material: sediment (humic acid fraction, bulk sample) (E Huckerby 2006)

Initial comment: as OxA-15883

Objectives: as OxA-15883

Calibrated date: *1σ*: 6230–6090 cal BC
2σ: 6250–6060 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result, from the upper dated horizon from the base of the silty-clays provides a constraint for the end of peat accumulation and adate for the the last flood inundation of *c* 6250–6060 cal BC (Reimer *et al* 2004).

Laboratory comment: see OxA-15883

References: Reimer *et al* 2004

SUERC–10644 9365 ±40 BP

$\delta^{13}C$: -26.9‰

Sample: CAL/C5 1.61–1.56m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (bud scales) (E Huckerby 2006)

Initial comment: the materials are organic detritus from peaty sand-rich alluvium overlying a 0.75m thick peat deposit. The sequence was sampled from a core (CAL/C5) on Calder Terrace 1. The surface geomorphology suggests the setting is a palaeochannel. The sedimentary sequence comprises a thick sequence of glacio-lacustrine rhythmites, which are buried by 0.75m of woody peat. Overlying the peat are 0.35m of sandy organic-rich flood laminations, which in turn are buried by finer grained overbank style flood laminated alluvium. The sample is taken from the basal sand flood layer at 1.61–1.56m above the peat deposit. The materials are *in situ*, and so are locally derived and are likely to be similar in age to the flood deposit. The overlying flood laminations are intact, which denotes little or no downwards penetration of organic materials. At the time of sampling the water table was at 0.5m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: at this location, the setting, a river terrace (Calder 1), and the sediments reveal a sequence of flooding probably related to active channel flow. The sequence of flood laminations overlies a peat deposit which reflects an episode of stability. The dated horizon provides an early age estimate for active channel sediment transport to affect this fluvial surface. The samples are organic detritus from within the basal flood layers (core CAL/C5) on terrace 1 of the Calder river terrace sequence at Whalley, prior to the switch to finer-grained alluvial overbank-style flooding. The radiocarbon date will secure flood activity immediately prior to terrace abandonment and so provides a minimum age estimate for terrace abandonment.

Calibrated date: *1σ*: 8710–8570 cal BC
2σ: 8750–8540 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for flood activity immediately prior to terrace abandonment and so also gives a minimum age estimate for terrace abandonment.

Laboratory comment: English Heritage, a second sample from this level failed to produce a sufficient carbon for dating.

SUERC–10645 9985 ±40 BP

$\delta^{13}C$: -27.0‰

Sample: CAL/C5 2.5–2.45m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (seeds): *Potamogeton* sp.; *Carex* sp.; *Eleocharis* sp.; *Ranunculus flammula* (E Huckerby and R Chiverrell 2006)

Initial comment: as OxA-15709

Objectives: as OxA-15709

Calibrated date: *1σ*: 9660–9360 cal BC
2σ: 9750–9310 cal BC

Final comment: see OxA-15709

Laboratory comment: see OxA-15709

Ribble Valley: the Calder, terrace 2, core 6, Lancashire

Location: SD 728366
Lat. 53.49.29 N; Long. 02.24.48 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: a back-terrace palaeochannel on terrace T2, and probably one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation.

Objectives: to provide a chronological framework for reconstruction of the fluvial history of the lower Calder.

Final comment: R Chiverrell and P Marshall (12 November 2007), a cycle of cut and fill (depth *c* 3m) is responsible for the formation of Terrace T2 (height relative to the current river *c* 5.5m). Its development involved meandering channels, and post-T2 incision is estimated at *c 3660–1030 cal BC* (*Event 2/3*; fig 94; Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b

OxA–15745 4965 ±34 BP

$\delta^{13}C$: -27.8‰

Sample: CAL/C6 1.03–1.09m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (alder catkins/seeds) (E Huckerby 2006)

Initial comment: the materials are organic detritus from an organic-rich silty clay palaeosoil towards the top of a sequence of laminated coarse to medium sand flood deposits. The sequence was sampled from a core (CAL/C6) located in the centre of a palaeochannel with surface expression on Calder Terrace 2. The surface geomorphology reveals the setting is a palaeochannel. The sample is taken from towards the top of the palaeochannel fill, targeting a flood layer at 1.03–1.09m. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived, and are likely to be similar in age to the flood deposit. The dateable material comes from a sandy flood layer buried by further finer-grained flood laminations. Downwards root penetration is unlikely given the deposits are sealed beneath intact flood laminations. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: at this location the setting is a back-terrace palaeochannel, probably one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The samples are organic detritus from towards the top of the flood sequence of a palaeochannel fill (core CAL/C6) on the second terrace of the Calder river terrace sequence at Whalley. The underlying deposits are a series of flood-laminated alternations from coarse to medium grain-sized sands, and so the radiocarbon date will secure the last major flood to affect this former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: 1σ: 3790–3700 cal BC
2σ: 3900–3650 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), given the nature of the underlying deposits, a series of flood-laminated alternations from coarse to medium grain-sized sands, the radiocarbon result secures the date of the last major flood to affect this former channel and also provides a latest age estimate for terrace abandonment.

Laboratory comment: English Heritage (2007), the two measurements from this level (OxA-15745 and SUERC-10646) are statistically consistent (T′=0.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15746 4909 ±35 BP

$\delta^{13}C$: -26.0‰

Sample: CAL/C6 3.12–3.17m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (alder catkins) (E Huckerby 2006)

Initial comment: the materials are organic detritus from the base of a sequence of coarse sand flood deposits. The sequence was sampled from a core (CAL/C6) located in the centre of a palaeochannel with surface expression on Calder Terrace 2. The surface geomorphology reveals the setting is a palaeochannel. The sample is taken from the base of the palaeochannel fill, targeting the basal sand flood layer at 3.12–3.17m. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived, and are likely to be similar in age to the flood deposit. The flood laminations are intact, which denotes little or no downwards penetration of organic materials. The dateable material comes from the basal flood layer which overlies (erosive contact) a thick sequence of glaciolacustrine rhythmites. At the time of sampling the water table was at 0.4m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: at this location the setting is a back-terrace palaeochannel, and probably one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The samples are organic detritus from within the basal flood layers (core CAL/C6) of a palaeochannel fill on the terrace 2 of the Calder river terrace sequence at Whalley. The radiocarbon date will secure channel activity immediately prior to abandonment and provide an age estimate for terrace abandonment.

Calibrated date: 1σ: 3710–3650 cal BC
2σ: 3770–3630 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for channel activity immediately prior to its abandonment and a minimum age estimate for terrace abandonment.

Laboratory comment: English Heritage (2007), the two measurements (OxA-15746 and SUERC-10647) from organic detritus within the basal flood layer that overlies (with an erosive contact) a thick sequence of glaciolacustrine rhythmites are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1;Ward and Wilson 1978) and could therefore be of the same age.

References: Ward and Wilson 1978

SUERC–10646 4925 ±35 BP

$\delta^{13}C$: -29.4‰

Sample: CAL/C6 1.03–1.09m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Corylus* sp., twigs (E Huckerby 2006)

Initial comment: as OxA-15745

Objectives: as OxA-15745

Calibrated date: 1σ: 3710–3650 cal BC
2σ: 3790–3640 cal BC

Final comment: see OxA-15745

Laboratory comment: see OxA-15745

SUERC–10647 4900 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: CAL/C6 3.12–3.07m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (hazelnut shells) (E Huckerby 2006)

Initial comment: as OxA-15746

Objectives: as OxA-15746

Calibrated date: 1σ: 3710–3640 cal BC
2σ: 3760–3630 cal BC

Final comment: see OxA-15746

Laboratory comment: see OxA-15746

Ribble Valley: the Calder, terrace 3, core 4, Lancashire

Location: SD 725360
Lat. 53.49.10 N; Long. 02.25.04 W

Project manager: R Chiverrell (Department of Geography, University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: a back-terrace palaeochannel, which was probably one of the earliest to be both abandoned and affected by flood inundation on terrace T3. Core CAL/C4 shows a transition from basal cohesive glacial diamict to coarse channel gravel, and an upward transition to laminated clayey silts, reflecting a change from in-channel to backwater-style sedimentation.

Objectives: to provide a chronological framework for reconstruction of the fluvial history of the lower Calder.

Final comment: R Chiverrell and P Marshall (12 November 2007), a further cut and fill (depth *c* 2.5m) cycle led to the formation of Terrace T3 (height relative to the current river *c* 4m), with the deposits composed of fine-grained alluvium. The terrace surface displays meandering channels, fills having been dated between *970 cal BC* and *cal AD 490* (*Event 3/4;* Chiverrell *et al* 2007b, fig 7), with flood-generated sedimentation continuing in Terrace T3 palaeochannels until at least cal AD 650–890.

References: Chiverrell *et al* 2007b

OxA–15744 1237 ±27 BP

$\delta^{13}C$: -28.9‰

Sample: CAL/C4 0.93–0.80m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Salix* sp., single fragment (E Huckerby 2006)

Initial comment: the dated material is organic detritus from an organic-rich silty clay palaeosoil towards the top of a sequence of laminated coarse sand to silt and clay flood deposits. The sequence was sampled from a core (CAL/C4) located in the centre of a palaeochannel with surface expression on Calder terrace 3. The surface geomorphology reveals the setting is a palaeochannel. The sample is taken from towards the top of the palaeochannel fill, targeting a flood layer at 0.92m. The materials are *in situ* soil and plant matter, probably locally derived, and are likely to be similar in age to the flood deposit. The flood-laminations are intact, which denotes little or no downwards penetration of organic materials, and are buried and sealed towards the top of a 2m thick sequence of flood-laminated sand, silt, and clay. The datable material come from a palaeosoil buried by further fine-grained flood-laminations. Downwards root penetration is unlikely, given the deposits are sealed beneath intact flood laminations. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface. Neither sample is definitively *in situ*, but organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: at this location the setting is a back-terrace palaeochannel, probably one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The samples are organic detritus from towards the top of the flood sequence of a palaeochannel fill (core CAL/C4) on terrace 3 of the Calder river terrace sequence at Whalley. The underlying deposits are a series of flood-laminated alternations between flood sands and slack water silts and clays, and so the radiocarbon date will secure the last major flood to affect this former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 710–810
2σ: cal AD 680–890

Final comment: R Chiverrell and P Marshall (12 November 2007), as the underlying deposits are a series of flood-laminated alternations between flood sands and slack water silts and clays, the radiocarbon date allows an estimate of the age of the last major flood to affect this former channel and provides a latest age estimate for terrace abandonment.

Laboratory comment: English Heritage (2007), the two measurements (SUERC-10664 and OxA-15744) from (0.93-0.8m) near the top of the flood sequence of the palaeochannel fill are statistically consistent (T'=3.1; T'(5%)=3.8; ν=1;Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10664 1315 ±35 BP

$\delta^{13}C$: -26.8‰

Sample: CAL/C4 0.93–0.80m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-15744

Objectives: as OxA-15744

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: see OxA-15744

Laboratory comment: see OxA-15744

SUERC–10665 2840 ±35 BP

$\delta^{13}C$: -27.0‰

Sample: CAL/C4 2.33–2.45m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (bark, single fragment) (R Gale 2006)

Initial comment: the material is organic detritus from the base of a sequence of coarse sand to gravel flood deposits. The sequence was sampled from a core (CAL/C4) located in the centre of a palaeochannel with surface expression on the third Calder terrace. The surface geomorphology reveals the setting is a palaeochannel. The sample is taken from the base of the palaeochannel fill targeting the basal gravels at 2.45–2.33m. The material is detrital rather than *in situ*, but it comprises soft plant matter, probably locally derived and is likely to be similar in age to the flood deposit. The flood laminations are intact, which denotes little or no downwards penetration of organic materials. The datable material comes from the basal flood layer, and is buried by a further 2m of flood-laminated sands, silts, and clays. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to pre-date the flood by more than 10–20 years.

Objectives: at this location the setting is a back-terrace palaeochannel, and probably one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The samples are organic detritus from within the basal flood layers (core CAL/C4) of a palaeochannel fill on the third terrace of the Calder river terrace sequence at Whalley. The samples are organic materials from the base of the flood sequence. The radiocarbon date will secure channel activity immediately prior to abandonment and provide an age estimate for terrace abandonment.

Calibrated date: 1σ: 1050–930 cal BC
2σ: 1130–900 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), as the sample was organic detritus from within the basal flood layers of a palaeochannel fill on terrace 3 of the Calder river terrace sequence, the radiocarbon result gives a date that secures channel activity immediately prior to abandonment and provides an age estimate for terrace abandonment.

Ribble Valley: the Calder, terrace 4, bank and peat, Lancashire

Location: SD 721362
Lat. 53.49.16 N; Long. 02.25.26 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: at river bank exposures of terrace T4, two sites were sampled from 25–50m of laterally continuous river bank exposure. The base of the sequence consists of cohesive glacial diamict, giving way to *c* 0.5m of peaty alluvium, overlain by *c* 1m of organic-rich, sandy flood layers, and capped by a unit of finer-grained, clay/silt flood laminations. The two sampled sections recorded slightly different depositional sequences; at CAL/BS there was an organic-rich flood laminated alluvium, while at CAL/PEAT, the equivalent unit, there was a floodplain/backchannel peat deposit.

Objectives: to provide a chronological framework for reconstructing the fluvial and environmental history of the lower Calder.

Final comment: R Chiverrell and P Marshall (12 November 2007), a further cut and fill (depth *c* 2m) cycle led to the formation of Terrace T4 (height relative to the current river *c* 2.5m), with deposits composed of fine-grained alluvium. The terrace displays meandering palaeochannels, fills spanning *c* cal AD 430–1270. The chronology reflects a pre-T4 incision before *c* cal AD 430–620, with flood aggradation until at least cal AD 1150–1270, and probable subsequent incision and abandonment of Terrace T4 after cal AD 1460–1610.

References: Chiverrell *et al* 2007b

OxA–15684 1398 ±27 BP

$\delta^{13}C$: -30.5‰

Sample: CALD peat section 00–20mm (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood (twig) (E Huckerby 2006)

Initial comment: the peat sequence was sampled from cut exposures in the banks of the Calder near Whalley. The bank section peat profile targeted a 0.26m thick peat than overlies bar form gravels. This sample is taken from the base (00–20mm) of this 0.26m thick peat sequence overlying coarse river gravels, which in turn are buried by a sequence of flood silts and clays. The peat has formed over the bar gravels, probably encouraged by the saturated conditions, and is composed of *in situ* plant remains and so the organic materials are *in situ* rather than detrital. The peat deposit overlies fluvial gravels and is buried by a further 1m of flood-laminated silts and clays. Downwards root penetration is possible within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acids.

Objectives: the datable material was sampled from exposures in the banks of the Calder near Whalley. The peat bed was exposed over some 50m and graded from a full back-channel setting, where inorganic floods were interbedded with the peat, to a bar-top peat-bed rich with wood remains. This sequence is sampled away from the channel in a bar top dry land environment. The samples are *in situ* organic materials from the base of the peat sequence. The age estimate is a range-finder date to secure the age of the base of the peat sequence, which is being subjected to pollen analysis.

Calibrated date: 1σ: cal AD 640–660
2σ: cal AD 600–670

Final comment: R Chiverrell and P Marshall (12 November 2007), the measurement dates the start of peat accumulation to the early medieval period as had been expected.

Laboratory comment: English Heritage (2007), the two results on samples (OxA-16356 and OxA-15684) are statistically consistent (T'=0.0; $T'(5\%)$=3.8; ν=1; Ward and Wilson 1978). A second sample from 00–20mm failed to produce sufficient carbon for dating.

References: Ward and Wilson 1978

OxA–15688 1506 ±27 BP

$\delta^{13}C$: -27.9‰

Sample: CALD T4 bank section 1.73–1.84m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (E Huckerby 2006)

Initial comment: the exposed sediment sequence Calder T4 Bank Section was sampled using stream-cut exposures in the banks of the Calder near Whalley. The Bank Section profile shows a basal diamict (a stiff clay matric supporting angular, shattered and lithologically diverse rock fragments) overlain by 0.20–0.25m of coarse fluvial gravels, probably lain down in a channel setting. These are overlain by 1m of laminated organic-rich layers of sand, silt, and clay. The sequence represents a sequence of floods inundating an abandoned channel. The sample is taken from the base of the palaeochannel fill targeting the basal flood layer at 1.84–1.73m, directly overlying coarse river gravels. The flood layers comprise substantial quantities of plant remains, some of which are *in situ*. The flood laminations are intact, which denotes little or no downwards penetration of organic materials. Neither of the samples are *in situ*, but they are locally derived and are equivalent in age to the flood deposit. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: the dateable material was sampled from bank exposures. An organic bed is exposed over some 50m of the west bank of the Calder near Whalley in the deposits of Calder Terrace 4. The bed grades from a palaeochannel fill with inorganic floods interbedded with organic-rich layers to a bar-top peat-bed rich with wood remains. This sequence is sampled from the thicker channel sequence. The samples are *in situ* organic materials from the base of the flood sequence overlying channel gravels. The radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 540–600
2σ: cal AD 460–620

Final comment: R Chiverrell and P Marshall (12 November 2007), the radiocarbon result provides a date for the onset of channel abandonment and allows an age estimate for terrace abandonment to be postulated.

Laboratory comment: English Heritage (2007), two samples were submitted from the basal flood layer overlying channel gravels; the results (SUERC-10663 and OxA-15688) are statistically consistent (T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15711 1283 ±30 BP

δ¹³C: -28.2‰

Sample: CALD peat section 0.24–0.26m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., twig (E Huckerby 2006)

Initial comment: as SUERC-10643

Objectives: as SUERC-10643

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 660–780

Final comment: R Chiverrell and P Marshall (12 November 2007), although the two measurements from the top of the peat are statistically consistent they are not in agreement with the results from the base of the peat sequence.

Laboratory comment: English Heritage (2007), the two samples from the top of the peat (OxA-15711 and SUERC-10643) are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16356 1399 ±28 BP

δ¹³C: -28.0‰

Sample: CALD peat section 00–40mm, submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (leaf fragments) (R Chiverrell 2006)

Initial comment: peat sampled from cut exposures in the banks of the Calder near Whalley. In the bank section the peat profile targeted a 0.26m thick peat that overlies bar-form gravels. This sample is taken from the base (00–40mm) of this 0.26m thick peat sequence, overlying coarse river gravels, which in turn are buried by a sequence of flood silts and clays. The peat has formed over the bar gravels, probably encouraged by the saturated conditions, and is composed of *in situ* plant remains, and so the organic materials are *in situ* rather than detrital. The peat deposit overlies fluvial gravels and is buried by a further 1m of flood-laminated silts and clays. Downwards root penetration is possible within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acid.

Objectives: the datable material was sampled from exposures. The peat bed was exposed over some 50m and graded from a full back-channel setting where inorganic floods were interbedded with the peat to a bar-top peat-bed rich with wood remains. This sequence is sampled away from the channel in a bar top dry-land environment. The samples are *in situ* organic materials from the base of the peat sequence. The age estimate is a range-finder date to secure the age of the base of the peat sequence, which is being subjected to pollen analysis.

Calibrated date: *1σ:* cal AD 630–660
2σ: cal AD 600–670

Final comment: see OxA-15684

Laboratory comment: see OxA-15684

SUERC–10643 1315 ±35 BP

δ¹³C: -28.6‰

Sample: CALD peat section 0.24–0.26m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (leaf fragments) (E Huckerby 2006)

Initial comment: the Calder Bank peat section was sampled from cut exposures in the banks of the Calder near Whalley. This profile targeted a 0.26m thick peat that overlies bar-form gravels. This sample is taken from the top (0.24–0.26m) of this 0.26m thick peat sequence, overlying coarse river gravels, which in turn are buried by a sequence of flood silts and clays. The peat has formed over the bar gravels, probably encouraged by the saturated conditions, and is composed of *in situ* plant remains and so the organic materials are *in situ* rather than detrital. Downwards root penetration is possible within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acid.

Objectives: the datable material was sampled from exposures. The peat bed was exposed over some 50m and graded from a full back-channel setting where inorganic floods were interbedded with the peat to a bar-top peat bed rich with wood remains. This sequence is sampled away from the channel in a bar-top dryland environment. The samples are *in situ* organic materials from the top of the peat sequence. The age estimate is a range-finder date to secure the age of the top of the peat sequence, which is being subjected to pollen analysis.

Calibrated date: *1σ*: cal AD 660–770
2σ: cal AD 650–780

Final comment: R Chiverrell and P Marshall (12 November 2007), although the two measurements from the top of the peat are statistically consistent, they are not in agreement with the results from the base of the peat sequence.

Laboratory comment: see OxA-15711

SUERC–10662 830 ±35 BP

δ¹³C: -26.6‰

Sample: CALD T4 bank section 0.90–1m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Corylus/Alnus* sp., single fragment (R Gale 2006)

Initial comment: the exposed sediment sequence Calder T4 Bank section was sampled using stream-cut exposures in the banks of the Calder near Whalley. The profile shows a basal diamict (a stiff matrix supporting angular, shattered, and lithologically diverse rock fragments) overlain by 0.2–0.25m of coarse fluvial gravels, probably lain down in a channel setting. These are overlain by 1m of laminated organic-rich layers of sand, silt, and clay. The sequence represents a sequence of floods inundating an abandoned channel. The sample is taken from towards the top of the palaeochannel fill, targeting a flood layer at 1–0.9m. The flood layers comprise substantial quantities of plant remains, some of which are *in situ*. The flood laminations are intact, which denotes little or no downwards penetration of organic materials. None of the samples are *in situ*, but they are locally derived and are equivalent in age to the flood deposit. Wood and seed materials in flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: the datable material was sampled from bank exposures. An organic bed is exposed over some 50m of the west bank of the Calder near Whalley in the deposits of Calder Terrace 4. The bed grades from a palaeochannel fill with inorganic floods interbedded with organic-rich layers to a bar-top peat-bed rich with wood remains. This sequence is sampled from the thicker channel sequence. The samples are *in situ* organic materials from towards the top of the flood sequence. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays, and so the radiocarbon date will secure the last major flood to affect this former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: *1σ*: cal AD 1170–1260
2σ: cal AD 1150–1270

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the last major flood to affect this former channel and also gives a minimum age estimate for terrace abandonment.

SUERC–10663 1520 ±35 BP

δ¹³C: -28.1‰

Sample: CALD T4 bank section 1.73–1.84m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (E Huckerby 2006)

Initial comment: as OxA-15688

Objectives: as OxA-15688

Calibrated date: *1σ*: cal AD 530–600
2σ: cal AD 430–620

Final comment: see OxA-15688

Laboratory comment: see OxA-15688

Ribble Valley: the Hodder river terraces, Burholme Farm, terrace 3, core 3/2, Lancashire

Location: SD 659479
Lat. 53.55.33 N; Long. 02.31.10 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the Hodder river system in the Bowland Fells provides a well-defined record of geomorphic activity during the Holocene. A core was obtained from Terrace T3, which targeted a palaeochannel 1–2km downstream from the Harvey and Renwick (1987) site. They identified their palaeochannel as Terrace T3, but in the light of the present work this was revised to a palaeochannel associated with Terrace T2. Core BUR 3/2, taken from a palaeochannel located on Terrace T3, consists of basal channel gravels and a fining-up sequence of fluvial flood deposits, and *c* 1m thick accumulation of well-humified peat. Three samples were submitted from core BUR 3/2, a back-terrace palaeochannel that was thought to be the earliest that was both abandoned as the active channel and ceased being affected by flood inundation.

Objectives: to construct a chronological framework for the glacial, fluvial, and hillslope geomorphology, and to provide preliminary chronological control for potential palaeoecological sites within the Ribble catchment.

Final comment: R Chiverrell and P Marshall (12 November 2007), the dates obtained for Terrace T3 are difficult to interpret. The lack of agreement between the radiocarbon age of samples and their stratigraphic position suggests that some of the dated material is either too old or too young for its context (ie residual or intrusive). The monocotyledonous leaves from the base of the peat (OxA-16370) are probably the most taphonomically secure of the three samples as they probably represent *in situ* plant material. The onset of channel abandonment of Terrace T3 is therefore estimated to have occurred in *cal AD 250–1150 (Event 3/4; Ffg 102;* Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b
Harvey and Renwick 1987

OxA–16349 1255 ±28 BP

$\delta^{13}C$: -27.5‰

Sample: Bur 3/2 top flood and top peat, 1.02–1.07m, submitted in July 2006 by R Chiverrell

Material: waterlogged wood (unidentified roundwood fragments) (R Chiverrell 2006)

Initial comment: the materials are organic detritus from within a sequence of flood-laminated silts and clays. The sequence of flood-laminations was sampled from a core located in the centre of a palaeochannel with surface expression from Hodder terrace 3 core 3/2. The organic materials were incorporated within the uppermost sequence of fine-grained flood-laminations and overly 1m of peat deposits. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and are likely to be similar in age to the flood deposit. The deposit overlies channel gravels and is buried by 0.75m of flood-laminated silts and clays, and surface soil. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.25–0.5m below the surface. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: at this location, the setting is a back-terrace palaeochannel, and probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The samples are organic detritus from within the basal flood layer of a palaeochannel fill on terrace 3 of the Hodder river terrace sequence at Burholme Bridge. The dateable material was sampled from core Bur T3 C2. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 680–780
2σ: cal AD 670–870

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the top of the peat layer and the uppermost flood-laminated silts and clays.

OxA–16350 1395 ±28 BP

$\delta^{13}C$: -27.5‰

Sample: Bur 3/2 basal flood, 2.62–2.66m, submitted in July 2006 by R Chiverrell

Material: waterlogged wood (unidentified roundwood fragments) (R Chiverrell 2006)

Initial comment: the sample is organic detritus from within a sequence of flood-laminated silts and clays. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from Hodder terrace 3 core 3/2. The organic materials were incorporated within the uppermost sequence of fine-grained flood laminations and overlay 1m of peat deposits. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and are likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.25–0.5m below the surface.

Objectives: as OxA-16349

Calibrated date: *1σ:* cal AD 640–660
2σ: cal AD 600–670

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for for the top of the peat layer and the uppermost flood-laminated silts and clays.

OxA–16370 1779 ±30 BP

$\delta^{13}C$: -28.2‰

Sample: Bur 3/2 base peat 2.04–1.99m, submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (monocot leaves) (R Chiverrell 2006)

Initial comment: the material is from a 1m thick *in situ* peat deposit above a sequence of coarse to medium sand flood laminations, buried by fine-grained flood deposits. The materials were sampled from a core sequence located in the centre of a palaeochannel with surface expression from Hodder terrace 2 core 3/2. The organic materials were *in situ* peat deposits, providing a rare floodplain locality for palaeoenvironmental investigation, and so were sampled at 50mm intervals for pollen analysis. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.25–0.5m below the surface. The materials are *in situ* plant remains derived from a peat deposit and are likely to be contemporaneous with formation of the peat.

Objectives: at this location the setting is a back-terrace palaeochannel, and probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The sample was from the base of a 1m thick peat in a palaeochannel fill on the third terrace of the Hodder river terrace sequence at Burholme Bridge. The dateable material was sampled from core Bur T3 C2. The underlying deposits are channel gravels, and so the radiocarbon date will constrain a rare floodplain locality for palaeoenvironmental investigation in the Hodder and has been sampled at 50mm intervals for pollen analysis in subsequent work.

Calibrated date: *1σ:* cal AD 220–320
2σ: cal AD 130–340

Final comment: R Chiverrell and P Marshall (12 November 2007), the lack of agreement between radiocarbon dates and their stratigraphic positions suggests that some of the dated material has been reworked. The monocot leaves from the base of the peat which formed this sample are probably the most taphonomically secure as they probably represent *in situ* plant material. They thus provide a *terminus ante quem* for the onset of channel abandonement on terrace 3 of cal AD 130–340 (Reimer *et al* 2004).

References: Reimer *et al* 2004

Ribble Valley: the Hodder river terraces, Burholme Farm, terrace 4, core 4/1, Lancashire

Location: SD 659483
Lat. 53.55.46 N; Long. 02.31.10 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the Hodder river system in the Bowland Fells provides a well-defined record of geomorphic activity during the Holocene. The only datable organic materials, other than those from core Bur 3/2, were obtained from terrace T4 and were from the base of a rather thin (ie < 2m) fining-up palaeochannel fill. The core on terrace segment T4(c), a large palaeomeander, yielded sufficient material for radiocarbon dating.

Objectives: to construct a chronological framework for the glacial, fluvial, and hillslope geomorphology, and to provide preliminary chronological control for potential palaeoecological sites within the Ribble catchment.

Final comment: R Chiverrell and P Marshall (12 November 2007), Harvey and Renwick's (1987) two-stage (low terrace and floodplain) sequence has also been revised into four phases, of which the earliest yielded no datable material. Phases 4b and 4c form an extensive terrace surface, on which a large palaeomeander loop was either the latest phase of T4b or a discrete terrace in its own right. The result provides a date for this palaeochannel fill and secures the onset of channel abandonment at Terrace T4b of cal AD 1030–1220 (Reimer *et al* 2004).

References: Harvey and Renwick 1987
Reimer *et al* 2004

OxA–16369 888 ±29 BP

$\delta^{13}C$: -28.3‰

Sample: Bur 4/1 basal flood, 0.79–0.75m, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (R Chiverrell 2006)

Initial comment: the materials are organic detritus from within a sequence of flood-laminated silts and clays. The sequence of flood laminations was sampled from a core sequence located in the centre of a palaeochannel with surface laminations from Hodder terrace 4 core 4/1. The organic materials were incorporated within the uppermost sequence of fine-grained flood laminations and overlay 1m of peat deposits. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and are likely to be similar in age to the flood deposit. 0.79–0.75m from the surface, buried and sealed within a flood laminated sequence of coarse to medium silt clay. The deposit overlies channel gravels and is buried by 0.75m of flood-laminated silts and clays, and surface soil. There is no evidence for bioturbation or downwards root penetration, because the flood-laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.25–0.5m below the surface. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: as OxA-16349

Calibrated date: *1σ:* cal AD 1050–1210
2σ: cal AD 1030–1220

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for this palaeochannel fill and secures the onset of channel abandonment at Terrace T4b of cal AD 1030–1220 (Reimer *et al* 2004).

References: Reimer *et al* 2004

Ribble Valley: the lower Ribble, lower House Farm, terrace 3, core 2, Lancashire

Location: SD 605327
Lat. 53.47.20 N; Long. 02.35.59 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbaldeston Hall and lower House Farm. At the lower House Farm meander, palaeochannels provided the opportunity to secure data on the rates of change within terraces 3 and 4. This core is from a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation.

Objectives: to secure absolute dates on the rates of change within terrace T3 at lower House Farm.

Final comment: R Chiverrell and P Marshall (12 November 2007), for terrace T3 the radiocarbon dating framework is a little contradictory, but it appears that older channels were being abandoned from 2440–2140 cal BC (OxA-15743; 3814 ±34BP; Reimer *et al* 2004), prior to eventual abandonment by incision in *310 cal BC–cal AD 280 (Event 3/4(1); 95% probability;* fig 82) or *2100-640 cal BC (Event 3/4(2); 95% probability;* fig 82) (Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b
Reimer *et al* 2004

OxA–15687 2232 ±28 BP

$\delta^{13}C$: -27.7‰

Sample: LH T2 C2 2–2.10m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood (alder, single fragment) (E Huckerby 2006)

Initial comment: the material is organic detritus from the base of a sequence of coarse to medium sand flood-laminations, sampled from a core located in the centre of a palaeochannel from lower Ribble terrace 2. The material is detrital rather than *in situ*, but comprises soft plant matter, probably locally derived and likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood-laminations are undisturbed. At the time of sampling the water table was at 0.50m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: at this location, the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the uppermost flood layer of a palaeochannel fill on terrace 3 of the Ribble river terrace sequence at lower House Farm. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays, and so the radiocarbon date will secure the last major flood to affect this former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: *1σ*: 380–200 cal BC
2σ: 390–200 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that the material submitted was reworked and therefore does not secure a date for the last major flood to affect this former channel and thus provide a latest age estimate for terrace abandonment.

Laboratory comment: English Heritage (2007), the two results (OxA-15687 and SUERC-10648) from the base of the sequence of coarse to medium sand flood laminations overlying channel gravels gave statistically inconsistent results (T′=274.8; T′(5%)=3.8; ν=1;Ward and Wilson 1978) and thus this deposits contains material of vastly different ages.

References: Ward and Wilson 1978

OxA–16513 982 ±31 BP

$\delta^{13}C$: -26.6‰

Sample: LH T2 0.90–1m, submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (monocot stems and root) (E Huckerby 2006)

Initial comment: the material is organic detritus from the uppermost level of a sequence of coarse to medium sand flood laminations within the back palaeochannel on terrace 3. The core was taken from the centre of the palaeochannel. The organic materials were incorporated within the uppermost sandy flood lamination, below the switch to silt and clay laminations. The materials are detrital rather than *in situ*. They are probably locally derived and are likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. Organic flood trash of this type is unlikely to predate the flood by more than 10–20 years.

Objectives: as OxA-15687

Calibrated date: *1σ*: cal AD 1020–1120
2σ: cal AD 990–1160

Final comment: R Chiverrell and P Marshall (12 November 2007), as the later result from this horizon, OxA-16513 provides the best estimate for the date of the last major flood to affect this channel and terrace abandonment.

Laboratory comment: English Heritage (2007), the two measurements (OxA-16513 and SUERC-10667) from 0.9-1m within the uppermost sandy flood deposits just below the switch to silt and clay laminations (ie the last major flood event to affect the channel) are statistically inconsistent (T′=777.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10648 1480 ±35 BP

$\delta^{13}C$: -27.7‰

Sample: LH T2 C2 2–2.1m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (root fragment) (E Huckerby 2006)

Initial comment: as OxA-15687

Objectives: as OxA-15687

Calibrated date: *1σ*: cal AD 550–620
2σ: cal AD 530–650

Final comment: R Chiverrell and P Marshall (12 November 2007), as the latest result from this horizon, SUERC-10648 provides the best estimate for the start of coarse to medium sand laminations in this channel.

Laboratory comment: see OxA-15687

SUERC–10667 2280 ±35 BP

$\delta^{13}C$: -28.3‰

Sample: LH T2 C2 0.90–1m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-16513

Objectives: as OxA-16513

Calibrated date: *1σ*: 400–360 cal BC
2σ: 410–200 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests that the material submitted was reworked and therefore does not secure a date for the last major flood to affect this former channel, and only provides a latest age estimate for terrace abandonment.

Laboratory comment: see OxA-16513

Ribble Valley: the lower Ribble, lower House Farm, terrace 3, core 3, Lancashire

Location: SD 605327
Lat. 53.47.20 N; Long. 02.35.59 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbaldeston Hall and lower House Farm. At the lower House Farm meander, palaeochannels provided the opportunity to secure data on the rates of change within terraces 3 and 4. This core is from a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and cease to being affected by flood inundation.

Objectives: to secure absolute dates on the rates of change within terrace T3 at lower House Farm.

Final comment: R Chiverrell and P Marshall (12 November 2007), for terrace T3 the radiocarbon dating framework is a little contradictory, but it appears that older channels were being abandoned from 2440–2140 cal BC (OxA-15743; 3814 ±34BP; (Reimer *et al* 2004), prior to eventual abandonment by incision in *310 cal BC – cal AD 280 (Event 3/4(1); 95% probability;* fig 82) or *2100-640 cal BC (Event 3/4(2); 95% probability;* fig 82) (Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b
Reimer *et al* 2004

OxA–16357 2462 ±31 BP

δ¹³C: -28.1‰

Sample: LH T2 C3 1.34–1.51m, submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossils (unidentified wood, and monocot stem and roots) (E Huckerby 2006)

Initial comment: the material is organic detritus from the uppermost of a sequence of coarse to medium sand flood laminations within the back palaeochannel on terrace 3. The core was taken from the centre of a palaeochannel. The organic materials were incorporated within the uppermost sandy flood lamination below the switch to silt and clay laminations. The materials are detrital rather than *in situ*. They are probably locally derived and are likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.5m beneath the surface and, based on iron and manganese discolouration, probably oscillates around 0.5–0.75m below the surface. Organic flood trash of this type is unlikely to predate the flood by more than 10–20 years.

Objectives: as OxA-16513

Calibrated date: *1σ*: 760–420 cal BC
2σ: 770–400 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides the best estimate for the date of the last major flood to affect this channel and a minimum age for terrace abandonment.

Ribble Valley: the lower Ribble, lower House Farm, terrace 3, core 4, Lancashire

Location: SD 604327
Lat. 53.47.20 N; Long. 02.36.04 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbldeston Hall and lower House Farm. At the lower House Farm, meander palaeochannels provided the opportunity to secure data on the rates of change within terraces 3 and 4. This core is from a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation.

Objectives: to secure absolute dates on the rates of change within terrace T3 and lower House Farm.

Final comment: R Chiverrell and P Marshall (12 November 2007), for terrace T3 the radiocarbon dating framework is a little contradictory, but it appears that older channels were being abandoned from 2440–2140 cal BC (OxA-15743; 3814 ±34BP; Reimer *et al* 2004), prior to eventual abandonment by incision in *310 cal BC–cal AD 280 (Event 3/4(1); 95% probability;* fig 82) or *2100–640 cal BC (Event 3/4(2); 95% probability;* fig 82) (Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b
Reimer *et al* 2004

OxA–15743 3814 ±34 BP

δ¹³C: -25.4‰

Sample: LH T3 C4 2.62–2.61m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood (*Alnus/Betula* sp., single fragment) (E Huckerby 2006)

Initial comment: the sample was organic detritus from a thick sandy gravel flood layer towards the base of a sequence of flood-laminated palaeochannel fill. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from lower Ribble terrace 3. The organic materials were incorporated within a thick sandy gravel flood lamination 0.4m above the underlying channel gravels. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived, and are likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface. The sample was not *in situ*, however it is locally derived and equivalent in age to the flood deposit. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: at this location the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the basal flood layer of a palaeochannel fill on terrace 3 of the Ribble terrace sequence at lower House Farm. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: 1σ: 2300–2200 cal BC
2σ: 2440–2140 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the onset of channel abandonment.

Laboratory comment: English Heritage (2007), from core LH T3 C4 two measurements (OxA-15743 and SUERC-10652) obtained on samples from the organic detritus within a thick sandy gravel floor layer 0.4m above the underlying channel gravels are statistically consistent (T′=3.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–16358 1229 ±29 BP

δ¹³C: -28.5‰

Sample: LH T3 C4 1.70–1.62m, submitted in February 2006 by R Chiverrell

Material: waterlogged wood (unidentified, single fragment) (E Huckerby 2006)

Initial comment: the materials are organic detritus from towards the top of a sequence of coarse to medium sand flood laminations. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from the lower Ribble terrace 3. The organic materials were incorporated within the uppermost sandy flood lamination, below the switch to silt and clay laminations. The materials are detrital rather than *in situ*, and probably locally derived and likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.5m beneath the surface and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface. Organic flood trash of this type is unlikely to predate by more than 10–20 years.

Objectives: at this location the setting is back-terrace palaeochannel, and probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. This sample is organic detritus from within the upper flood layers of a palaeochannel fill on terrace 3 of the Ribble river terrace sequence at lower Farm House. The dateable material was sampled from core LH T3 C4. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays, and so the radiocarbon date will secure the later stages of major flood inundations to affect the former channel and provide a latest age estimate for terrace abandonment. The basal dates of 3814 ±34 BP (2440–2140 cal BC) and 3725 ±35 BP (2280–2020 cal BC) (Reimer *et al* 2004) show the earliest abandonment of this palaeochannel, which appears older than the adjacent T2 C2/C3 palaeochannel on terrace 3 surface.

Calibrated date: 1σ: cal AD 710–860
2σ: cal AD 680–890

Final comment: R Chiverrell and P Marshall (12 November 2007), provides a date for the later stages of a major flood inundation and an estimated minimum age at which terrace 3 was abandoned.

References: Reimer *et al* 2004

OxA–16410 1197 ±30 BP

δ¹³C: -29.0‰

Sample: LH T3 C4 1.61–1.59m, submitted in February 2006 by R Chiverrell

Material: waterlogged wood (unidentified, single fragment) (E Huckerby 2006)

Initial comment: as OxA-16358

Objectives: as OxA-16358

Calibrated date: 1σ: cal AD 770–890
2σ: cal AD 710–940

Final comment: R Chiverrell and P Marshall (12 November 2007), provides a date for the later stages of a major flood inundation and an estimated minimum age at which terrace 3 was abandoned.

SUERC–10652 3725 ±35 BP

δ¹³C: -25.4‰

Sample: LH T3 C4 2.62–2.61m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (*Prunus*?, fruitstone) (E Huckerby 2006)

Initial comment: as OxA-15743

Objectives: as OxA-15743

Calibrated date: 1σ: 2200–2030 cal BC
2σ: 2280–2020 cal BC

Final comment: see OxA-15743

Laboratory comment: see OxA-15743

Ribble Valley: the lower Ribble, lower House Farm, terrace 4, channel 5/6, Lancashire

Location: SD 606331
Lat. 53.47.33 N; Long. 02.35.53 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbaldeston Hall and lower House Farm. At the lower House Farm meander, palaeochannels provided the opportunity to secure data on the rate of change within terraces 3 and 4. The core was taken from a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation.

Objectives: to secure absolute dates on the rates of change within terrace T4 at lower House Farm.

Final comment: R Chiverrell and P Marshall (12 November 2007), following abandonment of terrace 3 by incision in either *310 cal BC–cal AD 280 (Event 3/4(1); 95% probability;* fig 82) or *2100–640 cal BC (Event 3/4(2); 95% probability;* fig 82) (Chiverrell *et al* 2007b), there followed incision and subsequent aggradation, culminating in the formation of terrace T4, which in turn was being abandoned after cal AD 230–390 (OxA-15689; 1739 ±27BP) (Reimer *et al* 2004).

References: Chiverrell *et al* 2007b
Reimer *et al* 2004

OxA–15689 1739 ±27 BP

$\delta^{13}C$: -25.7‰

Sample: LH T4 C5/6 4.43–4.33m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Prunus spinosa*, single fragment (R Gale 2006)

Initial comment: the material is organic detritus from a sandy flood layer towards the base of a sequence of a 4.2m thick flood laminated palaeochannel fill. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from lower Ribble terrace 4. The organic materials were incorporated within a thick sandy gravel flood lamination, 0.25m above the underlying channel gravels. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and likely to be similar in age to the flood deposit.

Objectives: at this location, the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the basal flood layer of a palaeochannel fill in the fourth terrace of the Ribble at lower House Farm. The datable material was sampled from core LH T4 C5/6. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ*: cal AD 240–350
2σ: cal AD 230–390

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the basal flood layer above the underlying channel gravels.

Laboratory comment: English Heritage (2007), the two basal samples from T4 C5/6 (OxA-15689 and SUERC-10666) are statistically consistent ($T'=0.5$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978) and thus provide a date for the basal flood layer above the underlying channel gravels.

References: Ward and Wilson 1978

OxA–15882 8185 ±45 BP

$\delta^{13}C$: -25.1‰

Sample: LH T44 C5/6 0.88–0.93m (A), submitted in February 2006 by R Chiverrell

Material: sediment (humic acid fraction, bulk sample)

Initial comment: the material is organic-rich soil (finer than 200μm fraction) from towards the top of a sequence of coarse to medium sand flood laminations. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from lower Ribble terrace 4. The soil overlies a sandy flood lamination below the switch to silt and clay laminations. The material is an embryonic soil and so is *in situ*, and is likely to be similar in age to the flood deposit.

Objectives: at this location the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the uppermost flood layer of a palaeochannel fill on the terrace 4 of the Ribble terrace sequence at lower House Farm. The datable material was sampled from core LH T4 C5/6. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays and soils, and so the radiocarbon date will secure the last major flood to affect the former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: *1σ*: 7310–7070 cal BC
2σ: 7340–7060 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the date is much too early and the sample has clearly been contaminated.

Laboratory comment: English Heritage (12 November 2007), this measurement is clearly far too early and once again highlights the problematic nature of dating AMS-sized bulk samples. The humin fraction of this sample produced insufficient carbon for dating.

SUERC–10666 1770 ±35 BP

$\delta^{13}C$: -29.8‰

Sample: LH T4 C5/6 4.43–4.33m (B), submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-15689

Objectives: as OxA-15689

Calibrated date: *1σ*: cal AD 230–330
2σ: cal AD 130–390

Final comment: see OxA-15689

Laboratory comment: see OxA-15689

Ribble Valley: the lower Ribble, lower House Farm, terrace 4, core 7/8, Lancashire

Location: SD 609333
Lat. 53.47.40 N; Long. 02.35.37 W

Project manager: R Chiverrell (Department of Geography, University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbaldeston Hall and lower House Farm. At the lower House Farm meander, palaeochannels provided the opportunity to secure data on the rate of change within terraces 3 and 4. The core was taken from a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation.

Objectives: to secure absolute dates on the rate of change within terrace T4 at lower House Farm.

Final comment: R Chiverrell and P Marshall (12 November 2007), following abandonment of terrace 3 by incision in either *310 cal BC–cal AD 280 (Event 3/4(1); 95% probability;* fig 82) or *2100–640 cal BC (Event 3/4(2); 95% probability;* fig 82) (Chiverrell *et al* 2007b), there followed incision and subsequent aggradation, culminating in the formation of terrace T4, which in turn was being abandoned after cal AD 230–390 (OxA-15689; 1739 ±27BP) (Reimer *et al* 2004).

References: Chiverrell *et al* 2007b
Reimer *et al* 2004

OxA–16359 2477 ±31 BP

$\delta^{13}C$: -29.8‰

Sample: LH T4 C7/8 4.40–4.30m, submitted in February 2006 by R Chiverrell

Material: waterlogged wood (unidentified roundwood, single fragment) (R Gale 2006)

Initial comment: the material is from a sandy flood layer towards the base of a sequence of a 4.2m thick flood laminated palaeochannel fill. The core was taken from the centre of a palaeochannel with surface expression from lower Ribble terrace 4. The wood remains were incorporated within thick basal sandy gravel flood laminations 0.25m above the underlying channel gravels. The materials are detrital rather than *in situ*, but they comprise wood remains, probably locally derived, and are likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: this sample is organic detritus from within the basal flood layer of a palaeochannel fill on the terrace 4 of the Ribble terrace sequence at the lower House Farm. The datable material was sampled from core LH T4 C7. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ*: 760–510 cal BC
2σ: 780–410 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), as OxA-16359 is a single measurement from core C7/8, it is not possible to confirm its reliability with respect to other results from this sequence and the statistically inconsistent dates from the base of T2/C2 highlight the problems of the reworking of organic material in this area.

Ribble Valley: the lower Ribble, Osbaldeston Hall, terrace 2, core 1, Lancashire

Location: SD 638340
Lat. 53.48.03 N; Long. 02.32.59 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbaldeston Hall and lower House Farm. At Osbaldeston Hall the samples came from palaeochannels of three of the four identified terraces (2–4). The Flashers Wood palaeomeander bend, terrace 2, yielded a basal cohesive diamict, (a stiff clay matrix supporting angular, shattered, and lithologically diverse rock fragments, interpreted as lodgement till deposited under the base of an ice sheet during the last (Devensian) glacial episode). This was overlain by a *c* 2m thick unit of sandy flood bed deposits, in turn buried by a *c* 1.5m thick accumulation of well-humified peat; clast-supported gravels, regarded as diagnostic of channel lag deposits, were not present, and it appears the channel bed was locally sand-dominated.

Objectives: to provide a geochronological framework for terrace development in the lower Ribble.

Final comment: R Chiverrell and P Marshall (12 November 2007), the chronological control for the second terrace is young compared to other sites in the lower Ribble valley and an alternative interpretation is that the samples from the deepest contexts in core OS T1 C1 are in fact 1.75m above the basal sand-dominated channel fill, rather than from towards the top of the active channel-bedded sands, as suggested above. This alternative interpretation would thus mean that OxA-15686 and SUERC-10656 only provide *termini ante quem* for abandonment of the OS T1 C1 channel and before cal AD 240–390. It is not considered likely that the surface-laminated silty clays in this palaeochannel reflect active channel flooding; they are more likely to reflect localised inundation from the hillslope gullies that drain the adjacent Flashers Wood slopes. For the third terrace the currently available data suggest abandonment by incision around *cal AD 630–1460 (Event 3/4*; fig 86; Chiverrell *et al* 2007b). There followed incision and subsequent aggradation, culminating in the formation of terrace 4, which in turn was being abandoned here in *cal AD 1460–1610 (Event 4/5*; fig 86; Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b

OxA–15686 1690 ±26 BP

$\delta^{13}C$: -28.3‰

Sample: OS T1 C1 3.60–3.42m (A), submitted in July 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (E Huckerby 2006)

Initial comment: the sequence OS T1 C1 was sampled from a core taken from the centre of a large palaeochannel with surface expression from the lower Ribble second terrace. The basal sequence comprises a cohesive diamict (a stiff clay matrix supporting angular, shattered, and lithologically diverse rock fragments) overlain by 4m of cold-stage out-wash style fluvial sands. Much of the sands are devoid of organic materials, but towards the top of these sands there is organic detritus present within coarse to medium sand beds. The organic materials were incorporated within a bedded sand 0.25m below the top of this sand unit. Overlying these reddish (Triassic-derived) sands, there is a sequence of organic-rich sand and coarse sand, which are more clearly flood layers within a palaeochannel fill sequence. The organic materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and are likely to be similar in age to the flood deposit.

Objectives: this location is a large back channel, and is probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The samples are organic detritus from within the uppermost layers of sand-dominated active channel sedimentation before the earliest organic-rich flood layers within the palaeochannel fill on terrace 2 of the Ribble. The sample is from towards the top of active channel-bedded sands, and so the radiocarbon date will secure the later stages of channel sedimentation and provide an age estimate for the later stages of aggradation of the fluvial deposits associated with terrace 2.

Calibrated date: *1σ:* cal AD 260–410
2σ: cal AD 250–420

Final comment: R Chiverrell and P Marshall (12 November 2007), the date from a sample towards the top of active channel-bedded sands provided a *terminus post quem* for the later stages of channel sedimentation and aggradation of the fluvial deposits associated with terrace 2.

Laboratory comment: English Heritage (2007), duplicate samples (OxA-15686 and SUERC-10656) from towards the top of active channel bedded sands, providing *termini post quem* for the later stages of channel sedimentation and aggradation of the fluvial deposits associated with terrace 2, are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1;Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

OxA–15690 1596 ±27 BP

δ¹³C: -28.4‰

Sample: OC T1 C1 2.66–2.68m (A), submitted in July 2006 by R Chiverrell

Material: waterlogged wood: *Alnus* sp., single fragment (R Gale 2005)

Initial comment: the sequence OS T1 C1 was sampled from a core from the centre of a large palaeochannel with surface expression from lower Ribble second terrace. This sample is taken from the base of a 1.5m thick peat sequence overlying organic-rich sand and coarse sand flood layers, which in turn overlie a 4.5m thick sequence of reddish (Triassic-derived) fluvial sands. The peat has formed in the palaeochannel, probably encouraged by the saturated conditions, and is composed of *in situ* plant remains and so the organic materials are *in situ* rather than detrital. The peat deposit overlies a thick sequence of probable fluvial sands and are buried by a further 1.25m of flood-laminated silts and clays. Downwards root penetration is possible within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acids. At the time of sampling the water table was at 0.20m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: the sample is from a large peat-filled back channel, which was probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The sample is *in situ* organic material from the base of the peat sequence within the palaeochannel fill on terrace 2 of the Ribble terrace sequence at Osbaldeston Hall. The age estimate is a range-finder date to secure the age of the base of the peat sequence.

Calibrated date: *1σ:* cal AD 420–540
2σ: cal AD 400–550

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the change from coarse sand flood layers to peat.

Laboratory comment: English Heritage (2007), the two measurements (SUERC-10654 and OxA-15690) from the base of a 1.5m thick peat sequence overlying organic rich sand and coarse sand flood layers are statistically consistent (T′=1.1; T′(5%)=3.8; ν=1;Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

OxA–15712 875 ±31 BP

δ¹³C: -28.5‰

Sample: OS T1 C1 1.18–1.2m (A), submitted in July 2006 by R Chiverrell

Material: waterlogged wood (thin twiggy material, very degraded) (R Chiverrell 2006)

Initial comment: the sequence OS T1 C1 was sampled from a core from the centre of a large palaeochannel with surface expression from lower Ribble terrace 2. This sample is taken from the base of a 1.5m thick peat sequence overlying organic-rich sand and coarse sand flood layers which in turn overlay a 4.5m thick sequence of reddish (Triassic-derived) fluvial sands. The peat has formed in the palaeochannel, probably encouraged by the saturated conditions, and is composed of *in situ* plant remains and so the organic materials are *in situ* rather than detrital. The peat deposit overlies a thick sequence of probable fluvial sands and is buried by a further 1.25m of flood-laminated silts and clays. Downwards root penetration is possible within woody peat deposits of this nature, as is the migration of different organic fractions, particularly fulvic acids. At the time of sampling the water table was at 0.2m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: the dateable material was sampled from core OS T1 C1. This location is a large peat-filled back channel, and is probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The sample is *in situ* organic material from the base of the peat sequence within the palaeochannel fill on terrace 2 of the

Ribble terrace sequence at Osbaldeston Hall. The age estimate is a range-finder date to secure the age of the top of the peat sequence.

Calibrated date: 1σ: cal AD 1150–1220
2σ: cal AD 1040–1230

Final comment: R Chiverrell and P Marshall (12 November 2007), the date provides a date for the change from peat development to flood-laminated silts and clays.

Laboratory comment: English Heritage (2007), the measurements (SUERC-10653 and OxA-15712) from the top of the same peat deposit, below flood laminated silts and clays, are statistically consistent ($T'=0.4$; $T'(5\%)=3.8$; $\nu=1$; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10653 905 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: OS T1 C1 1.18–1.2m (B), submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossils (leaf fragments) (R Chiverrell 2005)

Initial comment: as OxA-15712

Objectives: as OxA-15712

Calibrated date: 1σ: cal AD 1040–1180
2σ: cal AD 1020–1220

Final comment: see OxA-15712

Laboratory comment: see OxA-15712

SUERC–10654 1550 ±35 BP

$\delta^{13}C$: -29.4‰

Sample: OS T1 C1 2.66–2.68m (B), submitted in July 2006 by R Chiverrell

Material: waterlogged wood (twig, single fragment) (E Huckerby 2006)

Initial comment: as OxA-15690

Objectives: as OxA-15690

Calibrated date: 1σ: cal AD 430–560
2σ: cal AD 420–600

Final comment: see OxA-15690

Laboratory comment: see OxA-15690

SUERC–10655 1630 ±35 BP

$\delta^{13}C$: -27.1‰

Sample: OS T1 C1 2.96–2.94m, submitted in July 2006 by R Chiverrell

Material: waterlogged wood: *Sambucus* sp., and *Rubus* sp., twigs (E Huckerby 2006)

Initial comment: the sequence OS T1 C1 was sampled from a core from the centre of a large palaeochannel with surface expression from lower Ribble second terrace. This sample is taken from lowermost flood within a sequence of organic-rich sand and coarse sand flood layers overlying a 4.5m thick sequence of reddish (Triassic-derived) fluvial sands. The organic materials are *in situ* rather than detrital and are likely to be similar in age to the flood deposit. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.2m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: this location is a large back channel, and is probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. The sample is *in situ* organic materials from within the earliest organic-rich flood layers within the palaeochannel fill on terrace 2 of the Ribble terrace sequence at Osbaldeston Hall. The underlying deposits are channel sands, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: 1σ: cal AD 390–440
2σ: cal AD 340–540

Final comment: R Chiverrell and P Marshall (12 November 2007), the sample came from the lowermost flood deposits within a sequence of organic sand and coarse sand flood layers. It potentially provides a date for channel and terrace abandonment, although these horizons may not be the base of the fluvial sequence.

Laboratory comment: English Heritage (2007), a second sample from this horizon failed.

SUERC–10656 1720 ±35 BP

$\delta^{13}C$: -28.7‰

Sample: OS T1 C1 3.6–3.42m, submitted in July 2006 by R Chiverrell

Material: waterlogged wood (unidentified, single fragment)

Initial comment: as OxA-15686

Objectives: as OxA-15686

Calibrated date: 1σ: cal AD 250–390
2σ: cal AD 230–420

Final comment: see OxA-15686

Laboratory comment: see OxA-15686

Ribble Valley: the lower Ribble, Osbaldeston Hall, terrace 3, channel 2, Lancashire

Location: SD 638343
Lat. 53.48.13 N; Long. 02.32.59 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: the lower Ribble fluvial geomorphology comprises a series of cut and fill sequences that have formed four river terraces and modern deposits. In order to provide a chronology for this sequence, samples for radiocarbon dating were submitted from two meander loops at Osbaldeston Hall and lower House Farm. At Osbaldeston

Hall the samples came from palaeochannels of three of the four identified terraces (2–4). The Flashers Wood palaeo-meander bend, terrace 2, yielded a basal cohesive diamict, (a stiff clay matrix supporting angular, shattered, and lithologically diverse rock fragments, interpreted as lodgement till deposited under the base of an ice sheet during the last (Devensian) glacial episode). This was overlain by a *c* 2m thick unit of sandy flood bed deposits, in turn buried by a *c* 1.5m thick accumulation of well-humified peat; clast-supported gravels, regarded as diagnostic of channel lag deposits, were not present and it appears the channel bed was locally sand-dominated. The core is from a back-terrace palaeochannel, probably one of the earliest to be both abandoned as the active channel and to cease being affected by flood inundation on the third terrace.

Objectives: to provide a geochronological framework for terrace development in the lower Ribble.

Final comment: R Chiverrell and P Marshall (12 November 2007), for the third terrace the currently available data suggest abandonment by incision around *cal AD 630–1460 (Event 3/4*; fig 86; Chiverrell *et al* 2007b). There followed incision and subsequent aggradation, culminating in the formation of the fourth terrace, which in turn was being abandoned here in *cal AD 1460–1610 (Event 4/5*; fig 86; Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b

OxA–15708 1497 ±38 BP

δ¹³C: -25.5‰

Sample: OS T1 C1 3.43–3.33m (A), submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil: *Alnus* sp., scales and seeds (E Huckerby 2006)

Initial comment: the materials are organic detritus from the base of a sequence of coarse to medium sand flood laminations. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from lower Ribble terrace 3. The organic materials were incorporated within a basal flood lamination just overlying channel gravels. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and likely to be similar in age to the flood deposit.

Objectives: at this location, the setting is a back-terrace palaeochannel, probably one of the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. The samples are organic detritus from within the basal flood layer of a palaeochannel fill on terrace 3 of the Ribble terrace sequence at Osbaldeston Hall. The datable material was sampled from core OS T2 C2. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 540–610
2σ: cal AD 430–650

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests a date for abandonment by incision of the palaeochannel.

Laboratory comment: English Heritage (2007), the two measurements (OxA-15708 and SUERC-10657) are statistically consistent (T'=1.4; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2007), this sample had an offset between the $\delta^{13}C$ value measured on the mass spectrometer and that measured in the accelerator. The standard error has therefore been increased for this result.

References: Ward and Wilson 1978

OxA–16362 2049 ±30 BP

δ¹³C: -27.0‰

Sample: OS T2 C2 0.85–0.8m, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (unidentified buds and twigs) (R Chiverrell 2006)

Initial comment: the materials are from a sandy soil horizon from the upper part of a sequence of sand and silt flood laminations. The sequence of flood laminations was sampled from a core sequence located in the centre of a palaeochannel with surface expression from lower Ribble Terrace 3. The organic materials were incorporated within the uppermost sandy flood lamination below the switch to silt and clay laminations. The organic material, from a thin *in situ* soil, likely to be similar in age to the surrounding flood deposit. 0.8–0.85m from the surface, buried and sealed within a flood-laminated sequence of coarse to medium sands and soil. The deposit overlies channel gravels and is buried by a further 0.5m of flood laminated soils, silts, and clays. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.5m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface. The material, none of it *in situ,* was sealed within intact sequence of flood laminations, which ruled out downwards root penetration.

Objectives: at this location the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation. This sample is organic detritus from within the uppermost flood layer of a palaeochannel fill on terrace 3 of the Ribble river terrace sequence at Osbaldeston Hall. The datable material was sampled from core OS T2 C2. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays, and so the radiocarbon date will secure the last major flood to affect this former channel and provide a latest age estimate for terrace abandonment. The basal flood has been dated to cal AD 560–660 (OxA-15708; 1497 ±38 BP) and cal AD 430–650 (SUERC-10657; 1435 ±35 BP) (Reimer *et al* 2004).

Calibrated date: *1σ:* 100–1 cal BC
2σ: 170 cal BC–cal AD 30

Final comment: R Chiverrell and P Marshall (12 November 2007), the date is too old for its stratigraphic position and thus the sample must represent reworked material.

References: Reimer *et al* 2004

SUERC–10657 1435 ±35 BP

δ¹³C: -27.4‰

Sample: OS T2 C2 3.43–3.33m (B), submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossil (unidentified buds and twigs) (E Huckerby 2006)

Initial comment: as OxA-15708

Objectives: as OxA-15708

Calibrated date: *1σ:* cal AD 590–650
2σ: cal AD 560–660

Final comment: see OxA-15708

Laboratory comment: see OxA-15708

Ribble Valley: the lower Ribble, Osbaldeston Hall, terrace 3, channel 4, Lancashire

Location: SD 635344
Lat. 53.48.16 N; Long. 02.33.16 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: at the lower House Farm meander, palaeochannels provided the opportunity to secure data on the rates of change within terraces 3 and 4. At Osbaldeston Hall the samples came from palaeochannels of three of the four identified terraces (2–4). A back-terrace palaeochannel, and probably the earliest to be both abandoned as the active channel and cease being affected by flood inundation.

Objectives: to provide a geochronological framework for terrace development in the lower Ribble.

Final comment: R Chiverrell and P Marshall (12 November 2007), the data currently available for the third terrace suggest abandonment by incision around *cal AD 630–1460 (Event 3/4*; fig 86; Chiverrell *et al* 2007b). There followed incision and subsequent aggradation, culminating in the formation of the fourth terrace, which in turn was being abandoned here in *cal AD 1460–1610 (Event 4/5*; fig 86; Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b

OxA–16360 515 ±29 BP

δ¹³C: -26.8‰

Sample: OS T2 C4 1.9–1.85m, submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (monocot) (R Chiverrell 2006)

Initial comment: the material is organic detritus from the base of a sequence of coarse to medium sand flood laminations. The core was taken from the centre of a palaeochannel with surface expression from lower Ribble terrace 3. The organic material was incorporated within a basal flood lamination just overlying channel gravels. The material is detrital rather than *in situ*, but comprises soft plant matter, probably locally derived and is likely to be similar in age to the flood deposit. The deposit overlies channel gravels and is buried by a further 1.20m of flood-laminated sands. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed.

Objectives: at this location, the setting is a back-terrace palaeochannel, which is the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. The sample is organic detritus from within the basal flood layer of a palaeochannel fill on terrace 3 of the Ribble terrace sequence at Osbaldeston Hall. The datable material was sampled from core OS T2 C4. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 1400–1440
2σ: cal AD 1330–1450

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the onset of channel abandonment.

OxA–16361 1436 ±29 BP

δ¹³C: -28.0‰

Sample: OS T2 C4 1.5–1.45m, submitted in July 2006 by R Chiverrell

Material: waterlogged plant macrofossils (unidentified buds and twigs) (R Chiverrell 2006)

Initial comment: the material is from a flood horizon towards the top of the flood sequence of T2 C4. The sequence of flood laminations was sampled from a core sequence located in the centre of a palaeochannel with surface expression from lower Ribble terrace 3. The organic materials were incorporated within the uppermost sand flood lamination 1.5–1.45m below the switch to silt and clay laminations. The organic materials are flood trash organic materials, and are likely to be similar in age to the surrounding flood deposit. The deposit overlies channel gravels and is buried by a further 0.75m of flood laminated sands, silts, and clays. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.5m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5–0.75m below the surface.

Objectives: at this location, the setting is a back-terrace palaeochannel, which is probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the uppermost flood layer of a palaeochannel fill on terrace 3 of the Ribble terrace sequence at Osbaldeston Hall. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays, and so the radiocarbon date will secure the last major flood to affect this former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 600–650
2σ: cal AD 560–660

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the upper flood layers in the palaeochannel just before the switch to silt and clay laminations and suggests that the flooding recorded in the channelfill was short-lived but intense, resulting in *c* 2m of deposition.

Ribble Valley: the lower Ribble, Osbaldeston Hall, terrace 4, channel 3, Lancashire

Location: SD 635345
Lat. 53.48.16 N; Long. 02.33.16 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: at the lower House Farm meander, palaeochannels provided the opportunity to secure data on the rates of change within terraces 3 and 4. At Osbaldeston Hall the samples same from palaeochannels of three of the four identified terraces (2–4). The site is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. The sequence of flood laminations was sampled from a core sequence located in the centre of a palaeo-channel with surface expression from lower Ribble terrace 3.

Objectives: to provide a geochronological framework for terrace development in the lower Ribble.

Final comment: R Chiverrell and P Marshall (12 November 2007), the data currently available for the third terrace suggest abandonment by incision around *cal AD 630–1460 (Event 3/4*; fig 86; Chiverrell *et al* 2007b). There followed incision and subsequent aggradation, culminating in the formation of the fourth terrace, which in turn was being abandoned here in *cal AD 1460–1610 (Event 4/5*; fig 86; Chiverrell *et al* 2007b).

References: Chiverrell *et al* 2007b

OxA–15685 397 ±25 BP

$\delta^{13}C$: -30.3‰

Sample: OS T3 C3 2.5–2.4m (A), submitted in February 2006 by R Chiverrell

Material: waterlogged plant macrofossil (bark) (E Huckerby 2006)

Initial comment: the material is organic detritus from a thick sandy gravel flood layer towards the base of a sequence of flood laminated palaeochannel fill. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from lower Ribble terrace 4. The organic materials were incorporated within a thick sandy flood lamination just above the underlying channel gravels. The material is detrital rather than *in situ*, but it comprises soft plant matter, probably locally derived and likely to be similar in age to the flood deposit. The deposit overlies channel gravels and is buried by a further 2.3m of flood-laminated sands. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5m below the surface. The sample is not *in situ*, but it is locally derived and equivalent in age to the flood deposit. Organic flood trash of this type, where the character of plant remains (cell and tissue structure) is still discernible, is unlikely to predate the flood by more than 10–20 years.

Objectives: at this location, the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the basal flood layer of a palaeochannel fill on terrace 4 of the Ribble terrace sequence at Osbaldeston Hall. The underlying deposits are channel gravels, and so the radiocarbon date will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: *1σ:* cal AD 1440–1490
2σ: cal AD 1440–1620

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the basal flood layers in the palaeochannel just before the switch to silt and clay laminations and suggests that the flooding recorded in the channel-fill was short-lived but intense, resulting in *c* 2m of deposition.

Laboratory comment: English Heritage (2007), the two measurements (SUERC-10668 and OxA-15685) on samples from organic detritus within a sandy gravel floor layer towards the base of flood laminated deposits and the underlying channel gravels are statistically consistent (T'=0.3; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15707 422 ±29 BP

$\delta^{13}C$: -27.5‰

Sample: OS T3 C3 0.81–0.76m (A), submitted in February 2006 by E Huckerby

Material: waterlogged plant macrofossils (leaf fragments) (E Huckerby 2006)

Initial comment: the materials are organic detritus from towards the top of a sequence of coarse to medium sand flood laminations. The sequence of flood laminations was sampled from a core sequence located in the centre of a palaeochannel with surface expression from lower Ribble terrace 4. The organic materials were incorporated within the uppermost sandy flood-lamination, below the switch to silt and clay laminations. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived, and are likely to be similar in age to the flood deposit. The deposit is towards the top of a sequence of coarsely-bedded coarse sands and is buried by a further 0.4m of flood-laminated sand and silt. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5m below the surface.

Objectives: at this location the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is organic detritus from within the upper flood layers of a palaeochannel fill on terrace 4 of the Ribble terrace sequence at Osbaldeston Hall. The underlying deposits are a series of flood-laminated alternations between flood sands and slack-water silts and clays, and so the radiocarbon date will secure the last major flood to affect the former channel and provide a latest age estimate for terrace abandonment.

Calibrated date: *1σ*: cal AD 1440–1470
2σ: cal AD 1430–1610

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the upper flood layers in the palaeochannel just before the switch to silt and clay laminations, and suggests that the flooding recorded in the channel-fill was short-lived but intense, resulting in *c* 2m of deposition.

Laboratory comment: English Heritage (2007), the two measurements (SUERC-10658 and OxA-15707) are statistically consistent (T′=3.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–10658 340 ±35 BP

δ¹³C: -29.0‰

Sample: OS T3 C3 0.81–0.76m (B), submitted in February 2006 by E Huckerby

Material: waterlogged wood (twigs) (E Huckerby 2006)

Initial comment: as OxA-15707

Objectives: as OxA-15707

Calibrated date: *1σ*: cal AD 1470–1640
2σ: cal AD 1450–1650

Final comment: see OxA-15707

Laboratory comment: see OxA015707

SUERC–10668 375 ±35 BP

δ¹³C: -26.6‰

Sample: OS T3 C3 2.5–2.4m, submitted in February 2006 by R Chiverrell

Material: waterlogged wood: *Salix/Populus* sp., single fragment (R Gale 2006)

Initial comment: as OxA-15685

Objectives: as OxA-15685

Calibrated date: *1σ*: cal AD 1450–1620
2σ: cal AD 1440–1640

Final comment: see OxA-15685

Laboratory comment: see OxA-15685

Ribble Valley: Upper Ribble floodbasin, Littlebank Barn, terrace 2, core 2, Lancashire

Location: SD 803622
Lat. 54.03.19 N; Long. 02.18.09 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: several of the cores taken from the second terrace yielded a basal unit of coarse channel gravels that are buried by a thin (<1m) unit of laminated, low-energy flood deposits. Locally, a thin organic peat has developed between the gravels and the flood deposits, while some of the other coarser deposits may represent archaeological detritus from the remains of farming settlements. At a single site, coring was able to penetrate through the basal gravels, revealing an underlying unit of grey minerogenic clay rhythmite, interpreted as representing deposition in a pro-glacial lake environment. The coarse nature of the channel gravels tends to support the idea that the palaeochannel morphology on the second terrace was inherited from a high-energy (ie braided) rather than low-energy (ie anastomosing) fluvial setting. The relationship with the underlying lake deposit suggests that this braided river system or sandur developed during a cold climate glacially-fed or nival (snowmelt) regime during the Devensian deglaciation.

Objectives: to construct a chronological framework for the glacial, fluvial, and hillslope geomorphology, and to provide preliminary chronological control for potential palaeoecological sites within the Ribble catchment.

Final comment: R Chiverrell and P Marshall (12 November 2007), the present work at best represents a preliminary assessment of a rare fluvial environment. Tightly meandering and anastomosing flood-basin fluvial settings of this nature are unusual in upland Britain, hence the site's listing as an SSSI. It has been beyond the scope of the current study to undertake a comprehensive assessment of the basin, but a limited chronological constraint for the second terrace has been provided.

References: Chiverrell *et al* 2007b

OxA–15878 3780 ±34 BP

δ¹³C: -28.3‰

Sample: LB T2 C2 0.95–0.98m, submitted in July 2006 by R Chiverrell

Material: sediment (humic acid fraction) (R Chiverrell 2006)

Initial comment: the material is compacted well-humified peat that overlies coarse channel gravels. The sequence was sampled from a core located in the centre of a palaeochannel with surface expression from upper Ribble terrace 2. The peat layer is 0.15–0.2m in thickness and buried by laminated flood silts. The organic materials are *in situ,* and comprise soft plant matter and humic acid compounds. The deposit is buried by a further 0.2m of flood-laminated silt. There is no evidence of bioturbation or downwards root penetration, because the flood laminations are undisturbed. Downwards root penetration within the peat is possible given the nature of peat deposits, as is the migration of different organic, particularly fulvic acids. Roots appear not to have penetrated the overlying flood-laminated silts. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5m below the surface.

Objectives: at this location the setting is a back-terrace palaeochannel, probably the earliest to be both abandoned as the active channel and to cease being affected by flood inundation. This sample is a compacted well-humified peat layer overlying channel gravels within a palaeochannel fill on the terrace 2 of the upper Ribble flood-basin terrace sequence at Littlebank Barn. The sample was taken from the top of the peat, which inter-digitates with the overlying laminated flood silts, and so the radiocarbon date will secure the latter stages of flood inundation of the second terrace.

Calibrated date: 1σ: 2280–2140 cal BC
2σ: 2300–2050 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), humic acids are homogenous, as they are alkali soluble, and therefore can usually be more reliably dated by AMS.

Laboratory comment: English Heritage (2007), measurements on the humic acid (OxA-15878) and humin fractions (OxA-15879) of the peat are not statistically consistent (T'=54.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15879 4149 ±36 BP

$\delta^{13}C$: -28.0‰

Sample: LB T2 C2 0.95–0.98m, submitted in July 2006 by R Chiverrell

Material: sediment (peaty buried soil, humin fraction) (R Chiverrell 2006)

Initial comment: as OxA-15878

Objectives: as OxA-15878

Calibrated date: 1σ: 2880–2630 cal BC
2σ: 2890–2570 cal BC

Final comment: see OxA-15878

Laboratory comment: see OxA-15878

OxA–15880 3524 ±33 BP

$\delta^{13}C$: -27.7‰

Sample: LB T2 C2, 0.83–0.86m, submitted in July 2006 by R Chiverrell

Material: sediment (humic acid fraction) (R Chiverrell 2006)

Initial comment: the materials are from the upper layers of a compacted well-humified peat that overlies coarse channel gravels. The sequence was sampled from a core located in the centre of a palaeochannel with surface expression from upper Ribble terrace 2. The peat layer is 0.15–0.2m in thickness and buried by laminated flood silts. The organic materials are *in situ* and comprised soft plant matter and humic acid compounds. The deposit is buried by a further 0.2m of flood laminated silt. There is no evidence for bioturbation or downwards root penetration from above the peat, because the flood laminations are undisturbed. Downwards root penetration within the peat is possible given the nature of peat deposits, as is the migration of different organic fractions, particularly fulvic acids. Roots appear not to have penetrated the overlying flood laminated silts. At the time of sampling the water table was at 0.25m beneath the surface, and based on iron and manganese discolouration probably oscillates around 0.5m below the surface.

Objectives: as OxA-15878

Calibrated date: 1σ: 1900–1770 cal BC
2σ: 1950–1740 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), humic acids are homogenous, as they are alkali soluble, and therefore can usually be more reliably dated by AMS.

Laboratory comment: English Heritage (2007), the humic acid fraction (OxA-15880) and humin fraction (OxA-15881) measurements from the upper layers of the same compacted peat layer (0.83–0.86m) underlying flood-laminated silts from the latter stages of flood inundation of terrace 2 are not statistically consistent (T'=179.0; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

OxA–15881 4158 ±34 BP

$\delta^{13}C$: -28.3‰

Sample: LB T2 C2, 0.83–0.86m, submitted in July 2006 by R Chiverrell

Material: sediment (humin fraction) (R Chiverrell 2006)

Initial comment: as OxA-15880

Objectives: as OxA-15878

Calibrated date: 1σ: 2880–2630 cal BC
2σ: 2890–2580 cal BC

Final comment: see OxA-15880

Laboratory comment: see OxA-15880

Ribble Valley: Upper Ribble floodbasin, New Hall Farm, terrace 3, core 6, Lancashire

Location: SD 806614
Lat. 54.02.53 N; Long. 02.17.47 W

Project manager: R Chiverrell (University of Liverpool), 2005–6

Archival body: University of Liverpool

Description: a mid-terrace palaoechannel on the third terrace of the upper Ribble flood-basin terrace sequence at New Hall Farm.

Objectives: to construct a chronological framework for the glacial, fluvial, and hillslope geomorphology, and to provide preliminary chronological control for potential palaeoecological sites within the Ribble catchment.

Final comment: R Chiverrell and P Marshall (12 November 2007), the present work at best represents a preliminary assessment of a rare fluvial environment. Tightly meandering and anastomosing flood-basin fluvial settings of this nature are unusual in upland Britain, hence the site's listing as an SSSI, Long Preston Deeps SSSI. It has been beyond the scope of the current study to undertake a comprehensive assessment of the basin, but a limited chronological constraint for terrace T3 has been provided.

References: Chiverrell *et al* 2007b

SUERC–10672 670 ±35 BP

$\delta^{13}C$: -28.8‰

Sample: NH T3 C6 1.86–1.91m (B), submitted in July 2006 by R Chiverrell

Material: waterlogged wood: *Salix/Populus* sp., single fragment (R Gale 2006)

Initial comment: the material is organic detritus from towards the top of a 1m thick sequence of coarse to medium sand flood-laminations. The sequence of flood-laminations was sampled from a core located in the centre of a palaeochannel with surface expression from upper Ribble terrace 3. The organic materials were incorporated within the uppermost sandy flood-lamination below the switch to sandy silt and clay laminations. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived, and are likely to be similar in age to the flood deposit. This sample is 1.91–1.86m from the, surface with flood-laminated coarse to medium sands reflecting channel inundation, and buried and sealed beneath a flood-laminated sequence of sandy silt and clay reflective more passive flood inundation. The deposit is towards the top of a sequence of sand flood layers and is buried by a further 0.6m of flood-laminated sand and silt. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at the surface, and based on iron and manganese discolouration probably oscillates down to around 0.5m below the surface.

Objectives: at this location the setting is a back-terrace palaeochannel, and one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation. This sample is organic detritus from within a flood layer towards the top of a palaeochannel fill on terrace 3 of the upper Ribble flood-basin terrace sequence at New Hall Farm. The underlying deposits are laminated stiff glaciolacustrine clays and silts, in turn buried by 1.6m of fluvial flood sand layers. The radiocarbon dating will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: 1σ: cal AD 1280–1390
2σ: cal AD 1270–1400

Final comment: R Chiverrell and P Marshall (12 November 2007), the result provides a date for the switch to sandy silt and clay laminations from coarse to medium sand flood laminations.

Laboratory comment: English Heritage (2007), a second sample from this level failed.

SUERC–10673 5935 ±35 BP

$\delta^{13}C$: -27.9‰

Sample: NH T3 C6 2.79–2.75m (B), submitted in July 2006 by R Chiverrell

Material: waterlogged wood: *Ulmus* sp., single fragment (R Gale 2006)

Initial comment: the material is organic detritus from towards the top of a 1m thick sequence of coarse to medium sand flood laminations. The sequence of flood laminations was sampled from a core located in the centre of a palaeochannel with surface expression from upper Ribble terrace 3. The organic materials were incorporated within the uppermost sandy flood-lamination, below the switch to sandy silt and clay laminations. The materials are detrital rather than *in situ*, but they comprise soft plant matter, probably locally derived and likely to be similar in age to the flood deposit. The sample is from 2.79–2.75m from the surface with flood-laminated coarse to medium sands reflecting channel inundation, and buried and sealed beneath a flood-laminated sequence of sandy silt and clay reflective of more passive flood inundation. The deposit is towards the top of a sequence of sand flood layers and is buried by a further 0.5m of flood-laminated sand and silt. There is no evidence for bioturbation or downwards root penetration, because the flood laminations are undisturbed. At the time of sampling the water table was at the surface, and based on iron and manganese discolouration probably oscillates down to around 0.5m below the surface.

Objectives: at this location, the setting is a back-terrace palaeochannel, one of the earliest to be both abandoned as the active channel and cease being affected by flood inundation. This sample is organic detritus from within a flood layer, towards the top of a palaeochannel fill on terrace 3 of the upper Ribble flood-basin terrace sequence at New Hall Farm. The underlying deposits are laminated stiff glaciolacustrine clays and silts, in turn buried by 1.6m of fluvial flood sand layers. The radiocarbon dating will secure the onset of channel abandonment and provide an age estimate for terrace abandonment.

Calibrated date: 1σ: 4850–4770 cal BC
2σ: 4910–4710 cal BC

Final comment: R Chiverrell and P Marshall (12 November 2007), the result suggests, that the date of channel abandonment (NH T3 C6) and the abandonment of the third terrace was some time after 4910–4710 cal BC.

Ripon Cathedral, North Yorkshire

Location: SE 31447112
Lat. 54.08.05 N; Long. 01.31.08 W

Project manager: A Bayliss (English Heritage), 2005

Description: the first church on the site of Ripon Cathedral was originally part of a Celtic monastery. This was reorganised by St Wilfrid in AD 660. Between then and AD 1050 it was refounded as a College of secular canons under the patronage of the Archbishop of York. It remained as a parish church even after the dissolution of the College in AD 1547. In AD 1604 the college was refounded under James I, dissolved during the Commonwealth, but founded yet again in AD 1660. It was elevated to Cathedral status in AD 1836. The nave roof consists of 15 'truncated' trusses, consisting alternately of single larger principal rafters (trusses 1, 3, 5, etc, numbering from west to east) or of two very slightly smaller principal rafters in close-set pairs (trusses 2, 4, 6, etc). All such principal rafters are of oak. The apex of each truss seems to have been cut off (if indeed the original ever went to the ridge) and replaced in softwood. Set to the underside of the principal roof timbers are the beams of the ceiling vault. These consist of ridge and vault ribs, from which spring diagonal and intermediate ribs. All these timbers are of oak.

Objectives: the tree-ring analysis of Ripon Cathedral (Arnold *et al* 2005) was unusual in producing two, well-replicated but undated, site chronologies, each containing more than 100 rings. This provided the opportunity to test the accuracy of the radiocarbon dating produced for the ALSF research programme, using samples whose relative age was known by dendrochronology. The submission of related, and replicate, samples to the laboratories collaborating on the ALSF programme tested the comparability of results produced by different laboratories. Accelerator Mass Spectrometry has only recently achieved the precision needed for wiggle-matching, and so a subsidiary aim was to field test the technique to determine whether it can offer, on a routine basis, the accuracy required for applications relating to historic buildings. Further samples from this site were dated as part of the wider English Heritage radiocarbon dating programme, and as part of the internal quality control procedures of the Scottish Universities Environmental Research Centre.

Final comment: A Bayliss (13 November 2007), of the 20 groups of replicate measurements from Ripon Cathedral, 16 are statistically consistent at two standard deviations (Ward and Wilson 1978; *see* below). In two other cases the results are consistent at three standard deviations, although in the other two cases they are not. Bayesian wiggle-matching suggests that the timbers in site sequence RIPCSQ01 were felled in *cal AD 1855–1870 (95% probability; RIPCSQ01 bark edge;* Bayliss *et al* forthcoming, fig 10*)*, and the timbers in site sequence RIPCSQ02 were felled in *cal AD 1850–1870 (95% probability; RIPCSQ02 bark edge;* Bayliss *et al* forthcoming, fig 11). This suggests that the entire roof structure of the nave was reconstructed as part of the works designed by Sir Gilbert Scott and undertaken between AD 1862 and AD 1872. These date estimates are compatible with tentative tree-ring matches, which would date the final ring of both master sequences to AD 1868 (Bayliss *et al* forthcoming).

References: Arnold *et al* 2005
Bayliss *et al* forthcoming
Ward and Wilson 1978

Ripon Cathedral: RIPCSQ01, North Yorkshire

Location: SE 31447112
Lat. 54.08.05 N; Long. 01.31.08 W

Project manager: A Bayliss (English Heritage), 2005

Archival body: Nottingham Tree-Ring Dating Laboratory, English Heritage

Description: the undated 226-ring tree-ring master sequence, RIPCSQ01, is made up of series from six principal rafters from the nave roof (Arnold *et al* 2005). Five of these timbers are complete to bark edge, including both cores from which radiocarbon samples were dated (RIP-C08 and RIP-C11).

Final comment: A Bayliss (13 November 2007), the wiggle-matching of site sequence RIPCSQ01 suggests that the last ring of the tree-ring chronology was formed in *cal AD 1855–1870 (95% probability; RIPCSQ01 bark edge*; Bayliss *et al* forthcoming, fig 10), or *cal AD 1860–1865 (68% probability)*. This model has good overall agreement ($A_{overall}$ = 166.3%, A_n= 22.4%; Bronk Ramsey 1995). These date estimates are compatible with a tentative tree-ring match, which would date the final ring of this sequence to AD 1868.

References: Arnold *et al* 2005
Bayliss *et al* forthcoming
Bronk Ramsey 1995

SUERC–8963 100 ±35 BP

$\delta^{13}C$: -24.0‰

Sample: RIP-C08 <1>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 217–226 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: to demonstrate the accuracy and inter-laboratory comparability of radiocarbon samples dated under the ALSF research programme, and to provide calendar dating for the undated tree-ring master sequence, RIPCSQ01, from the nave roof of Ripon Cathedral.

Calibrated date: *1σ*: cal AD 1680–1955*
2σ: cal AD 1670–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11434 (140 ±35 BP) and GrA-30753 (150 ±30 BP) (T′=1.2; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 132 ±19 BP, calibrates to cal AD 1675–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1850–1865 (95% probability; rings 217–226*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8964 135 ±35 BP

$\delta^{13}C$: -23.6‰

Sample: RIP-C08 <2>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 207–216 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ*: cal AD 1670–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11435 (160 ±35 BP) and GrA-30755 (115 ±30 BP)(T′=1.0; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 135 ±19 BP, calibrates to cal AD 1670–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1840–1855 (95% probability; rings 207–216*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8965 145 ±35 BP

$\delta^{13}C$: -23.4‰

Sample: RIP-C08 <3>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 197–206 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ:* cal AD 1670–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11439 (135 ±35 BP) and GrA-30756 (115 ±30 BP) (T′=0.5; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 130 ±19 BP, calibrates to cal AD 1675–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1830–1845 (95% probability; rings 197–206*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8969 150 ±35 BP

$\delta^{13}C$: -23.5‰

Sample: RIP-C08 <4>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 187–196 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11440 (110 ±35 BP) and GrA-30757 (65 ±30 BP) (T′=3.4; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 104 ±19 BP, calibrates to cal AD 1680–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1820–1835 (95% probability; rings 187–196*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8970 155 ±35 BP

$\delta^{13}C$: -23.5‰

Sample: RIP-C08 <5>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 177–186 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11441 (85 ±35 BP) and GrA-30635 (95 ±30 BP) (T′=2.4; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 110 ±19 BP, calibrates to cal AD 1680–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1810–1825 (95% probability; rings 177–186*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8971 240 ±35 BP

$\delta^{13}C$: -23.7‰

Sample: RIP-C08 <6>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 167–176 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ:* cal AD 1640–1950
2σ: cal AD 1520–1955*

Final comment: A Bayliss (13 November 2007), this result is not statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11442 (140 ±35 BP) and GrA-30761 (75 ±30 BP) (T′=12.9; T′(5%)=6.0; ν=2; Ward and Wilson 1978), and may be slightly older than expected. The weighted mean of these three measurements, 144 ±19 BP, calibrates to cal AD 1665–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1800–1815 (95% probability; rings 167–176*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8972 270 ±35 BP

$\delta^{13}C$: -23.4‰

Sample: RIP-C08 <7>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 157–166 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ*: cal AD 1530–1660
2σ: cal AD 1510–1955*

Final comment: A Bayliss (13 November 2007), this result is not statistically consistent with two other measurements available for this decade of RIPCSQ01 at 95% confidence (SUERC-11443, 145 ±35 BP and GrA-30762, 165 ±30 BP; T′=7.6; T′(5%)=6.0; ν=2; Ward and Wilson 1978), although it is at 99% confidence. The weighted mean of these three measurements, 191 ±19 BP, calibrates to cal AD 1655–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1790–1805 (95% probability; rings 157–166*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8973 275 ±35 BP

δ¹³C: -23.3‰

Sample: RIP-C08 <8>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 147–156 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ*: cal AD 1520–1660
2σ: cal AD 1510–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11444 (230 ±35 BP) and GrA-30763 (210 ±30 BP)(T′=2.0; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 235 ±19 BP, calibrates to cal AD 1640–1950 (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1780–1795 (95% probability; rings 147–156*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8974 245 ±35 BP

δ¹³C: -23.2‰

Sample: RIP-C08 <9>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 137–146 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ*: cal AD 1640–1950
2σ: cal AD 1520–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11445 (140 ±35 BP) and GrA-30765 (165 ±30 BP) (T′=5.0; T′(5%)=6.0; ν=2; Ward and Wilson 1978). The weighted mean of these three measurements, 182 ±19 BP, calibrates to cal AD 1660–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1770–1785 (95% probability; rings 137–146*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–8975 275 ±35 BP

δ¹³C: -23.3‰

Sample: RIP-C08 <10>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 127–136 of floating tree-ring sequence RIPCSQ01. The sample is from core RIP-C08, which was taken from the north principal rafter of truss 3.

Objectives: as SUERC-8963

Calibrated date: *1σ*: cal AD 1520–1660
2σ: cal AD 1510–1955*

Final comment: A Bayliss (13 November 2007), this result is not statistically consistent with two other measurements available for this decade of RIPCSQ01, SUERC-11449 (160 ±35 BP) and GrA-30766 (120 ±30 BP) (T′=11.7; T′(5%)=6.0; ν=2; Ward and Wilson 1978), and may be slightly older than expected. The weighted mean of these three measurements, 179 ±19 BP, calibrates to cal AD 1660–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ01 suggests that this sample dates to *cal AD 1760–1775 (95% probability; rings 127–136*; Bayliss *et al* forthcoming, fig 10).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

Ripon Cathedral: RIPCSQ02, North Yorkshire

Location: SE 31447112
Lat. 54.08.05 N; Long. 01.31.08 W

Project manager: A Bayliss (English Heritage), 2005

Archival body: Nottingham Tree-Ring Dating Laboratory, English Heritage

Description: the undated 117-ring tree-ring master sequence, RIPCSQ02, is made up of series from nine timbers, including five ′double′ rafters and two ceiling ribs from each end of the nave (Arnold *et al* 2005, fig 5). Six of these timbers are complete to bark edge, including both cores from which radiocarbon samples were dated (RIP-C14 and RIP-C29).

Final comment: A Bayliss (13 November 2007), the wiggle-matching of site sequence RIPCSQ02 suggests that the last ring of the tree-ring chronology was formed in *cal AD 1850–1870 (95% probability; RIPCSQ02 bark edge*; Bayliss *et al* forthcoming, fig 11), or *cal AD 1855–1865 (68% probability)*. This model has good overall agreement ($A_{overall}$ = 69.7%, A_n= 22.4%; Bronk Ramsey 1995). These date estimates are compatible with a tentative tree-ring match, which would date the final ring of this sequence to AD 1868.

References: Arnold *et al* 2005
Bayliss *et al* forthcoming
Bronk Ramsey 1995

OxA–15406 132 ±25 BP

$\delta^{13}C$: -23.8‰

Sample: RIP-C29<1>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 108–117 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: to demonstrate the accuracy and inter-laboratory comparability of radiocarbon samples dated under the ALSF research programme, and to provide calendar dating for the undated tree-ring master sequence, RIPCSQ02, from the nave roof of Ripon Cathedral.

Calibrated date: *1σ*: cal AD 1680–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30767 (115 ±30 BP) (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 126 ±20 BP, calibrates to cal AD 1675–1955* (Reimet *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1845–1865 (95% probability; rings 108–117*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15407 143 ±26 BP

$\delta^{13}C$: -22.8‰

Sample: RIP-C29 <3>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 88–97 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: *1σ*: cal AD 1670–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30770 (95 ±30 BP)(T′=1.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 123 ±20 BP, calibrates to cal AD 1680–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1825–1845 (95% probability; rings 88–97*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15408 141 ±25 BP

$\delta^{13}C$: -23.1‰

Sample: RIP-C29 <4>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 78–87 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: *1σ*: cal AD 1680–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is not statistically consistent with another measurement for this decade of RIPCSQ02 at 95% confidence, although it is at 99% confidence (GrA-30772, 60 ±30 BP; T′=4.3; T′(5%)= 3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 109 ±20 BP, calibrates to cal AD 1680–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1815–1835 (95% probability; rings 78–87*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15409 147 ±26 BP

$\delta^{13}C$: -23.2‰

Sample: RIP-C29 <5>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 68–77 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: *1σ*: cal AD 1670–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30773 (85 ±30 BP)(T′=2.4; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 121 ±20 BP, calibrates to cal AD 1680–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1805–1825 (95% probability; rings 68–77*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15410 171 ±25 BP

δ¹³C: -23.1‰

Sample: RIP-C29 <6>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 58–67 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: OxA-15406

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1660–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30775 (155 ±35 BP)(T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 166 ±21 BP, calibrates to cal AD 1665–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1795–1815 (95% probability; rings 58–67*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15411 208 ±26 BP

δ¹³C: -22.3‰

Sample: RIP-C29 <7>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 48–57 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: *1σ:* cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30776 (170 ±30 BP)(T′=0.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 192 ±20 BP, calibrates to cal AD 1655–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1785–1805 (95% probability; rings 48–57*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15412 221 ±25 BP

δ¹³C: -22.6‰

Sample: RIP-C29 <8>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 38–47 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: *1σ:* cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30777 (150 ±30 BP)(T′=3.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 192 ±20 BP, calibrates to cal AD 1655–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1775–1795 (95% probability; rings 38–47*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15413 188 ±25 BP

δ¹³C: -23.2‰

Sample: RIP-C29 <9>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: as OxA-15406

Objectives: decadal sample from rings 28–37 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1650–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30779 (190 ±30 BP)(T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 189 ±20 BP, calibrates to cal AD 1660–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1765–1785 (95% probability; rings 28–37*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15414 211 ±25 BP

δ¹³C: -23.7‰

Sample: RIP-C29 <10>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 18–27 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: 1σ: cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30780 (220 ±30 BP)(T′=0.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 215 ±20 BP, calibrates to cal AD 1645–1955* (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1755–1775 (95% probability; rings 18–27*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15497 155 ±23 BP

δ¹³C: -24.0‰

Sample: RIP-C29 <2>, submitted on 13 December 2005 by D Hamilton

Material: waterlogged wood: *Quercus* sp. (R Howard 2005)

Initial comment: decadal sample from rings 98–107 of floating tree-ring sequence RIPCSQ02. The sample is from core RIP-C29, which was taken from a ceiling rib spanning bays 11 and 12.

Objectives: as OxA-15406

Calibrated date: 1σ: cal AD 1670–1955*
2σ: cal AD 1665–1955*

Final comment: A Bayliss (13 November 2007), this result is statistically consistent with another measurement for this decade of RIPCSQ02, GrA-30768 (100 ±30 BP)(T′=2.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978). The weighted mean of these measurements, 135 ±18 BP, calibrates to cal AD 1675–1940 (Reimer *et al* 2004). The wiggle-matching of RIPCSQ02 suggests that this sample dates to *cal AD 1835–1855 (95% probability; rings 98–107*; Bayliss *et al* forthcoming, fig 11).

References: Bayliss *et al* forthcoming
Reimer *et al* 2004
Ward and Wilson 1978

Seabed Prehistory: Great Yarmouth, English Coastal Waters

Location: Lat. 52.34.53 N; Long. 01.53.28 E

Project manager: M Allen and S Leather (Wessex Archaeology), July 2006

Archival body: Wessex Archaeology

Description: the 800x800m survey area was located 12km east of Great Yarmouth, Norfolk submerged under 25 to 30m of water. Survey included geophysics (sidescan sonar, echosounder, shallow seismic) and vibrocores (5m length). One core (VC-GY1) sampled the main sequence and was selected for subsampling for palaeoenvironmental data (pollen, diatoms, ostracods, foraminifera, molluscs, and radiocarbon dating). Samples were taken from vibrocore VC GY1. The main sequence recorded was shallow marine sands and gravels overlain by glacio-fluvial sands then freshwater sands and silts, littoral sand, estuarine alluvium and a shallow marine lag gravel.

Objectives: to enable judgement to be made upon potential archaeological impact of aggregate dredging in the area. The results will show whether the gravels, sands, silts and clays are related to the Devensian and early Holocene offshore extension of the Yare river.

References: Bellamy 1995

OxA–16466 39820 ±390 BP

δ¹³C: -5.7‰

Sample: 57422 VC-GY1 1.92B, submitted on 25 August 2006 by M Allen

Material: shell (*Hinia reticulata*) (J Russell 2006)

Initial comment: the marine shell is in a discrete littoral deposit of marine shell overlying freshwater sediments. None of the shells are particularly worn or abraded (ie obviously long-term residual). This layer overlying freshwater sediment is potentially a sea-level index point. The sample is from a vibrocore at a depth of 1.92m below the seabed (-29.53m OD).

Objectives: to provide a chronological framework for the sedimentary units and palaeoenvironmental (pollen, ostracods, foraminifera, and diatom) data, and to relate this data to other known and dated or comparable sequences.

Final comment: J Russell (8 November 2007), this date would indicate deposition during the Devensian (OIS3) when sea level is thought to have been at least *c* 80m below OD (Siddall *et al* 2003). The presence of a marine shell at -29.53m OD is therefore enigmatic. Subsequent OSL dating, molluscs, pollen, and plant macrofossils recovered from these sediments suggest an Ipswichian date is more likely.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), this sample was stained with Fiegl's solution prior to dating as a check on whether the shell was predominantly aragonitic or calcitic. The shell turned black in solution, which is an indicator of a predominantly aragonitic mineralogy. Since recrystallisation of carbonate occurs always as a calcite polymorph, there is a lower likelihood of substantial contamination in this radiocarbon determination. Further analysis is possible, for example using XRD or cathodoluminescence or a similar method, but this is not routinely implemented here.

Laboratory comment: English Heritage (17 January 2008), the result is beyond current limits of the internationally agreed calibration range (Reimer *et al* 2004).

References: Reimer *et al* 2004
Siddall *et al* 2003

SUERC–11979 >50000 BP

δ¹³C: -27.9‰

Sample: 57422 VC-GY1 2.25, submitted on 15 August 2006 by M Allen

Material: waterlogged plant macrofossil (<5g) (herbaceous stem) (C Chisham 2006)

Initial comment: the plant stem was horizontal sealed *in situ* within a very organic black clayey silt with frequent freshwater molluscs. The plant (unidentified) is considered to have been associated with this shallow freshwater deposit. The sample is from a vibrocore 2.25m below the seabed (-29.86m OD).

Objectives: to provide a chronological framework for the sedimentary units and palaeoenvironmental (pollen, ostracods, foraminifera, diatom, and mollusc) data, and to relate this data to other known and dated or comparable sequences.

Final comment: J Russell (7 November 2007), the result indicates the sample to be older than originally suspected. Further dating (OSL) and environmental remains suggest that the deposit is likely to be Ipswichian in date.

Laboratory comment: English Heritage (17 January 2008), the result is beyond current limits of the internationally agreed calibration range (Reimer *et al* 2004).

References: Reimer *et al* 2004

SUERC–11983 43800 ±400 BP

$\delta^{13}C$: -6.8‰

Sample: 57422 VC-GY1 1.92A, submitted on 25 August 2006 by M Allen

Material: shell (*Hinia reticulata*) (J Russell 2006)

Initial comment: the marine shell is in a discrete littoral deposit of marine shell overlying freshwater sediments. None of the shells are particularly worn or abraded (ie obviously long-term residual). This layer overlies the freshwater sediment and is potentially a sea-level index point. The sample is from a vibrocore at a depth of 1.92m below the seabed (-29.53m OD).

Objectives: to provide a chronological framework for the sedimentary units and palaeoenvironmental (pollen, ostracods, foraminifera and diatom) data, and to relate this data to other known and dated or comparable sequences.

Final comment: J Russell (7 November 2007), this date indicates deposition during the Devensian (OIS3) when sea level is thought to have been *c* 80m below OD (Siddall *et al* 2003). The presence of a marine shell at -29.53m OD is therefore enigmatic. OSL dating, molluscs, pollen, and plant macrofossils recovered from these sediments suggest an Ipswichian date is more likely.

Laboratory comment: English Heritage (17 January 2008), the result is beyond current limits of the internationally agreed calibration range (Reimer *et al* 2004).

References: Reimer *et al* 2004
Siddall *et al* 2003

Seabed Prehistory: palaeo-Arun, English Coastal Waters

Location: Lat. 50.39.24 N; Long. 00.24.01 W

Project manager: M Allen and S Leather (Wessex Archaeology), July 2006

Archival body: Wessex Archaeology

Description: the 5km^2 survey area was located 18km south of Littlehampton, Sussex, presently submerged under *c* 25 to 35m of water. Geophysical survey had identified the area to contain sediments relating to the offshore extension of the river Arun (Bellamy 1995). Further investigations have included grab sampling at 100m intervals. Many of the grab samples contained blocks of peat. One grab sample, which contained peat at 32.5m below OD, also included a freshly broken fragment of oak charcoal, found within the peat, that could be anthropogenic. Reed stems (*Phragmites* sp.) at the same level were selected for radiocarbon dating.

Objectives: to enable judgement to be made upon potential archaeological impact of aggregate dredging in the area and to aid in evaluating the usefulness of screening grab samples in understanding the archaeological and environmental significance of submerged land surfaces adjacent to and within aggregate extraction areas.

References: Bellamy 1995

SUERC–12007 8815 ±40 BP

$\delta^{13}C$: -26.6‰

Sample: 57421 H54, submitted on 28 July 2006 by M Allen

Material: waterlogged plant macrofossil (*Phragmites*) (C Chisham 2006)

Initial comment: reed stem (*Phragmites* sp.) stratified horizontally in peat from the same sample and depth as charcoal (sample H54). The *Phragmites* sp. is considered to be a component of the peat. The sample is from peat at -32.5m OD (recovered in a grab sample), which is presently exposed on the seabed.

Objectives: to date the peat from which the charcoal was recovered. To relate this to the dated peats already studied in this area.

Calibrated date: *1σ:* 8170–7780 cal BC
2σ: 8210–7730 cal BC

Final comment: J Russell (7 November 2007), this date forms part of a consistent series of dates from the palaeo-Arun area. It is both the shallowest and therefore expectedly the youngest sample dated from the survey area. The elevation and dates of these Holocene saltmarsh peats are consistent with sea-level rise in the area during the Mesolithic period.

Suffolk Rivers, Suffolk

Location: TM 64232919: TM 6423 2920:
TL 8295 6918: TL 5938 2797
Lat. 51.53.53 N; Long. 01.50.28 E, :
Lat. 51.53.53 N; Long. 01.50.28E:
Lat. 52.17.23 N; Long. 00.40.58 E:
Lat. 51.55.37 N; Long. 00.19.06 E

Project manager: T Hill (University of Birmingham), July 2006

Description: the Suffolk river valleys project was developed to address themes identified through discussion with curatorial and academic archaeologists working in Suffolk. This ongoing project is developing a historic environment research and management framework for all the mineral resource areas primarily through SMR/HER enhancement and analysis of aerial photographs. Heritage managers in Suffolk County Council are fully aware of the threats to the historic archaeological resource within their region. Whilst other parts of the Suffolk archaeological landscape have been the focus of intensive research investigation, such as the Palaeolithic record (eg Wymer 1999) and development of the agricultural landscape (eg Williamson 1987; Martin and Satchel forthcoming), the palaeoenvironmental record and archaeological resource of these Holocene valley floors have been largely ignored. Furthermore, generic models of alluvial development of such low-gradient fluvial systems suggest that the build-up of fine-grained sediment through overbank sedimentation has probably resulted in the burial of significant archaeological remains within such valley floor environments (Howard and Macklin 1999). The desk-based assessment and pilot fieldwork undertaken in Phase 1 successfully identified a number of regions within the county with the potential to yield palaeoenvironmental information, which could be dovetailed with cultural records. Through the assessment of available resources, including HER data, aerial photographs, and LiDAR, a total of five sites were identified for further consideration: Beccles, Brandon, Hengrave, Hoxne, and Ixworth. Of these, Beccles, Hengrave, and Ixworth were found to have sedimentary archives suitable for applying palaeoenvironmental assessments (pollen, beetles, and diatoms) and radiocarbon dating.

Objectives: this proposal aims to elucidate the geoarchaeological development of the Waveney, Little Ouse, Lark, Gipping, and Black Bourne. Study of these valleys is considered important because of the direct impact of past, present, and future aggregate extraction on their cultural heritage and landscape. Recent ALSF-funded research in Suffolk has addressed in detail issues regarding the identification and quantification of the archaeological record in the mineral resource areas, but no provision was made within the project for the characterisation and investigation of the palaeoenvironmental and geoarchaeological resource. Subsequently, Suffolk County Council Archaeological Service has identified this as a major gap in knowledge, and a future funding priority. Overall, the study will contribute information to inform strategic management of the combined archaeological and geoarchaeological resource in the valleys and enhance understanding of the evolution of these rivers and the implications of this for human activity and the archaeological record.

The Suffolk river valley's project proposal was developed with the following primary aims: to assess and characterise the geoarchaeological and palaeoenvironmental resource of the major river valleys of Suffolk affected by mineral extraction; to investigate how the evolution of different river catchments relates to the preservation and character of archaeological sequences in these areas; and to assess the potential for investigating the role that factors such as human activity and climate change have played in the evolution of the different river valleys; the use of the information to create a research agenda for Cultural Resource Management for the Suffolk rivers and thus aid in the design and development of future prospection and mitigation strategies in areas susceptible to or affected by aggregate extraction; to enhance the Historic Environmental Record (SMR/HER) held by Suffolk County Council to inform future Cultural Resource Management; and to disseminate the results of the research to the stakeholder community, including the general public.

Final comment: T Hill (19 September 2007), whilst multi-proxy assessments of the valley archives have revealed promising palaeoenvironmental results, the radiocarbon dating programme has indicated significant problems with the age estimates for each site. The three sites that underwent subsequent chronostratigraphic assessments (Beccles, Hengrave, and Ixworth) provided highly anomalous AMS radiocarbon results, where inverted dates were common, in addition to modern age estimates being encountered deep within the stratigraphic sequences (Hill *et al* 2007). It is beyond the scope of this proposal to consider the precise reasons for these anomalies, but the evidence from the environmental assessments support the stratigraphic integrity of the sampled sequences. A subsequent meeting with an English Heritage dating specialist established that sampling protocols applied during both fieldwork and laboratory analysis did not appear to be responsible for providing the erroneous radiocarbon results. This was further supported by the apparent clear conformable biostratigraphy encountered within the Hengrave and Ixworth pollen sequences; the pollen curves from both diagrams make ecological sense, with no evidence for any form of significant disturbance to the sequences of sediment deposition. Indeed, despite the poorer preservation of pollen at Beccles, the biostratigraphy at this site is also apparently conformable, with the diatom spectra from both Beccles core 1 and core 2 also supporting this conclusion. It was therefore agreed that other factors may have been influential in providing such erroneous results. Discussion of this issue with a number of colleagues suggests that chronological problems with radiocarbon dating are not restricted to the Suffolk River Valleys Project, but are quite commonplace. It is therefore essential to investigate the reasons behind such inconsistencies on both a spatial and temporal scale.

From the curatorial perspective of Suffolk County Council, it is deemed essential to understand the reasons behind such chronological problems within the East Anglian region. Phase 1 of the Suffolk river Valleys Project highlighted the abundance of valuable palaeoenvironmental records within valley lowlands susceptible to aggregate extraction. If a clear understanding of the causes behind this dating problem is not gained, subsequent palaeoenvironmental assessments within the region may experience similar problems, and the management of deposits of palaeoenvironmental potential at risk through aggregate extraction could be problematic. This proposed project would provide a methodological framework, which could be applied to future studies in the region.

References: Hill *et al* 2007
Howard and Macklin 1999
Martin and Satchell forthcoming
Williamson 1987
Wymer 1999

Suffolk Rivers: Beccles core 1, Suffolk

Location: TM 64232919
Lat. 51.53.53 N; Long. 01.50.28 E

Project manager: T Hill (University of Birmingham), July 2006

Archival body: University of Birmingham

Description: analysis of aerial photographs, LiDAR, and grey literature as part of this project resulted in the identification of a thick peat sequence within the valley floodplain of the river Waveney, proximal to the town of Beccles. During flood alleviation works along the river Waveney, the excavation of a drainage ditch identified an abundance of vertical timber posts preserved within the peat archive. These were subsequently identified as the remnants of a prehistoric trackway. Coring proximal to the trackway confirmed the presence of up to 6m of fen peat overlying basal sands and gravels. Approximately 0.85m of well-humified herbaceous silty peat is present, which is underlain by 0.15m of grey-brown organic-rich silt. A thin 0.15m layer of silty peat is found below the organic-rich silt unit. This, in turn, is underlain by a further 4.2m of herbaceous humified peat with colour variations from red-brown to dark brown/black. Sands and gravels were encountered at the base of the core.

Objectives: to determine the timing of the onset of biogenic (*in situ)* organic accumulation at the site; to identify variations in the rate of organic accumulation within the floodplain during its depositional history; and to determine the timing of the onset and cessation of minerogenic sedimentation.

Final comment: T Hill (19 September 2007), the application of pollen, coleopteran, and diatom analysis to the stratigraphic archives present within the river Waveney floodplain proximal to Beccles yielded contrasting results. The very low pollen counts for the sequence preclude any detailed discussion, with the lack of a robust chronology also hindering interpretation. In addition, coleopteran assemblages were almost wholly absent from the archive under assessment. It is therefore likely that either a) such proxy records were never incorporated into the sedimentary archive during *in situ* organic accumulation or, b) post-depositional decomposition of the sedimentary archive has resulted in the removal of the proxy records from the sequence. Comparisons made between the palaeoenvironmental assessments undertaken for this project and those undertaken during the trackway archaeological excavation could prove useful when attempting to explain the absence of proxy assemblages.

The radiocarbon dating of samples from Beccles core 1 did not provide a robust chronological framework. Whilst palaeoenvironmental assessments suggested a broadly chronostratigraphical sequence was present, dating inversions were evident within the sequence to suggest that the radiocarbon dating of the sequence had been unsuccessful. The basal date 10,040–9220 cal BC (GrA-33477; 9960 ±130BP; Reimer *et al* 2004), however, correlates with the pollen evidence in showing that the onset of organic accumulation started in the early Holocene. In addition, the deposition of the estuarine silt towards the top of the stratigraphic archive is dated to *c* 50 cal BC (GrA-33472; 2090 ±70BP and GrA-33471; 2080 ±50BP; Reimer *et al* 2004), which could be correlated with a positive sea-level tendency commonly encountered within coastal lowland archives, termed the Romano-British transgression.

Laboratory comment: English Heritage (18 December 2007), two further samples, plant macrofossils from 0.84m and 4.92m, failed to produce sufficient carbon for dating.

References: Hill *et al* 2007
Martin *et al* 1981
Reimer *et al* 2004

GrA–33471 2080 ±50 BP

$\delta^{13}C$: -27.3‰

Sample: Beccles#1 0.84m B, submitted in October 2006 by B Gearey

Material: waterlogged wood (-1.42m OD): *Alnus glutinosa*, single fragment, -0.415m OD (R Gale 2006)

Initial comment: this sample was taken from the base of a dark grey-brown very well-humified silty peat. The underlying geology of this part of the Waveney Valley comprises glaciofluvial drift and chalk till. The stratigraphy and sedimentology of the deposits suggests the area has infilled naturally through biogenic *in situ* sedimentation. A thin silt horizon is located at *c* 0.85–1m depth, which is believed to be of estuarine origin, and is indicative of a period of temporary inundation before a return to terrestrial sedimentation. Estuarine sediments become present in increasing thickness within the valley's sedimentary archive with distance north from the Beccles Core 1 site. The sediments were extracted using a Russian corer to a depth of 4m, whilst a gauge corer was used to extract sediments from 4m to 5.45m. The natural water table was located *c* 0.5m from the surface, although an archaeological dig proximal to the site resulted in the temporary artificial lowering of the water table. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the timing of organic sedimentation across the Holocene floodplain; to identify the timing of the removal of estuarine conditions from the valley setting; to determine the duration of biogenic sedimentation and variations in the rates of sedimentation during the depositional history.

Calibrated date: *1σ:* 180–40 cal BC
2σ: 350 cal BC–cal AD 50

Final comment: T Hill (19 September 2007), the sample was taken from the silt-rich peat unit immediately overlying a layer of silt known to be estuarine in origin. This broadly correlates with the period of estuarine sedimentation encountered at Adelby, proximal to Beccles, between *c* 500 cal BC and *c* 300 cal BC (Alderton 1983). Therefore, whilst questions remain regarding the reliability of the radiocarbon sequence of Beccles Core 1, the upper sample(s) may be interpreted as being chronostratigraphically significant.

Laboratory comment: English Heritage (18 December 2007), a second macrofossil from this level produced insufficient carbon for dating.

References: Alderton 1983

GrA–33472 2090 ±70 BP

$\delta^{13}C$: -27.3‰

Sample: Beccles#1 0.99m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (-1.55m OD): *Alnus glutinosa*, nutlets (R Gale 2006)

Initial comment: as GrA-33471

Objectives: as GrA-33471

Calibrated date: *1σ:* 200–1 cal BC
2σ: 360 cal BC–cal AD 70

Final comment: see GrA-33471

Laboratory comment: Rijksuniversitat Groningen (AMS) (2006), the graphite quality was poor, which explains the large error term quoted.

GrA–33473 2215 ±40 BP

$\delta^{13}C$: -28.3‰

Sample: Beccles#1 1.18m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae, fragments and internode; -1.74m OD) (Birmingham Archaeology 2006)

Initial comment: as GrA-33472

Objectives: to determine the timing of organic sedimentation across the Holocene floodplain; and to determine the duration of *in situ* biogenic sedimentation and variations in the rates of sedimentation during the site's depositional history.

Calibrated date: *1σ*: 380–200 cal BC
2σ: 400–170 cal BC

Final comment: T Hill (19 September 2007), when taking into account the results of the radiocarbon dating of Beccles core 1, this sample does not contribute to a robust chronological framework. The radiocarbon results from the centre of the unit are all relatively similar (spanning *c* 1300–100 cal BC), with a number of date inversions also present. Considering the thickness of the sedimentary sequence, combined with the basal date of 10040–9220 cal BC (GrA-33477; 9960 ±130BP; Reimer *et al* 2004), the radiocarbon results are therefore not deemed chronostratigraphically reliable.

Laboratory comment: (2007), this result is significantly different from that on a second, bulk, sample of waterlogged plant macrofossils from this level (GrA-33473; T′=20.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Reimer *et al* 2004

GrA–33475 2695 ±40 BP

$\delta^{13}C$: -27.6‰

Sample: Beccles#1 1.99m, submitted in October 2006 by B Gearey

Material: waterlogged wood (-2.55m OD): *Alnus glutinosa*, single fragment (R Gale 2006)

Initial comment: as GrA-33472

Objectives: as GrA-33473

Calibrated date: *1σ*: 900–800 cal BC
2σ: 920–790 cal BC

Final comment: see GrA-33473

GrA–33476 2785 ±40 BP

$\delta^{13}C$: -28.1‰

Sample: Beccles#1 3.5m, submitted in October 2006 by B Gearey

Material: waterlogged wood (-4.06m OD): *Alnus glutinosa*, single fragment (R Gale 2006)

Initial comment: this sample was taken from the centre of a dark red-brown herbaceous very well humified peat.

Objectives: as GrA-33473

Calibrated date: *1σ*: 1000–890 cal BC
2σ: 1030–830 cal BC

Final comment: see GrA-33473

GrA–33477 9960 ±130 BP

$\delta^{13}C$: -27.2‰

Sample: Beccles#1 5.34m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (unidentified plant remains, bulk sample; -5.9m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from the base of a dark brown herbaceous very well-humified peat.

Objectives: to determine the onset of organic sedimentation onto the underlying sands and gravels across the Holocene floodplain; and to determine the duration of *in situ* biogenic sedimentation and variations in the rates of sedimentation during the site's depositional history.

Calibrated date: *1σ*: 9770–9280 cal BC
2σ: 10040–9220 cal BC

Final comment: T Hill (19 September 2007), this sample was taken from the basal peat unit overlying gravels on the river Waveney floodplain. The date suggests an early Holocene timescale for the onset of peat deposition within the valley, which correlates well with the palaeoenvironmental evidence undertaken on the core (Hill *et al* 2007) as well as previous studies in the Waveney Valley (Alderton 1983).

Laboratory comment: Rijksuniversitat Groningen (AMS) (2006), the graphite quality was poor, which explains the large error term quoted.

References: Alderton 1983
Hill *et al* 2007

SUERC–12035 1595 ±35 BP

$\delta^{13}C$: -24.2‰

Sample: Beccles#1 1.15m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (Poaceae fragments; -1.71m OD) (Birmingham Archaeology 2006)

Initial comment: as GrA-33471

Objectives: as GrA-33471

Calibrated date: *1σ*: cal AD 410–540
2σ: cal AD 390–550

Final comment: T Hill (19 September 2007), this sample provided a radiocarbon date younger than that of the overlying radiocarbon sample (GrA-33472). This therefore indicates inverted dates are present within the sequence, suggesting a robust chronological framework is not present.

SUERC–12036 1975 ±35 BP

$\delta^{13}C$: -28.1‰

Sample: Beccles#1 1.18m A, submitted in October 2006 by B Gearey

Material: waterlogged wood (-1.74m OD): *Alnus* sp., single fragment (R Gale 2006)

Initial comment: as GrA-33471

Objectives: as GrA-33473

Calibrated date: 1σ: 40 cal BC–cal AD 70
2σ: 50 cal BC–cal AD 120

Final comment: see GrA-33473

Laboratory comment: see GrA-33473

SUERC–12037 2835 ±35 BP

$\delta^{13}C$: -27.5‰

Sample: Beccles#1 2.02m, submitted in October 2006 by B Gearey

Material: waterlogged wood (unidentified bark, single fragment; -2.58m OD) (R Gale 2006)

Initial comment: as GrA-33471

Objectives: as GrA-33473

Calibrated date: 1σ: 1050–920 cal BC
2σ: 1120–900 cal BC

Final comment: see GrA-33473

Suffolk Rivers: Beccles core 2, Suffolk

Location: TM 64232920
Lat. 51.53.53 N; Long. 01.50.28 E

Project manager: T Hill (University of Birmingham), July 2006

Archival body: University of Birmingham

Description: analysis of aerial photographs, LiDAR, and grey literature as part of this project resulted in the identification of a thick peat sequence within the valley floodplain of the river Waveney, proximal to the town of Beccles. During flood alleviation works along the river Waveney, the excavation of a drainage ditch identified an abundance of vertical timber posts preserved within the peat archive. These were subsequently identified as the remnants of a prehistoric trackway. Coring proximal to the trackway confirmed the presence of up to 6m of fen peat overlying basal sands and gravels. With distance north from the archaeological excavation, the sedimentary sequence changes, with blue-grey clayey silts overlying the peat. The thickness of the minerogenic unit was also shown to increase northwards. Beccles core 2 was taken to the north of Beccles core 1, where the stratigraphy had been found to change from floodplain peat deposits into a sequence of *c* 2.8m blue-grey clays and silts overlying the fen peat. A distinct shift in environmental conditions was therefore inferred as having occurred, the timing of which was not known. The stratigraphic assessment suggested estuarine conditions had once prevailed in the area. Diatom analysis of the minerogenic sequence confirmed this. Radiocarbon dating of plant macrofossils from within the estuarine deposits was undertaken in order to provide a chronostratigraphic framework for the site.

Objectives: to determine the onset of the minerogenic sedimentation onto the underlying peat at the site; to identify variations in the rate of minerogenic accumulation within the coastal lowland environment during its depositional history; and to provide a chronological understanding of the variations in sedimentology within the minerogenic unit, which are believed to be related to changes in relative sea level.

Final comment: T Hill (19 September 2007), the application of diatom analysis to the sedimentary archive confirmed the presence of estuarine conditions as far inland as Beccles. Positive and negative sea-level tendencies have been inferred through the diatom assemblages preserved within each of the nine minerogenic units. Whilst the palaeoenvironmental evidence suggested a conformable sequence was present, radiocarbon dating of five samples taken from Beccles core 2 suggested that an intact sedimentary sequence was not present. Due to the absence of a reliable chronology, it was not possible to confirm whether such sea-level tendencies are indicators of marine transgressions or regressions resulting from changes in relative sea level within the Waveney valley.

Laboratory comment: English Heritage (18 December 2007), four samples of waterlogged plant material from 1.55m, 1.73m, 2.57m, and 2.75m, failed to produce sufficient carbon for dating. The results suggest that an intact sequence does not survive here, although the two modern results might be explained by the use of an Eijkalcamp corer in the minerogenic sediments.

References: Alderton 1983
Brew 1990
Hill *et al* 2007

GrA–33479 1.05 ±0.011 fM

$\delta^{13}C$: -29.7‰

Sample: Beccles#2 2.54m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (monocot stem; -3.03m OD) (R Gale 2006)

Initial comment: analysis of the minerogenic sediments within the valley floodplain of the river Waveney has indicated deposition in an intertidal coastal lowland environment. This sample was taken from the base of a blue-grey clayey silt, believed to have been deposited in an inter-tidal estuarine environment. The underlying geology of this part of the Waveney valley comprises glaciofluvial drift and chalk till. The stratigraphy and sedimentology of the deposits suggest the area has infilled naturally through biogenic *in situ* sedimentation. A shift from freshwater to estuarine conditions then occurred, resulting in the deposition of minerogenic sediments within a lowland coastal setting. The thickness of the estuarine sedimentary unit increases with distance north from the Beccles core 2 site. To the south, the thickness of the unit reduces until the stratigraphic archive is composed primarily of freshwater peat deposits. The natural water table was located *c* 0.5m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the timing of minerogenic sedimentation across the Holocene coastal lowland and to determine the duration of minerogenic sedimentation and variations in the rates of sedimentation in relation to relative sea-level change during the depositional history.

Calibrated date: 1σ: cal AD 1956–1958
2σ: cal AD 1955–1958

Final comment: T Hill (19 September 2007), when taking into account the complete sequence of radiocarbon dates taken from Beccles Core 2, it has been concluded that the dates are not stratigraphically reliable and hence palaeoenvironmental interpretations of the stratigraphic archive are limited.

Laboratory comment: English Heritage (18 December 2007), this result shows the influence of ^{14}C produced by atmospheric nuclear weapons testing and dates to after AD 1950. It has been calibrated using data from Kueppers *et al* (2004).

References: Kueppers *et al* 2004

GrA–35050 225 ±40 BP

δ¹³C: -27.7‰

Sample: Beccles#2 2.12m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (unidentified plant fragments, -0.083m OD) (Birmingham Archaeology 2006)

Initial comment: as GrA-33479

Objectives: as GrA-33479

Calibrated date: *1σ:* cal AD 1640–1955*
2σ: cal AD 1530–1955*

Final comment: see GrA-33479

GrA–35067 1445 ±40 BP

δ¹³C: -26.4‰

Sample: Beccles#2 2.83m A, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (unidentified plant remains; -3.32m OD) (Birmingham Archaeology 2006)

Initial comment: as GrA-33479

Objectives: as GrA-33479

Calibrated date: *1σ:* cal AD 570–650
2σ: cal AD 540–660

Final comment: see GrA-33479

SUERC–12038 915 ±35 BP

δ¹³C: -27.9‰

Sample: Beccles#2 1.34m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae, fragments; -1.83m OD) (Birmingham Archaeology 2006)

Initial comment: as GrA-33479

Objectives: as GrA-33479

Calibrated date: *1σ:* cal AD 1030–1170
2σ: cal AD 1020–1220

Final comment: see GrA-33479

SUERC–12039 1770 ±35 BP

δ¹³C: -24.2‰

Sample: Beccles#2 2.5m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (herbaceous stems, -0.083m OD) (R Gale 2006)

Initial comment: as GrA-33479

Objectives: as GrA-33479

Calibrated date: *1σ:* cal AD 230–330
2σ: cal AD 130–390

Final comment: see GrA-33479

Suffolk Rivers: Hengrave, Suffolk

Location: TL 82956918
Lat. 52.17.23 N; Long. 00.40.58 E

Project manager: T Hill (University of Birmingham), July 2006

Archival body: University of Birmingham

Description: analysis of aerial photographs, LiDAR, and grey literature as part of this project resulted in the identification of a possible palaeochannel within the floodplain of the river Lark, proximal to Hengrave. The lack of palaeoenvironmental research undertaken within the region resulted in the site being chosen for further analysis. Coring was undertaken along a transect running across the western floodplain of the river Lark. A core that was representative of the typical sedimentary archive of the Hengrave floodplain was extracted and stored for palaeoenvironmental analysis. Dark brown herbaceous well-humified peat typifies the stratigraphy to a depth of 3.m. Within the peat sequence variations in silt and sand content were encountered.

Objectives: to determine the timing of the onset of *in situ* organic sedimentation at the site; to identify variations in the rate of sedimentary accumulation within the floodplain environment during its depositional history; and to provide an understanding of the timing of enhanced minerogenic sedimentation within the peat depositional archive.

Final comment: T Hill (19 September 2007), the radiocarbon results obtained from the Hengrave core did not provide a chronological framework for the palaeoenvironmental study. Whilst the majority of the results could be interpreted as broadly conformable, inverse dates restricted subsequent assessments of the archive. The timing of the onset and cessation of phases of minerogenic and biogenic sedimentation could therefore not be established.

References: Hunt and Lewis 1991

GrA–33481 1965 ±40 BP

δ¹³C: -27.4‰

Sample: Hengrave 1.5m A, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae stems and internode; +19.11m OD) (Birmingham Archaeology 2006)

Initial comment: from the base of a unit of dark-brown/grey-brown herbaceous well-humified silty peat.

Objectives: to determine the timescale for *in situ* organic sedimentation in the valley floodplain of the river Lark; and to determine the duration of sedimentation and variations in the rates of sedimentation during the depositional history.

Calibrated date: *1σ:* 20 cal BC–cal AD 80
2σ: 50 cal BC–cal AD 130

Final comment: T Hill (19 September 2007), due to the presence of inverted dates within the Hengrave dating series, chronostratigraphic and palaeoenvironmental interpretations were restricted.

GrA–33482 1620 ±35 BP

δ¹³C: -27.3‰

Sample: Hengrave 2.56m A, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae fragments; +18.05m OD) (Birmingham Archaeology 2006)

Initial comment: as SUERC-12030

Objectives: as SUERC-12027

Calibrated date: *1σ:* cal AD 400–530
2σ: cal AD 340–540

Final comment: see SUERC-12027

GrA–35051 1025 ±45 BP

δ¹³C: -28.0‰

Sample: Hengrave 0.59m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae stems; +20.02m OD) (Birmingham Archaeology 2006)

Initial comment: from the base of a unit of grey-brown herbaceous very well-humified silty peat.

Objectives: as GrA-33481

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 890–1160

Final comment: see GrA-33481

GrA–35054 1740 ±45 BP

δ¹³C: -27.0‰

Sample: Hengrave 1.99m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae stems; +18.62m OD) (Birmingham Archaeology 2006)

Initial comment: from the base of a dark grey-brown herbaceous well-humified sandy peat with occasional sand horizons.

Objectives: as GrA-33481

Calibrated date: *1σ:* cal AD 240–390
2σ: cal AD 130–420

Final comment: see GrA-33481

SUERC–12027 125 ±35 BP

δ¹³C: -27.8‰

Sample: Hengrave 0.26m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae stems; +20.35m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from the top of a herbaceaous well-humified silty peat. The underlying geology of this part of the river Lark catchment is comprised predominantly of glaciofluvial drift. The stratigraphy and sedimentology of the deposits suggest the area infilled naturally through biogenic *in situ* sedimentation. The variation in minerogenic content within the peat units suggests changing environmental conditions during the development of the stratigraphic archive. The natural water table was located *c* 0.8m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: as GrA-33481

Calibrated date: *1σ:* cal AD 1680–1955*
2σ: cal AD 1660–1955*

Final comment: see GrA-33481

SUERC–12028 955 ±35 BP

δ¹³C: -25.9‰

Sample: Hengrave 0.99m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae fragments; +19.62m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from the base of a herbaceaous humified peat. The underlying geology of this part of the river Lark catchment is comprised predominantly of glaciofluvial drift. The stratigraphy and sedimentology of the deposits suggest the area infilled naturally through biogenic *in situ* sedimentation. The variation in minerogenic content within the peat units suggests changing environmental conditions during the development of the stratigraphic archive. The natural water table was located *c* 0.8m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: as GrA-33481

Calibrated date: *1σ:* cal AD 1020–1160
2σ: cal AD 1010–1170

Final comment: see GrA-33481

SUERC–12029 1750 ±35 BP

δ¹³C: -27.4‰

Sample: Hengrave 1.63m A, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (unidentified plant remains cf. seed/flower head; +18.98m OD) (Birmingham Archaeology 2006)

Initial comment: from the base of a unit of dark grey-brown herbaceous very well-humified slightly sandy peat.

Objectives: as GrA-33481

Calibrated date: *1σ:* cal AD 240–340
2σ: cal AD 210–400

Final comment: see GrA-33481

SUERC–12030 1000 ±35 BP

δ¹³C: -26.1‰

Sample: Hengrave 2.32m A, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae fragments; +18.29m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from within a herbaceous well-humified slightly silty peat. The underlying geology of this part of the river Lark catchment is comprised predominantly of glaciofluvial drift. The stratigraphy and sedimentology of the deposits suggest the area infilled naturally through biogenic *in situ* sedimentation. The variation in minerogenic content within the peat units suggests changing environmental conditions during the development of the stratigraphic archive. The natural water table was located *c* 0.8m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: as GrA-33481

Calibrated date: 1σ: cal AD 1010–1040
2σ: cal AD 980–1160

Final comment: see GrA-33481

SUERC–12031 1720 ±35 BP

$\delta^{13}C$: -27.3‰

Sample: Hengrave 2.99m, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (unidentified plant stems; +17.62m OD) (Birmingham Archaeology 2006)

Initial comment: from the base of a herbaceous well-humified slightly silty peat.

Objectives: as GrA-33481

Calibrated date: 1σ: cal AD 250–390
2σ: cal AD 230–420

Final comment: see GrA-33481

Suffolk Rivers: Ixworth, Suffolk

Location: TL 59382797
Lat. 51.55.37 N; Long. 00.19.06 E

Project manager: T Hill (University of Birmingham), July 2006

Archival body: University of Birmingham

Description: analysis of aerial photographs, LiDAR, and grey literature as part of this project resulted in the identification of possible organic deposits preserved within palaeochannel features within Mickle Mere, Ixworth. An abundance of archaeological sites, especially relating to the Roman period, have been found in and around Ixworth. Due to this abundance of local archaeology, combined with the lack of palaeoenvironmental research undertaken within the region, Mickle Mere was chosen as a site suitable for further analysis. Coring was undertaken along a transect running across the western floodplain of the river Black Bourn.
A core that was representative of the typical sedimentary archive of Mickle Mere was extracted and stored for further palaeoenvironmental analysis. Light grey slightly gravely silts from 0–0.57m are underlain by predominantly dark brown well-humified peat with varying silt content to 3.45m. Within the peat sequence are thin minerogenic horizons. An organic-rich sand horizon is located at 1.38–1.41m and a slightly gravelly organic silt is located at 2.5–2.64m. The peat unit is underlain by grey silty sands, which, in turn, is underlain by sand and gravels.

Objectives: to determine the timing of the onset of *in situ* organic sedimentation at the site; to identify variations in the rate of sedimentary accumulation within the floodplain environment during its depositional history; and to provide an understanding of the timing of enhanced minerogenic sedimentation within the peat depositional archive.

Final comment: T Hill (19 September 2007), of the seven samples submitted for radiocarbon dating, only the basal date could be considered as stratigraphically reliable, supporting the palaeoenvironmental evidence provided through pollen analysis. The basal date (GrA-33483) correlates with the pollen evidence in suggesting that organic sedimentation commenced in the early Holocene. The other dates, however, do not support the seemingly conformable pollen evidence that suggests an intact palaeoenvironmental sequence. A chronological framework therefore cannot be provided for the upper part of the sequence.

Laboratory comment: English Heritage (21 November 2007), a sample of bulk waterlogged plant remains from 0.56m failed when the combustion tube cracked in the furnace.

References: Murphy and Wiltshire 1989

GrA–33483 9900 ±60 BP

$\delta^{13}C$: -27.7‰

Sample: Ixworth 3.44m A, submitted in October 2006 by B Gearey

Material: waterlogged wood (+23.69m OD): *Alnus glutinosa*, single fragment (R Gale 2006)

Initial comment: this sample was taken from the base of a well-humified peat unit, which is underlain by silty sands. The underlying geology of the area surrounding Mickle Mere comprises predominantly chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have accumulated during periods of temporary catchment instability and floodplain flooding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the onset of the first phase of *in situ* organic sedimentation across the valley floodplain, to determine the duration of sedimentation and variations in the rates of sedimentation during the depositional history.

Calibrated date: 1σ: 9390–9280 cal BC
2σ: 9660–9250 cal BC

Final comment: T Hill (19 September 2007), radiocarbon dating of this sample provided the only reliable date from the Mickle Mere core. The date supports the palaeoenvironmental evidence provided through pollen analysis to suggest the onset of biogenic sedimentation at the site occurred in the early Holocene.

GrA–33485 6265 ±45 BP

$\delta^{13}C$: -29.0‰

Sample: Ixworth 2.49m, submitted in October 2006 by B Gearey

Material: waterlogged wood (+24.64m OD): *Alnus glutinosa*, single fragment (R Gale 2006)

Initial comment: this sample was taken from the base of a herbaceous well-humified peat unit, which is underlain by an organic silt unit. The underlying geology of the area surrounding Mickle Mere comprises predominantly chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have been accumulated during periods of temporary catchment instability and floodplain flooding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the timing of *in situ* organic sedimentation across the valley floodplain, and to determine the duration of sedimentation and variations in the rates of sedimentation during the depositional history.

Calibrated date: 1σ: 5310–5210 cal BC
2σ: 5330–5070 cal BC

Final comment: T Hill (19 September 2007), radiocarbon dating of the Mickle Mere core does not provide a reliable chronostratigraphic framework for the palaeoenvironmental development of the site. Except for the basal date, the remaining dates were commonly inverted, restricting any robust interpretations from being achieved.

GrA–35055 1935 ±40 BP

$\delta^{13}C$: -26.8‰

Sample: Ixworth 0.86m A, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (unidentified seed; +26.27m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from the base of a dark brown very well-humified unit, which is underlain by a silty peat. The underlying geology of the area surrounding Mickle Mere comprises predominantly chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have been accumulated during periods of temporary catchment instability and floodplain flooding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the timing of *in situ* organic sedimentation across the valley floodplain, and to determine the duration of sedimentation and variations in the rates of sedimentation during depositional history.

Calibrated date: 1σ: cal AD 20–130
2σ: 40 cal BC–cal AD 140

Final comment: see GrA-33485

GrA–35056 1465 ±45 BP

$\delta^{13}C$: -25.4‰

Sample: Ixworth 1.4m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossil (Poaceae fragments; +25.73m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from the base of a light grey-brown organic sand unit, which is underlain by dark brown well humified peat. The underlying geology of the area surrounding Mickle Mere comprises predominantly of chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have been accumulated during periods of temporary catchment instability and floodplain flodding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the onset of minerogenic sedimentation on the underlying peat unit across the valley floodplain, and to determine the duration of sedimentation and variations in the rates of sedimentation during the depositional history.

Calibrated date: 1σ: cal AD 550–650
2σ: cal AD 530–660

Final comment: see GrA-35485

SUERC–12021 1560 ±35 BP

$\delta^{13}C$: -27.0‰

Sample: Ixworth 1.37m B, submitted in October 2006 by B Gearey

Material: waterlogged plant macrofossils (Poaceae fragments; +25.76m OD) (Birmingham Archaeology 2006)

Initial comment: this sample was taken from the base of a dark brown very well-humified silty peat unit, which is underlain by an organic-rich sand horizon. The underlying geology of the area surrounding Mickle Mere comprises predominantly chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have been accumulated during periods of temporary catchment instability and floodplain flooding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: to determine the onset of *in situ* organic sedimentation on the underlying sand horizon across the valley floodplain, and to determine the duration of sedimentation and variations in the rates of sedimentation during the depositional history.

Calibrated date: 1σ: cal AD 430–550
2σ: cal AD 410–590

Final comment: see GrA-33485

SUERC–12025 2905 ±35 BP

δ¹³C: -27.4‰

Sample: Ixworth 1.49m A, submitted in October 2006 by B Gearey

Material: waterlogged wood (unidentified fragments; +25.64m OD) (R Gale 2006)

Initial comment: this sample was taken from the base of a well-humified slightly silt peat unit, which is underlain by herbaceous well-humified peat. The underlying geology of the area surrounding Mickle Mere comprises predominantly of chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have been accumulated during periods of temporary catchment instability and floodplain flooding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: as GrA-33485

Calibrated date: *1σ*: 1190–1010 cal BC
2σ: 1260–990 cal BC

Final comment: see GrA-33485

SUERC–12026 5980 ±40 BP

δ¹³C: -26.6‰

Sample: Ixworth 2.63m, submitted in October 2006 by B Gearey

Material: waterlogged wood (+24.50m OD): *Alnus glutinosa*, single fragment (R Gale 2006)

Initial comment: this sample was taken from the base of an organic silt unit, which is underlain by well-humified peat. The underlying geology of the area surrounding Mickle Mere comprises predominantly chalk, chalk till, and glaciofluvial drift and till. The stratigraphy and sedimentology of the deposits suggest the area initially infilled naturally through biogenic *in situ* sedimentation. Thin minerogenic horizons are present within the peat deposits, which may have been accumulated during periods of temporary catchment instability and floodplain flooding. The peat is capped by a layer of silt which is likely to have accumulated through floodplain deposition. The natural water table was located *c* 0.4m from the surface. Rootlet penetration was not evident within the core upon extraction.

Objectives: as GrA-33485

Calibrated date: *1σ*: 4940–4790 cal BC
2σ: 4990–4770 cal BC

Final comment: see GrA-33485

Swale-Ure Washlands: Ings Plantation (core 12A), North Yorkshire

Location: SE 27878475
Lat. 54.15.27 N; Long. 01.34.20 W

Project manager: A Long (Durham University)

Archival body: Durham University

Description: core 12A contains the deepest peat section from a transect of cores taken across Ings Planation at Snape Mires. The stratigraphic record shows approximately 0.5m of peat overlying shell marl, underneath which *Limus* is recorded before coring reached stiff blue clay and gravel

Objectives: to provide a chronology for organic sedimentation since the last glaciation and to help interpret geomorphological changes in landscape history.

Final comment: P Marshall (28 January 2008), the radiocarbon results show that the base of the core dates to the early post-Glacial 9870–9400 cal BC; (SUERC-8574), and the maximum *Betula* frequencies recorded in the pollen record to 9190–8720 cal BC (SUERC-8573). The two measurements from SN8 (0.79–0.81m) are statistically consistent (T′=1.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and date the *Corylus* rise in the pollen record to the mid-ninth millennium cal BC.

References: Bridgland *et al* forthcoming
Ward and Wilson 1978

SUERC–8568 9270 ±40 BP

δ¹³C: -28.4‰

Sample: SNM8 (0.79–0.81m), submitted on 1 November 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Menyanthes trifoliata*, seeds; Cyperaceae spp., nutlets; *Betula* sp., fruits (C O'Brien 2005)

Initial comment: core 12A contains the deepest peat section from a transect of cores taken across Ings Plantation at Snape Mires. The stratigraphy shows approximately 0.50m peat overlying shell marl, underneath which *limus* is recorded before the core ends in stiff blue clay and gravel. This sample is taken from the middle of the shell marl. The core is from a shallow peat basin on the edge of woodland and on land farmed for cattle. The sample is from the subsurface, is undisturbed and was sampled with a Russian corer. The section is underlain by rocks of carboniferous age.

Objectives: the dating strategy for this site at Ings Plantation is to provide good chronological control over vegetational history to aid palaeoenvironmental reconstruction. This date from core 12A is from the middle of the shelly marl and is coincident with the rise in *Corylus*.

Calibrated date: *1σ*: 8570–8450 cal BC
2σ: 8630–8330 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for the start of the rise of the *Corylus* curve and is compatible with most dates on this pollen stratigraphic feature at other sites in the region. The date is therefore acceptable.

Laboratory comment: (2007), two measurements on macrofossils from this level are statistically consistent (SUERC-8569 and SUERC-8968) (T′=1.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–8569 9330 ±40 BP

δ¹³C: -29.6‰

Sample: SNM8 (0.79–0.81m) B, submitted on 1 November 2005 by D Bridgland

Material: waterlogged wood (twigs) (C O'Brien 2005)

Initial comment: as SUERC-8568

Objectives: as SUERC-8568

Calibrated date: 1σ: 8640–8550 cal BC
2σ: 8710–8470 cal BC

Final comment: J Innes (9 July 2007), this date is from the same level as SUERC-8568 and, although different, is of the same order of age. It is acceptable for the timing of the start of the *Corylus* rise in this region.

Laboratory comment: see SUERC-8568

SUERC–8573 9545 ±55 BP

δ¹³C: -28.4‰

Sample: SNM9 (1.25m), submitted on 1 January 2005 by D Bridgland

Material: waterlogged plant macrofossil: Cyperaceae spp., nutlets; *Betula* sp., fruits (C O'Brien 2005)

Initial comment: as SUERC-8568

Objectives: as SUERC-8568

Calibrated date: 1σ: 9130–8770 cal BC
2σ: 9190–8720 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for the culmination of the early Holocene *Betula* pollen rise and the fall in local grass pollen frequencies. Although acceptable the date is rather late and the dominance of *Betula* pollen at this site may have been delayed by persistent high frequencies of grass pollen from local wetland sources.

SUERC–8574 10060 ±40 BP

δ¹³C: -26.5‰

Sample: SNM10 (1.42m), submitted on 1 November 2005 by D Bridgland

Material: waterlogged plant macrofossil: Cyperaceae spp., nutlets; *Menyanthes* sp.seeds (C O'Brien 2005)

Initial comment: as SUERC-8568

Objectives: the dating strategy for this site at Ings Plantation is to provide good chronological control over vegetational history to aid palaeoenvironmental reconstruction. This date marks the onset of organic lacustrine sedimentation at the site and would provide control for palaeoenvironmental as well as geomorphological interpretation.

Calibrated date: 1σ: 9810–9450 cal BC
2σ: 9870–9400 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for organic sedimentation at the base of the profile. It agrees with the pollen data in suggesting a time around the transition from the late-Glacial to the Holocene periods.

Swale-Ure Washlands: Newby Wiske, North Yorkshire

Location: SE 368866
Lat. 54.16.25 N; Long. 01.26.05 W

Project manager: A Long (Durham University), 2003

Archival body: Durham University

Description: the site is located three miles south of Northallerton and one mile south of the village of Newby Wiske, in the valley of the Sprudling Dike, a tributary of the river Wiske. More than 4m of clay, marl, and peat were proven in the centre of the valley. There are eight samples in the series, all from the same core.

Objectives: dating eight samples from Newby Wiske will provide a chronology for late Glacial and Holocene peat and marl accumulation, and for major vegetation changes and pollen zone boundaries.

Laboratory comment: English Heritage (18 December 2007), this sample was submitted in December 2003, and was omitted in error from Bayliss *et al* (2007a, 91–3).

References: Bayliss *et al* 2007a
Bridgland *et al* forthcoming

OxA–13226 8265 ±45 BP

δ¹³C: -25.8‰

Sample: NW-2 (0.2–0.45m), submitted on 9 December 2003 by A Long

Material: waterlogged plant macrofossil: *Nymphaea alba*, nutlets; *Eupatorium cannabinum* achenes; *Sparganium* subgen *Xanthosparganium*, nutlets; *Carex* sp., nutlet; *Betula* sp., fruits (C O'Brien 2003)

Initial comment: the core is taken from the area of deepest sediment thickness in the centre of a drainage channel at Newby Wiske, near Northallerton. This sample is taken from 2.04m depth in peat, where the continuous *Alnus* pollen curve begins, its empirical limit, and where the *Pinus* and *Quercus* curves rise.

Objectives: the dating strategy for this site is to establish a chronology for the accumulation of the peat sediments for major pollen zone boundaries, and to establish and evaluate human impact on the landscape.

Calibrated date: 1σ: 7450–7180 cal BC
2σ: 7480–7090 cal BC

Final comment: A Long (14 September 2004), this date was intended to provide an age for the rise of *Pinus* (pine) and *Quercus* (oak) pollen percentages and the start of the pollen curve for *Alnus* (alder). The date is not incompatible with the pollen data and compares with the range of dates for such a pollen assemblage elsewhere in lowland northern England. The date can be considered to be broadly acceptable.

Swale-Ure Washlands: Sharow Mires, Sharow, North Yorkshire

Location: SE 235715
Lat. 54.08.19 N; Long. 01.38.25 W

Project manager: A Long (Durham University), 2003–6

Archival body: Durham University

Description: the site is a palaeochannel of the Ure and may also have formed as a result of dissolution of the underlying gypsum beds. The site contains a 9m-deep record of organic-rich sediments of late Holocene age. These may provide a high-resolution database of vegetational history and human land use of middle-late Holocene age.

Objectives: to establish a detailed chronology for human impact on the landscape and changes in vegetation history.

Final comment: A Long (14 September 2004), this dating series has achieved its objectives in providing a detailed chronology for the alluvial sediments in this channel. The dates form a consistent chronological series and provide an age range for human agricultural activity and changes in alluvial history from Bronze Age to late medieval times.

Laboratory comment: English Heritage (18 December 2007), eight measurements from this sequence were published by Bayliss *et al* (2007a, 95–7).

References: Bayliss *et al* 2007a
Bridgland *et al* forthcoming

SUERC–8881 3905 ±35 BP

$\delta^{13}C$: -26.4‰

Sample: SNM13A (9.54m), submitted on 5 December 2005 by D Bridgland

Material: waterlogged plant macrofossil (hazelnut fragment) (C O'Brien 2005)

Initial comment: this sample is from the deepest level in the palaeochannel from which plant macrofossils were recovered and is from dark grey organic silts.

Objectives: to date the lowest level in the palaeochannel from which terrestrial plant macrofossils have been recovered.

Calibrated date: *1σ*: 2470–2300 cal BC
2σ: 2480–2280 cal BC

Final comment: P Marshall (16 April 2006), the two results from plant macrofossils from this level are not statistically consistent (T'=4.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978) although they only just fail a chi-squared test. These dates demonstrate that the sequence provides a detailed record from the early Bronze Age to the medieval period.

References: Ward and Wilson 1978

SUERC–8885 3805 ±35 BP

$\delta^{13}C$: -30.5‰

Sample: SNM13B (9.54m), submitted on 5 December 2005 by D Bridgland

Material: waterlogged wood (four twigs) (C O'Brien 2005)

Initial comment: as SUERC-8881

Objectives: as SUERC-8881

Calibrated date: *1σ*: 2300–2150 cal BC
2σ: 2400–2130 cal BC

Final comment: see SUERC-8881

SUERC–8886 3485 ±35 BP

$\delta^{13}C$: -29.9‰

Sample: SNM14 (8.93m), submitted on 5 December 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Alnus* sp., single fragment (C O'Brien 2005)

Initial comment: this sample at 8.93m is from dark grey organic silts.

Objectives: this sample is intended to date a low level in this alluvial sequence to extend the dating framework beyond the dates of the first phase of sampling (Bayliss *et al* 2007a, 95–7). It is well above the level of SNM-13, which was nearer the base of the channel fill.

Calibrated date: *1σ*: 1890–1740 cal BC
2σ: 1910–1690 cal BC

Final comment: P Marshall (16 April 2006), this result is in good agreement with the stratigraphic sequence from this palaeochannel.

References: Bayliss *et al* 2007a

Swale-Ure Washlands: Snape Mill, Tufa site, North Yorkshire

Location: SE 286854
Lat. 54.15.49 N; Long. 01.33.45 W

Project manager: D Bridgland (Durham University), 2005–6

Archival body: Durham University

Description: the Snape Mills tufa site at Snape Mires is a low lying former lakebed underlain by pockets of peat-rich sediments as well as clays, sands, gravels, and tufa deposits.

Objectives: to provide a chronology for organic sedimentation since the last glaciation and to help interpret geomorphological changes in landscape history.

Final comment: P Marshall (28 January 2008), the results show that sedimentation was taking place from the late-Glacial into the early Holocene.

References: Bayliss *et al* 2007a
Innes 2002
Powell *et al* 1992

SUERC–8566 11310 ±45 BP

$\delta^{13}C$: -28.1‰

Sample: SNM3 (1.03m), submitted on 1 November 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Carex* sp.; *Betula* sp., fruits, nutlets, and twigs (C O'Brien 2005)

Initial comment: part of the section is exposed in a stream/ditch cutting. Cores were taken using a piston corer beneath the surface to 3m+ depth. This sample is taken from the subsurface. The sample is from a peat-rich lithology. The peat-rich material is in a thin layer on either side of which brown clay with gravel/pebbles occurs. The section is underlain by rocks of carboniferous age.

Objectives: the dating strategy for this site at Snape Mills (the "tufa" site) is to establish a chronology for organic sedimentation at this location. An important focus is to establish the duration of lacustrine environments at Snape Mills. Dating this particular sample will provide part of the dating control within which the palaeoenvironments may be interpreted. This peat layer is particularly interesting as it occurs between two clastic intervals with pebbles/gravel, suggesting a period of relative quiet sedimentation between more unstable events. This date could be critical to our understanding of geomorphological history at this site.

Calibrated date: *1σ*: 11300–11190 cal BC
2σ: 11330–11150 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for a switch from birch woodland to much more open tundra-type environments, presumably under severe cold climate. Although rather early, the date corresponds with such a switch at the start of the late Glacial (Loch Lomond) stadial and is therefore broadly acceptable.

SUERC–8567 12330 ±45 BP

$\delta^{13}C$: -27.1‰

Sample: SNM5 (2.94m), submitted on 1 November 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Eleocharis* sp., nutlets and unidentified twigs (C O'Brien 2005)

Initial comment: cores were taken using a piston corer beneath the surface to 3m+ depth. The sample is from the lowest organic clay/*limus* cored in the stream section. The section is underlain by rocks of carboniferous age.

Objectives: the dating strategy for this site at Snape Mills (the "tufa" site) is to establish a chronology for organic sedimentation at this location. An important focus is to establish the duration of lacustrine environments at Snape Mills. Dating this sample would provide an earliest date for the onset of organic sedimentation since glacial conditions prevailed. This date is essential to understanding and interpretation of post-Glacial lacustrine sedimentation at this site.

Calibrated date: *1σ*: 12310–12170 cal BC
2σ: 12650–12110 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for a phase near the base of the diagram that the sedge and grass pollen data suggest was a time of very severe cold climate. The age corresponds with such a cold period in the middle of the late-Glacial interstadial that has been dated elsewhere in northern England to a little before 12 ka BP, and so is acceptable.

SUERC–8879 9580 ±40 BP

$\delta^{13}C$: -24.5‰

Sample: SNM11 (+0.14m), submitted on 1 November 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Carex* sp.; *Betula* sp., fruits and bracts (C O'Brien 2005)

Initial comment: part of the section is exposed in a stream/ditch cutting. Cores were taken using a piston corer beneath the surface to 3m+ depth and monolith tins were used to collect material from the above ground surface section. The stratigraphic log, showing details of the profile, was attached with previous sample SNM1 in this series. This sample is taken from the lower of the two organic bands in the section. Its base forms the ground surface and site datum, hence the positive depth for this sample. The sample is from the base of the lower of two organic-rich peat-clay layers that underlie the tufa capping to this site. The section is underlain by rocks of carboniferous age.

Objectives: the dating strategy for this site at Snape Mires (the "tufa" site) is to establish a chronology for organic sedimentation at this location. An important focus is to establish the duration of lacustrine environments at the Snape Mires. Dating this particular sample will provide part of the dating control within which the palaeoenvironments may be interpreted.

Calibrated date: *1σ*: 9140–8810 cal BC
2σ: 9190–8770 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for the highest pollen level at this profile and is in series with the preceding date. Rising birch frequencies suggest the succession towards birch woodland in the early Holocene, although high local sedge percentages suppress the birch rise. The date is therefore acceptable.

SUERC–8880 10040 ±45 BP

$\delta^{13}C$: -25.1‰

Sample: SNM12 (+10mm), submitted on 1 November 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Sonchus* sp., achene; *Betula* sp., twigs (C O'Brien 2005)

Initial comment: part of the section is exposed in a stream/ditch cutting. Cores were taken using a piston corer beneath the surface to 3m+ depth. This sample is taken from an upper organic band. Datum for the section is the ground surface, level with the base of a lower organic band, hence the positive depth for this sample. The sample is from the upper of two organic rich peat-clay layers that underlies the tufa capping to this site. The section is underlain by rocks of carboniferous age.

Objectives: the dating strategy for this site at Snape Mires (the "tufa" site) is to establish a chronology for organic sedimentation at this location. An important focus is to establish the duration of lacustrine environments at the Snape Mires. Dating this particular sample will provide part of the dating control within which the palaeoenvironments may be interpreted.

Calibrated date: *1σ*: 9760–9440 cal BC
2σ: 9820–9360 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for the return of the pollen record after a period during which pollen was not preserved in the profile. The pollen data suggest a time at the transition from the late-Gacial to the Holocene period. This date is similar to several dates for this change regionally and beyond, and so is acceptable.

Swale-Ure Washlands: the Gallop, North Yorkshire

Location: SE 28358425
Lat. 54.15.11 N; Long. 01.33.53 W

Project manager: A Long (Durham University)

Archival body: Durham University

Description: the Gallop lies at the centre of the Snape Mires basin where a thin peat survives overlying shell marl, *limus*, and blue clay.

Objectives: to provide a chronology for organic sedimentation since the last glaciation and to help interpret geomorphological changes in landscape history.

Final comment: P Marshall (29 January 2008), the results show that peat started to accumulate at The Gallop in the late tenth to early ninth millennium cal BC.

References: Bridgland *et al* forthcoming

SUERC–8887 9515 ±40 BP

$\delta^{13}C$: -25.0‰

Sample: SNM16 (0.77m) A, submitted on 5 December 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Menyanthes trifoliata*, seed; *Lycopus europaeus*, nutlets; *Carex* sp., nutlets (C O'Brien 2005)

Initial comment: the site of the Gallop lies in the centre of Snape Mires and contains thin peat overlying shell marl, *limus* and blue clay. This sample is taken from the base of the peat where it overlies the shell marl. The core is from the centre of the Snape basin where only shallow peat has survived. The area is farmed for livestock. The sample is from a section exposed in a drainage ditch. The section is underlain by rocks of carboniferous age.

Objectives: the dating strategy for this site at The Gallop is to provide good chronological control over vegetational history to aid palaeoenvironmental reconstruction. This date from The Gallop is from the base of the peat overlying shelly marl and is coincident with the change from *Betula* pollen dominance to open conditions with abundant Poaceae. There may be an hiatus in depositions between the peat and the marl.

Calibrated date: 1σ: 9120–8760 cal BC
2σ: 9130–8720 cal BC

Final comment: J Innes (9 July 2007), this date provides an age for the start of the pollen curve for *Corylus* after birch frequencies have fallen from dominance. The date in the mid-first millennium of the Holocene is earlier than elsewhere at Snape but similar to several dates for this feature in northern England and so is acceptable.

Laboratory comment: English Heritage (2007), the replicate measurements on bulk plant macrofossils from this level are statistically consistent (T'=1.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–8888 9475 ±40 BP

$\delta^{13}C$: -25.9‰

Sample: SNM16 (0.77m) B, submitted on 5 December 2005 by D Bridgland

Material: waterlogged plant macrofossil: *Menyanthes trifoliata*, seeds; *Lycopus europaeus*, nutlets; *Carex* sp., nutlets (C O'Brien 2005)

Initial comment: as SUERC-8887

Objectives: as SUERC-8887

Calibrated date: 1σ: 8810–8730 cal BC
2σ: 9120–8630 cal BC

Final comment: see SUERC-8887

Laboratory comment: see SUERC-8887

Till-Tweed Project, Northumberland

Location: NU 020165to NU 001 524
Lat. 55.26.32 N; Long. 01.58.06 W, to
Lat. 55.45.17 N; Long. 03.35.31 W

Project manager: D Passmore and C Waddington (University of Newcastle upon Tyne and Archaeological Research Services Ltd), 2003–5

Description: the Till-Tweed Project (also encompassing the Milfield Basin Geoarchaeology Project) is a large-scale geoarchaeological investigation of the late Quaternary landscape and its archaeological associations in the valleys of the Breamish, Till, and lower Tweed, a continuous valley reach in Northumberland, north-east England, that extends from the uplands of the Cheviot massif to the North Sea coast at Berwick.

Objectives: to establish the spatial extent and character of landscapes associated with glaciation and deglaciation (including ice-contact meltwater deposits and glaciofluvial sand and gravel terraces) in the valley floor of the Till-Tweed study area; to establish the spatial extent, character, and (where possible) the chronology of Holocene landforms and sedimentary sequences within the study area; to identify and evaluate the extent and preservation of deposits of palaeoenvironmental and archaeological value developed on glacial and post-glacial landscapes within the study area; to enhance the understanding of past human land-use and settlement in the study area through analysis of aerial photographs and a programme of archaeological fieldwalking, limited excavation, and test-pitting; and to develop an archaeological evaluation and management guidance framework for the Till-Tweed study area.

Laboratory comment: English Heritage (9 December 2007), further radiocarbon dates from this project are reported by Bayliss *et al* (2007a, 11–25).

References: Bayliss *et al* 2007a
Passmore and Waddington forthcoming

Till-Tweed: Galewood, Northumberland

Location: NT 954323
Lat. 55.35.04 N; Long. 02.04.23 W

Project manager: D Passmore (University of Newcastle upon Tyne) C Waddington (Archaeological Research Services Ltd), 2005

Archival body: University of Newcastle upon Tyne

Description: a poorly drained boggy depression at Galewood, near Thirlings, in the Milfield Basin, river Till, Northumberland. The depression is part of a late-Glacial palaeochannel cut into glaciodeltaic sand and gravels (Passmore *et al* 1998; 2002); this low-lying area has locally infilled with up to 1.3m of Holocene peaty silts and fine sand, silt, and clay. Sediment core Galewood 1 is representative of the sedimentary sequence infilling the depression. The upper part of the core comprises 0.87m of fine sandy silt with occasional laminations of fine sand, occasional plant macrofossils, and some limited root penetration. These relatively inorganic sediments overlie dark brown humified peaty silt between 0.87–1.15m, which in turn seals coarse sand and gravel forming the late-Glacial channel bed. Sample GW-90 was taken from the upper levels of the peaty unit between 0.9–0.95m and, in conjunction with sample GW-115, was intended to bracket the period of peaty accumulation in this part of the palaeochannel.

Objectives: the site was recored in November 2005 to support the Cheviot Quarry excavations. Core Galewood 1 was extracted from sediments infilling a palaeochannel of late-Glacial origin that is proximal to several important prehistoric and early historic sediment sites, including the Anglo-Saxon site at Thirlings and the Neolithic settlement site at the recently excavated Cheviot Quarry (less than 300m to the north of the core site). Peaty silts between 0.87–1.15m at Galewood are assumed to be of Holocene age and may therefore contain a palaeoenvironmental record with the potential to elucidate the landscape context and land-use activities contemporary with these nearby sites or other archaeological periods. This dating programme is intended to establish the age span of the peaty unit and thereby determine whether a more detailed assessment of the deposit is warranted. Sample GW-90 is taken from the upper levels of the peaty unit between 0.9–0.95m and, in conjunction with sample GW-115, will bracket the period of peaty accumulation in this part of the palaeochannel.

References: Passmore *et al* 1998
Passmore *et al* 2002

SUERC–9080 11490 ±35 BP

$\delta^{13}C$: -26.9‰

Sample: GW-90, submitted in April 2005 by D Passmore

Material: waterlogged wood: *Alnus* sp., single fragment (D Passmore 2005)

Initial comment: sample GW-90 is taken from a humified peaty silt between 0.9–0.95m in the upper part of the peaty silt unit.

Objectives: sample GW-90 is one of two range-finding samples from core Galewood 1 that are submitted for dating.

Calibrated date: *1σ*: 11430–11330 cal BC
2σ: 11470–11300 cal BC

Final comment: D Passmore (24 October 2007), both this date (SUERC-9080) and SUERC-9081 gave older dates than anticipated and indicate that the phase of organic-rich sediment accumulation at Galewood occurred in the late Glacial (Windermere) Interstadial. Given the age of the samples, it is considered that the sample material is unlikely to be alder, and this material was probably mis-identified. These dates are consistent, however, with the location of the core site in a late Glacial palaeochannel cut into glaciodeltaic sand and gravels (Passmore *et al* 1998; 2002) and, although there is little prospect for conducting palaeoecological analysis of Holocene environments at this site, it is of considerable interest as one of the few radiocarbon-dated late Glacial sites in north-east England.

References: Passmore *et al* 1998
Passmore *et al* 2002

SUERC–9081 12280 ±40 BP

$\delta^{13}C$: -27.4‰

Sample: GW-115, submitted in April 2005 by D Passmore

Material: waterlogged wood: *Alnus* sp., single fragment (D Passmore 2005)

Initial comment: sample GW-115 is taken from a humified peaty silt unit between 1–1.15m in the upper part of the peaty silt unit.

Objectives: sample GW-115 is one of two range-filling samples from core Galewood 1 that are submitted for dating.

Calibrated date: *1σ*: 12250–12120 cal BC
2σ: 12310–12070 cal BC

Final comment: see SUERC-9080

Till-Tweed: Norham Castle, Northumberland

Location: NT 90654655
Lat. 55.42.44 N; Long. 02.08.56 W

Project manager: C Waddington (Archaeological Research Services Ltd), 2005

Archival body: Museum of Antiquities, Newcastle upon Tyne

Description: a substantial earthen bank extending across a natural promontory on the south bank of the river Tweed. An English Heritage survey suggested that this bank pre-dated the medieval castle and could be the remnants of an Iron Age promontory fort. A test pit was excavated to test this interpretation. This series consists of a single piece of wood from a thin branch found in the primary dump of the earthen bank.

Objectives: the sample will provide a date for the construction of the earthen bank. If the date is late (eg medieval) it means that an Iron Age date can de discounted.

Final comment: D Passmore (24 October 2007), only one dating sample was submitted.

References: Passmore and Waddington forthcoming

SUERC–6782 1.03 ±0.0047 fM

$\delta^{13}C$: -28.2‰

Sample: NOR 1, submitted in April 2005 by C Waddington

Material: waterlogged wood (0.65g) (*Castanea* sp., probably roundwood, single fragment) (R Gale 2005)

Initial comment: the sample comes from a slender branch of wood found within the primary 'rampart' dump of the bank at Norham Castle, suggested by the English Heritage survey team to be of Iron Age date. The bank must be later than the date of the timber and as such the date of the timber would provide a date for the primary bank dump. The sample was found 0.65m below the surface within the primary bank dump that comprised a distinctive blue-grey gravel. The geology comprises old red sandstone with overlying fill in places. The primary dump lay on a thin band of fill (measuring just several cm thick, and this overlay the sandstone bedrock). There was no root penetration into this deposit.

Objectives: the sample can provide a *terminus ante quem* on this large feature. It has been postulated as forming a promontory fort belonging to the Iron Age by an English Heritage surveying team. If it is Iron Age it would be the largest fort of this period in Northumberland. However, it could form part of the medieval castle outworks and so dating of this currently unscheduled feature remains important. If the date from the wood is medieval it would demonstrate that the bank cannot be prehistoric. Therefore an indicator date is important for both the characterisation and future conservation of this site.

Calibrated date: *1σ*: cal AD 1956–1957
2σ: cal AD 1955–1958

Final comment: D Passmore (24 October 2007), the radiocarbon date reveals that the piece of wood dates to the post-medieval to Victorian period and suggests that this bank was constructed as part of the remodelling of this area of the site, possibly as part of its use as a market garden. The bank's regular form, its lack of evidence for any kind of breastwork and its uniform composition support the radiocarbon date that indicates the bank is a relatively modern feature. The suggestion that it could have belonged to a prehistoric hillfort circuit seems no longer to be valid.

Laboratory comment: English Heritage (20 December 2007), this measurement shows the influence of carbon from modern atmospheric nuclear weapons testing, and has been calibrated using data from Keuppers *et al* (2004).

References: Kueppers *et al* 2004

Till-Tweed: river Beamish at Powburn, Northumberland

Location: NU 030165to NU 075 185
Lat. 55.26.32 N; Long. 01.57.09 E, to
Lat. 55.27.37 N; Long. 01.52.53 W

Project manager: D Passmore (University of Newcastle upon Tyne), 2005

Archival body: University of Newcastle upon Tyne

Description: the study area of the Till-Tweed project encompasses the valley floor of the river Till (called the river Breamish in its upper reaches) down-valley from Ingram (NU 020 165) to the Tweed confluence at Tweedmill (NT 870 430), and thence downstream through the lower Tweed corridor to Berwick (NT 001 524). Preliminary analysis of this area indicates that valley floors may be classified into five broad geomorphological settings that present contrasting scenarios for the preservation and evaluation of archaeological and palaeoenvironmental resources. The first of these reaches, between Ingram and New Berwick Bridge, is the piedmont reach of the Breamish as it leaves the steep and deeply incised valley upstream of Ingram. Here the gravel-bed Breamish occupies a valley floor up to 1km wide and is characterised by a low-sinuosity channel, which is upstream of the A697 bridge at Powburn divided by unstable active gravel bars. Historic maps indicate that the channel in this reach has been characterised by episodic channel division and lateral migration since the mid-nineteenth century. The selected study site in the valley floor near Powburn is representative for the first reach. Recent work and previous publications at the Powburn Quarry (Tipping 1992; 1994) have demonstrated the valley floor to be locally infilled by at least 7m of late Glacial and Holocene gravels. Lateral mobility increased after *c* 2500 BP (*c* 550 cal BC) (Tipping 1994) and successive fluvial incision and narrowing of the valley floor presumably took place since late medieval times. The single requested date is additional to a series of eight samples submitted during the first phase of the Till-Tweed project (Bayliss *et al* 2007a, 117–22). Over this reach the floodplain gradient changes from 0.0083m/m to 0.0044m/m and the gravel bed river transforms from an anabranching to a single meandering channel. It is the first dating series intended to establish the valley floor evolution and the age of the organic-rich deposits over different parts of the study reach. The sample of the series came from organic-rich deposits and tree trunks incorporated within and below the fluvial sequence.

Objectives: this series comprises a single sample from sediment core B12; phase 1 of the project obtained a date of cal AD 1410–1620 (SUERC-1156; 430 ±40 BP; Reimer *et al* 2004) between 0.9–0.96m (sample Bcd-6). This new sample is taken from a depth of 0.8m and will provide age control for the upper levels of a silty peat channel fill deposit that has been analysed for plant macrofossil, insect, and pollen content. It will also serve to confirm the chronology established by the earlier date.

References: Bayliss *et al* 2007a
Passmore and Waddington forthcoming
Reimer *et al* 2004
Tipping 1992
Tipping 1994

OxA–15085 105 ±24 BP

$\delta^{13}C$: -28.9‰

Sample: Bdc-6 (2), submitted in April 2005 by D Passmore

Material: waterlogged plant macrofossil: *Eleocharis* sp. (J Cotton 2005)

Initial comment: sample Bcd-6(2) is taken from the central part of a fine-grained palaeochannel fill on the T2 terrace level at location B12 in the valley floor. The depth of the fine-grained channel fill is 1.41m and the sample is taken at 0.8m. The sediment cores shows a succession of 0.84m of sandy to clayey silt on top of 0.32m of peaty silt – silt peat with abundant macros, followed by 0.25m of clayey silt to silty sand and is grounded on gravel at a depth of 1.41m. The relatively thick fine-grained organic palaeochannel fill shows the same succession in cores B13 and section B11. The stratified sediments on top of the peat layer and the lateral continuation of the later in several sediment observations argues against the possibility of post-depositional disturbance of the basal peaty silt. There is no contamination with younger organic material. The sample was extracted from a matrix of silty peat, which formed in a deep palaeochannel that is expressed in the surface morphology of terrace level T2.

Objectives: this sample is taken from a depth of 0.8m and will provide age control for the upper levels of a silty peat channel fill deposit that has been analysed for plant macro fossil, insect, and pollen content.

Calibrated date: *1σ:* cal AD 1690–1955*
2σ: cal AD 1680–1955*

Final comment: D Passmore (24 October 2007), this new sample dates the upper part of the organic-rich channel fill deposit in core B12 to sometime during or after the late-seventeenth century AD; it is stratigraphically consistent with the earlier date of *c* cal AD 1420–1620 (SUERC-1156) between 0.9–0.96m.

Till-Tweed: river Beamish-Till at Saw Mill, Northumberland

Location: NU 075191
Lat. 55.27.56 N; Long. 01.52.53 W

Project manager: D Passmore (University of Newcastle upon Tyne), 2003–6

Archival body: University of Newcastle upon Tyne

Description: the study areas of the Till-Tweed project encompasses the valley floor of the river Till (called the river Breamish in its upper reaches) down-valley from Ingram (NU 020 165) to the Tweed confluence at Tweedmill (NT 870 430), and thence downstream through the lower Tweed corridor to Berwick (NT 001 524). Preliminary analysis of this area indicates that valley floors may be classified into five broad geomorphological settings that present contrasting scenarios for the preservation and evaluation of archaeological and palaeoenvironmental resources. The second of these reaches, between New Berwick Bridge and Weetwood, is characterised by high sinuosity meandering channels that occupy a till-mantled valley consisting of several wider alluvial basins connected by confined corridors. The alluvial valley floor reaches a maximum width of 0.5km. The reach is narrowly confined by a Fell sandstone ridge immediately upstream of Weetwood. The selected study site in the valley floor near Saw Mill is one of two representative stretches of the second reach. There have been no previous studies of the Holocene valley floor development and sediments in this part of the valley floor. This series comprises three dates that are additional to a series of six samples submitted during the first phase of the Till-Tweed project (Bayliss *et al* 2007a, 122–5). The first dating series was intended to establish (i) the age of the associated terrace units and (ii) the age of preserved deposits of palaeoenvironmental and geoarchaeological significance by dating organic-rich deposits in palaeochannels. This new series of dates is from the upper levels of organic-rich fills in sequences BT2, 5, and 10; each sequence is representative of a separate palaeochannel.

Objectives: this new series will provide the age control for the upper levels of organic-rich channel fill deposits in sequences BT2, 5, and 10 that have been analysed for plant macrofossil, insect, and pollen content. The new series will also serve to confirm the chronology established by these earlier dates.

References: Bayliss *et al* 2007a
Passmore and Waddington forthcoming

OxA–15049 229 ±28 BP

δ¹³C: -25.9‰

Sample: BTcd-1 (2), submitted in April 2005 by D Passmore

Material: waterlogged plant macrofossil (*Carex* spp., seeds) (J Cotton 2005)

Initial comment: sample BTcd-1(2) is taken from the central part of a fine-grained palaeochannel fill on the T2 terrace level at location BT2 in the valley floor at Saw Mill. The depth of the fine-grained channel fill is 2.66m and the sample is taken from 0.97m. The sediment core shows a succession of 0.93m of clayey silt on top of 1.21m of peaty silt and silty peat with abundant macros, followed by 0.52m of clayey silt to silty sand (with abundant macros), and is grounded on gravel at 2.66m. The relatively thick fine-grained organic palaeochannel fill shows the same succession in adjacent cores. The stratified sediments on top of the peat layer and the lateral continuation of the latter in several sediment sequences argue against post-depositional disturbance of the basal peaty silt. There is no contamination with younger organic material. The sample was extracted from a matrix of alluvial silty peat (pH 6.45, LOI 48%) and is deposited in an abandoned channel (oxbow lake sedimentation). The upstream catchment area of the Breamish-Till river consists mainly of metamorphic and igneous rocks of the Cheviot massif, and additionally of some local sandstone.

Objectives: sample BTcd-1(2) is the second level to be dated from this sediment core; an earlier phase of the project obtained a date of cal AD 900–1160 (SUERC-1158; 1015 ±40 BP, Reimer *et al* 2004) between 2–2.14m (sample BTcd-1). The new sample is taken from a depth of 0.97m and will provide age control for the upper levels of a silty peat channel fill deposit that has been analysed for plant macrofossil, insect, and pollen content. It will also serve to confirm the chronology established by the earlier date.

Calibrated date: *1σ:* cal AD 1640–1955*
2σ: cal AD 1640–1955*

Final comment: D Passmore (24 October 2007), this new sample dates the upper part of the organic-rich channel fill deposit in core BT2 to the period during or after the late seventeenth century AD; the date is later than anticipated but is stratigraphically consistent with the earlier date of *c* cal AD 900–1150 (SUERC-1158) between 2–2.14m. The date is also consistent with pollen evidence of a largely deforested and cultivated landscape.

References: Reimer *et al* 2004

OxA–15050 171 ±28 BP

δ¹³C: -25.9‰

Sample: BTcd-2 (2), submitted in April 2005 by D Passmore

Material: waterlogged plant macrofossil (*Carex* spp., seeds) (J Cotton 2005)

Initial comment: sample BTcd-2(2) is taken from the central part of a fine-grained palaeochannel fill on the T2 terrace level at location BT5 in the valley floor at Saw Mill. The depth of the fine-grained channel fill is 1.8m and the sample is taken from 0.43m. The sediment core shows a succession of 1.7m peaty silt and silty peat with abundant macros, followed by 0.1m of sand and is grounded on gravel at 1.8m. The relatively thick fine-grained organic palaeochannel fill shows the same succession in adjacent cores. The stratified sediments on top of the peat layer and the lateral continuation of the latter in several sediment sequences argue against post-depositional disturbance of the basal peaty silt. There is no contamination with younger organic material. The sample was extracted from a matrix of silty peat (pH 6.57, LOI 68%) and is deposited in an abandoned channel (oxbow lake sedimentation).

Objectives: sample BTcd-2(2) is the second level to be dated from this sediment core; an earlier phase of the project obtained a date of cal AD 390–570 (SUERC-1159; 1585 ±40 BP, Reimer *et al* 2004) between 1.6–1.7m (sample BTcd-2). The new sample is taken from a depth of 0.43m and will provide age control for the upper levels of a silty peat channel fill deposit that has been analysed for plant macrofossil, insect, and pollen content. It will also serve to confirm the chronology established by the earlier date.

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1660–1955*

Final comment: D Passmore (24 October 2007), this new sample dates the upper part of the organic-rich channel fill deposit in core BT5 to the period during or after the late seventeenth century AD; the date is younger than anticipated but is stratigraphically consistent with the earlier date of *c* cal AD 390–600 (SUERC-1159) between 1.6–1.7m. A relatively young date for this level of the sediment sequence (0.43m depth) is also consistent with pollen evidence of an expansion in *Pinus* above 0.2m; this trend most probably reflects the marked expansion of pine plantations that has occurred in the area over the last 100 years or so.

References: Reimer *et al* 2004

OxA–15051 182 ±27 BP

$\delta^{13}C$: -27.1‰

Sample: BTcd-3 (2), submitted in April 2005 by D Passmore

Material: waterlogged plant macrofossil (*Carex* spp., seeds) (J Cotton 2005)

Initial comment: sample BTcd-3(2) is taken from the central part of a fine-grained palaeochannel fill on the T2 terrace level at location BT10 in the valley floor at Saw Mill. The depth of the fine-grained channel fill is 1.1m and the sample was taken from 0.65m. The sediment core shows a succession of 1.1m of peat and silty peat with abundant macros and is grounded on gravel at 1.1m. The relatively thick fine-grained organic palaeochannel fill shows the same succession in adjacent cores. The stratified sediments on top of the peat layer and the lateral continuation of the latter in several sediment sequences argue against post-depositional disturbance of the basal peaty silt. There is no contamination with younger organic material. The sample was extracted from a matrix of peat (pH 6.48, LOI 85%) and was deposited in an abandoned channel (oxbow lake sedimentation).

Objectives: sample BTcd-3(2) is the second level to be dated from this sediment core; an earlier phase of the project obtained a date of cal AD 670–940 (SUERC-1160; 1220 ±40 BP, Reimer *et al* 2004) between 0.95–1.1m (sample BTcd-3). This new sample is taken from a depth of 0.65m and will provide age control for the upper levels of a peaty channel fill deposit that has been analysed for plant macrofossil, insect, and pollen content. It will also serve to confirm the chronology established by the earlier date.

Calibrated date: *1σ:* cal AD 1660–1955*
2σ: cal AD 1650–1955*

Final comment: D Passmore (24 October 2007), this new sample dates the upper part of the organic-rich channel fill deposit in core BT10 to the period during or after the late seventeenth century AD; the date is later than anticipated but is stratigraphically consistent with the earlier date of *c* cal AD 680–940 (SUERC-1160) between 0.95–1.1m. The date is also consistent with pollen evidence of a largely deforested and intensively grazed and cultivated landscape.

References: Reimer *et al* 2004

Till-Tweed: river Tweed at Coldstream, Northumberland

Location: NT 845390
Lat. 55.38.40 N; Long. 02.14.47 W

Project manager: D Passmore (University of Newcastle upon Tyne), 2003–6

Archival body: University of Newcastle upon Tyne

Description: the study areas of the Till-Tweed project encompasses the valley floor of the river Till (called the river Breamish in its upper reaches) down-valley from Ingram (NU 020 165) to the Tweed confluence at Tweedmill (NT 870 430), and thence downstream through the lower Tweed corridor to Berwick (NT 001 524). Preliminary analysis of this area indicates that valley floors may be classified into five broad geomorphological settings that present contrasting scenarios for the preservation and evaluation of archaeological and palaeoenvironmental resources. The lower Tweed reach (TW) is located between Coldstream and Berwick upon Tweed and is characterised by low sinuosity meandering channels that are inset into cementstone (limestone), sandstone, and till deposits. The valley features several wide alluvial basins that are connected by narrow, drift, and bedrock-confined reaches with little alluvial storage; the widest alluvial basin (1.5km) is at Coldstream and displays the most complete terrace sequence of lower Tweed. Its terrace sequence can be correlated to the downstream alluvial basins in the lower Tweed area. There have been no previous studies of the Holocene valley floor development and sediments in this part of the valley floor. This series comprises two dates that are additional to a series of six samples submitted during the first phase of the Till-Tweed project (Bayliss *et al* 2007a, 115–17). All samples are from organic-rich sedimentary sequences infilling palaeochannels of the lower Tweed. The first dating series was intended to establish (i) the age of the various terrace units and (ii) the age of preserved deposits of palaeoenvironmental and geoarchaeological significance by dating organic-rich deposits in palaeochannels. This new series of dates is from the upper levels of organic-rich fills in sequences CDS1 and TW11; these cores were extracted from different locations in the same palaeochannel.

Objectives: this new series will provide the age control for the upper levels of organic-rich channel fill deposits in sequences CDS1 and TW11 that have been analysed for plant macrofossil, insect, and pollen content.

References: Bayliss *et al* 2007a
Passmore *et al* 2006
Passmore and Waddington forthcoming

OxA–15037 335 ±24 BP

$\delta^{13}C$: -26.8‰

Sample: TWcd-2(2), submitted in April 2005 by D Passmore

Material: waterlogged plant macrofossil: *Alnus* sp. (J Cotton 2005)

Initial comment: sample TWcd-2(2) was taken from a fine-grained palaeochannel fill at the southern edge of the valley floor on the central T3 terrace level at location CDS1 in the Coldstream study area. The depth of the fine-grained channel fill is 2.7m (over gravel) and the sample is from 1.05m. The sediment core shows a succession of bedded organic-rich fine sandy silt and silty sand with frequent macros and wood fragments. The relatively thick fine-grained organic palaeochannel fill shows the same successions in adjacent cores. The stratified sediments on top of the proposed sample and the similar sediment sequence in adjacent cores argue against post-depositional disturbance of the sampled organic-rich layer. There is no contamination with younger organic material. The sample consists of alder macrofossils extracted from organic-rich fine sandy silts infilling an abandoned channel (oxbow lake sedimentation). The upstream catchment area of the lower Tweed river consists of a variety of metamorphic and igneous rocks; and additionally of some local sandstone, till, and limestone with coal.

Objectives: sample TWcd-2(2) is the second level to be dated from this sediment core; an earlier phase of the project obtained duplicate dates on wood from a depth of 1.9–2m, giving consistent dates of cal AD 1010–1160 (OxA-12601; 969 ±26 BP) and cal AD 1015–1155 (OxA-12681, 980 ±24 BP, Reimer *et al* 2004). This new sample is taken from a depth of 1.05m and will provide age control for the upper levels of the channel fill deposit that has been analysed for plant macrofossil, insect, and pollen content. It will also serve to confirm the chronology established by the earlier dates.

Calibrated date: *1σ:* cal AD 1485–1635
2σ: cal AD 1465–1645

Final comment: D Passmore (24 October 2007), this new sample dates the upper part of the organic-rich channel fill deposit in core CDS1 to the late medieval – early post-medieval period; it is stratigraphically consistent with the earlier dates (OxA-12601 and OxA-12681) from 1.90-2m.

References: Passmore *et al* 2006

OxA–15048 964 ±29 BP

$\delta^{13}C$: -27.9‰

Sample: TWcd-3 (2), submitted in April 2005 by D Passmore

Material: waterlogged plant macrofossil (alder fragments and *Carex* spp., seeds) (J Cotton 2005)

Initial comment: sample TWcd-3(2) was taken from a fine-grained palaeochannel fill at the southern edge of the valley floor on the central T3 terrace level at location TW11 in the Coldstream study area. The depth of the fine-grained channel fill is 2.6m and the sample is taken from 2.12m. Sediment core TW11 shows a succession of bedded organic-rich fine sandy silt and silty sand with frequent macrofossils. The relatively thick fine-grained organic palaeochannel fill shows the same succession in adjacent cores. The stratified sediments on top of the proposed sample and the similar sediment sequence in adjacent cores argues against post-depositional disturbance of the sampled organic-rich layer. There is no contamination with younger organic material.

Objectives: sample TWcd-3(2) is the second level to be dated from this sediment core; an earlier phase of the project obtained duplicate dates on wood from a depth of 2.40–2.55m, giving dates of cal AD 1020–1170 (OxA-12682; 943 ±25 BP; Reimer *et al* 2004) and cal AD 990–1150 (OxA-12683; 996 ±25 BP; Reimer *et al* 2004), respectively. This new sample is taken from a depth of 2.12m and will provide age control for the upper levels of the channel fill deposit that has been analysed for plant macrofossil, insect, and pollen content. It will also serve to confirm the chronology established by the earlier dates.

Calibrated date: *1σ:* cal AD 1020–1150
2σ: cal AD 1010–1160

Final comment: D Passmore (24 October 2007), this new sample, from a core depth of 2.12m, has a near-identical calibrated 2σ age-range to the duplicated dates obtained between 2.4-2.55m (OxA-12682 and OxA-12683). The overlap of calibrated age-spans may reflect relatively rapid accumulation rates, but this is considered unlikely given the organic-rich context of the sediment body; rather, the new sample is considered more likely to reflect the deposition of reworked organic matter, possibly from localised scouring of previously placed channel fill sediments.

References: Reimer *et al* 2004

Till-Tweed: St Cuthbert's Farm, field 33, Northumberland

Location: NT 866222
Lat. 55.29.36 N; Long. 02.12.44 W

Project manager: C Waddington (Archaeological Research Services Ltd), 2003–6

Archival body: University of Newcastle upon Tyne

Description: from a test-pit programme conducted in the lower Tweed valley near Coldstream. Test pit 10 in Field 33 at St Cuthbert's farm revealed a ditch of a rectilinear crop-mark enclosure lying beneath the plough soil and a dense lithics scatter.

Objectives: to date the rectilinear crop-mark enclosure.

References: Passmore and Waddington forthcoming

SUERC–9078 1960 ±35 BP

$\delta^{13}C$: -24.3‰

Sample: TIT-1, submitted in April 2005 by D Passmore

Material: charcoal: *Quercus* sp., sapwood, single fragment (R Gale 2005)

Initial comment: samples TIT-1 and two were recovered from a test pit in Field 33 at St Cuthbert's Farm; this field produced a lithic density scatter of 198.9 lithics per hectare – the highest density ever recorded in north-eastern England.

All diagnostic material was Mesolithic in age, and the scatter is thought to be indicative of a Mesolithic settlement site (Passmore and Wadddington forthcoming). Both samples are from a depth of 0.5m in Test pit 10 and were extracted from the ditch fill of a rectilinear crop-mark enclosure lying beneath the plough soil and lithic scatter. The samples are fragments of charcoal. The oak sapwood provides the most reliable wood for dating. It was not possible to assess the likely age of the ash but as it consists of heartwood, it may already comprise some decades or so in age. The sample was extracted from a matrix of sandy silty clay at a depth of 0.5m. The feature is cut into fill overlying carboniferous limestone, while the geology of the catchment upstream of the site, is dominated by Silurian and Ordovician greywackes, slates, and shales in the west and a mixture of Devonian sandstone and Carboniferous limestone to the east. The subsoil is free-draining and there is no natural contamination anticipated.

Objectives: the sample will date the infill of the ditch cut and provide a minimum age for the cutting of the feature. It is provisionally assumed that this is of Mesolithic age, and the dating of this feature is intended to provide valuable comparative information for contemporary activities elsewhere in the Till-Tweed basin and also at Howick.

Calibrated date: *1σ:* cal AD 1–80
2σ: 50 cal BC–cal AD 130

Final comment: D Passmore (24 October 2007), the radiocarbon date indicates a likely date of the first century AD in the years either immediately before or immediately after the Roman invasion of the north. The dated feature would appear to form part of the late prehistoric enclosure complex known in this field from the crop mark evidence.

References: Passmore and Waddington forthcoming

SUERC–9079 2020 ±35 BP

$\delta^{13}C$: -23.5‰

Sample: TIT-2, submitted in December 2005 by D Passmore

Material: charcoal: *Fraxinus excelsior*, heartwood, single fragment (R Gale 2005)

Initial comment: as SUERC-9078

Objectives: as SUERC-9078

Calibrated date: *1σ:* 50 cal BC–cal AD 30
2σ: 160 cal BC–cal AD 70

Final comment: see SUERC-9078

Laboratory comment: English Heritage (20 December 2007), the two results from this context are statistically consistent (SUERC-9079 and SUERC-9078) (T′=1.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) which suggests that the sample of ash heartwood did not have a significant age-at-death offset.

References: Ward and Wilson 1978

Trent/Soar rivers confluence, Leicestershire

Location: SK 44873030
Lat. 52.52.05 N; Long. 01.20.00 W, (centre)

Project manager: A G Brown (University of Exeter), 2005–7

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the study area between the archaeological resource and geomorphology. These dates will provide a chronological framework through dating a series of palaeochannels within the study area. The samples consist of organic sediments from channel fills.

Objectives: to create a chronostratigraphic model for the confluence zone of the rivers Trent and Soar in Leicestershire.

Final comment: P Marshall (31 October 2007), every effort made to integrate the radiocarbon dates with the luminescence dating (Toms *et al* 2008b) and dendrochronology (Arnold *et al* 2007) into a single chronostratigrapic model failed. There are multiple possible explanations for the discrepancy between the radiocarbon and luminescence dates, with incomplete bleaching of the OSL samples and the reworking of the organic material sent for radiocarbon dating the two most plausible. A general time-scale for the evolution of the river confluence is, however, clear. The transition between terrace 1 and terrace 2 took place after the last glaciation, but probably prior to the Neolithic period. The first major river avulsion took place in the early Iron Age, and the two subsequent dated avulsions occured in the early medieval period.

Laboratory comment: English Heritage (31 October 2007), these results highlight two important lessons, firstly that the use of gouge augers can cause modern material to be taken down a core, and secondly AMS size bulk sediment samples frequently produce inaccurate dates.

References: Arnold *et al* 2007
Brown *et al* 2007
Toms *et al* 2008b

Trent/Soar rivers confluence: modern floodplain, core 1, Leicestershire

Location: SK 48623106
Lat. 52.52.28 N; Long. 01.16.39 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. The core is from the Trent/Soar confluence floodplain.

Objectives: to establish the basal dates for a series of palaeochannels and also to provide a series of dates on specific palaeoenvironmental samples.

Final comment: P Marshall (31 October 2007), part of the construction of the chronological model of the evolution of the confluence zone of the river Trent and river Soar.

References: Brown *et al* 2007

OxA–15894 368 ±28 BP

δ¹³C: -28.2‰

Sample: MF C1 1.53m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (unidentified) (A G Brown 2006)

Initial comment: from the base of a core from a palaeochannel located on the modern floodplain. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel.

Calibrated date: *1σ:* cal AD 1450–1620
2σ: cal AD 1440–1640

Final comment: A G Brown (8 October 2007), this date is consistent with a post-medieval date of abandonment of this palaeochannel close to the modern river.

Trent/Soar rivers confluence: modern floodplain, core 2, Leicestershire

Location: SK 48623099
Lat. 52.52.26 N; Long. 01.16.39 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. The core is from the Trent/Soar confluence floodplain.

Objectives: to establish the basal dates for a series of palaechannels and also to provide a series of dates on specific palaeoenvironmental samples.

Final comment: A G Brown (8 October 2007), part of the construction of the chronological model of the evolution of the confluence zone of the river Trent and river Soar.

References: Brown *et al* 2007

GrA–31989 1.09 ±0.008 fM

δ¹³C: -29.6‰

Sample: MF C2 1m (b), submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets)) (A G Brown 2006)

Initial comment: from 1m down a core located in a palaeochannel on the modern floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core.

Calibrated date: *1σ:* cal AD 1998–2001
2σ: cal AD 1957–2001

Final comment: A G Brown (8 October 2007), this date indicates that there has been modern contamination in this probably very young palaeochannel.

Laboratory comment: English Heritage (2007), the two results from this level (GrA-31989 and OxA-15974) are not statistically consistent (T′=3534.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

Laboratory comment: English Heritage (21 December 2007), this result shows the influence of carbon derived from modern atmospheric nuclear weapons testing, and has been calibrated using data from Kueppers *et al* (2004).

References: Brown *et al* 2007
Kueppers *et al* 2004
Ward and Wilson 1978

OxA–15974 4168 ±31 BP

δ¹³C: -26.6‰

Sample: MF C2 1m (a), submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: from 1m down a core located in a palaeochannel on the modern floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 2880–2670 cal BC
2σ: 2890–2620 cal BC

Final comment: A G Brown (8 October 2007), this date is considerably older than expected but may be due to an older core of floodplain re-exposed by the river as with OxA-16161.

Laboratory comment: see GrA-31989

Laboratory comment: Oxford Radiocarbon Accelerator Unit (19 September 2006), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon date must therefore be treated with caution.

References: Brown *et al* 2007

OxA–16161 2509 ±32 BP

δ¹³C: -27.7‰

Sample: MF C2 1.69m, submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: from 1.7m down a core located in a palaeochannel on the modern floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel. This sample will also provide the basal date of the channel.

Calibrated date: *1σ:* 780–540 cal BC
2σ: 800–510 cal BC

Final comment: A G Brown (8 October 2007), this date is older than expected but may be due to a palaeochannel on a core of older floodplain.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (19 September 2007), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon date must therefore be treated with caution.

References: Brown *et al* 2007

SUERC–13206 445 ±35 BP

δ¹³C: -27.0‰

Sample: MF C2 1.78–1.79m, submitted in April 2006 by A G Brown

Material: waterlogged wood: Pomoideae (A G Brown 2006)

Initial comment: the sample was 1.78–1.79m below the surface, in a palaeochannel. Based on geomorphology this is a young piece of floodplain. The sample was collected from well below the watertable in a grey/brown coarse sand matrix.

Objectives: this basal date will provide the date of abandonment of the channel.

Calibrated date: *1σ:* cal AD 1430–1460
2σ: cal AD 1410–1490

Final comment: A G Brown (8 October 2007), this date is consistent with a post-medieval date of abandonment of this palaeochannel scar very close to the modern river.

Trent/Soar rivers confluence: TFGC, Leicestershire

Location: SK 48102967
Lat. 52.51.43 N; Long. 01.17.08 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. The samples from this series are taken from cores from the Trent/Soar confluence floodplain. The core from TFGC is an extremely significant 4m gouge core, with excellent preservation of environmental materials.

Objectives: to establish a series of dates along the core sequence.

Final comment: P Marshall (31 October 2007), the result has provided a robust chronological framework for interpreting the palaeoenvironmental sequence. The four radiocarbon dates are consistent with their relative order in the core.

Laboratory comment: English Heritage (21 December 2007), a fifth sample, sediment from 1m depth in this core, failed to produce sufficient carbon for dating.

References: Brown *et al* 2007

GrA–31456 3880 ±35 BP

δ¹³C: -29.9‰

Sample: TFGC14 3.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (0.02g) (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from a depth of 3.5m in a core located in a palaeochannel between terrace 1 and terrace 2. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection and the water table was 1m below the surface.

Objectives: as GrA-31771

Calibrated date: *1σ:* 2470–2290 cal BC
2σ: 2480–2200 cal BC

Final comment: A G Brown (8 October 2007), this date broadly confirms a basal (minimum) age for the late Neolithic/early Bronze Age abandonment of the palaeochannel and is not in conflict with the date of the higher sample (GrA-31771) or lower sample (GrA-31948).

GrA–31771 3300 ±40 BP

δ¹³C: -29.9‰

Sample: TFGC14 2.5m, submitted in April 2006 by A G Brown

Material: waterlogged wood (twig, single fragment) (A G Brown 2006)

Initial comment: the sample is from a depth of 2.5m in a core located in a palaeochannel between terrace 1 and terrace 2. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection and the watertable was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ*: 1630–1510 cal BC
2σ: 1690–1490 cal BC

Final comment: A G Brown (8 October 2007), the sample provided a date for infilling of the previously abandoned palaeochannel in this reach – in this case Iron Age which is not in conflict with the archaeology of the lower sample (GrA-31456).

GrA–31948 4725 ±40 BP

$\delta^{13}C$: -29.1‰

Sample: TFGC14 3.8m, submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: the sample is from a depth of 3.8m in a core located in a palaeochannel between terrace 1 and terrace 2. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection and the water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel. To also provide the basal date of the channel.

Calibrated date: *1σ*: 3630–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: A G Brown (8 October 2007), this date provides a basal (minimum) age for the Neolithic abandonment of the palaeochannel and is not in conflict with the date of the three higher samples (GrA-31771, GrA-31456, and OxA-15886).

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurement must therefore be treated with caution.

References: Brown *et al* 2007

OxA–15886 3410 ±60 BP

$\delta^{13}C$: -27.9‰

Sample: TFGC14 3m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments) (A G Brown 2006)

Initial comment: from 3m depth in a core located in a palaeochannel between terrace 1 and terrace 2.

Objectives: to give a basal date for this palaeochannel, and to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ*: 1770–1620 cal BC
2σ: 1890–1530 cal BC

Final comment: A G Brown (8 October 2007), along with other dates from this palaeochannel it suggests that the channel was abandoned, at the latest, in the late Bronze Age/early Iron Age and subsequently infilled slowly.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), the sample produced less than 0.5mg carbon, which explains the large error.

Trent/Soar rivers confluence: Trent terrace 1, core 10, Leicestershire

Location: SK 48362994
Lat. 52.51.52 N; Long. 01.16.54 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. These series of dates will provide a chronological framework through dating a series of palaeochannels from Terrace 1. Twenty samples were submitted across nine cores from palaechannels that form series T1.

Objectives: to provide a chronological framework for core C10 from terrace 1, and to contribute to the development of the chronostratigraphic model for the Trent/Soar confluence.

Final comment: P Marshall (31 October 2007), three results were produced on sediment from three levels in core C10. While the lower two results (GrA-31998 and OxA-15931) are consistent with their relative stratigraphic order, the uppermost result is over 3500 years older (OxA-15972). This discrepancy is likely the result of reworked organic material being inwashed and breaking down *in situ*.

References: Brown *et al* 2007

GrA–31998 3920 ±35 BP

$\delta^{13}C$: -26.6‰

Sample: T1C10 1.45m, submitted in April 2006 by A G Brown

Material: sediment (>3g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: the sample is from 1.45m down a core from a palaeochannel associated with terrace 1. The palaeochannel bisects part of terrace 1. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: 1σ: 2480–2340 cal BC
2σ: 2550–2290 cal BC

Final comment: A G Brown (8 October 2007), a possible date for early infilling after abandonment of the terrace palaeochannel in the Neolithic as shown in Warren Farm Quarry.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon date must therefore be treated with caution.

References: Brown *et al* 2007

OxA–15931 4334 ±30 BP

$\delta^{13}C$: -28.2‰

Sample: T1C10 1.8m, submitted in April 2006 by A G Brown

Material: sediment (>5g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: the sample is from 1.8m depth in a core from a palaeochannel associated with terrace 1. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel and to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: 1σ: 3000–2900 cal BC
2σ: 3030–2890 cal BC

Final comment: A G Brown (8 October 2007), this date suggests that the palaeochannel was abandoned in the Neolithic which is in agreement with the archaeology and the lower date from this core (GrA-31998) but not the upper date which is regarded as too old.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (19 September 2007), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurement must therefore be treated with caution.

OxA–15972 7300 ±40 BP

$\delta^{13}C$: -27.6‰

Sample: T1C10 1m, submitted in April 2006 by A G Brown

Material: sediment (>5g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: from 1m down a core from a palaeochannel associated with terrace 1. The palaeochannel bisects part of terrace 1. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was than 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: 1σ: 6230–6070 cal BC
2σ: 6240–6060 cal BC

Final comment: A G Brown (8 October 2007), this date is in conflict with the lower dates from this palaeochannel which suggest that the channel was abandoned and started to infill during the Neolithic. The cause would appear to be contamination of the humic acid fraction by older humic acids.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (19 September 2007), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurement must therefore be treated with caution.

Trent/Soar rivers confluence: Trent terrace 1, core 12, Leicestershire

Location: SK 48862990
Lat. 52.51.51 N; Long. 01.16.27 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeo-channels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area.

Objectives: to provide a chronological framework for core C12 from terrace 1, and to contribute to the development of the chronostratigraphic model for the confluence of the rivers Trent and Soar.

Final comment: P Marshall (31 October 2007), four samples of monocotyledonous plant remains were dated from this core. The results are not in agreement with their relative stratigraphic order. This is probably the result of sampling contamination given that the result from C12 0.5m (GrA-31987) is modern in date.

Laboratory comment: (19 September 2007), the humin fraction of this sample failed to produce sufficient carbon for dating.

References: Brown *et al* 2007

GrA–31987 1.09 ±0.004 fM

$\delta^{13}C$: -29.4‰

Sample: T1C12 0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from 0.5m down a core from a palaeochannel located between terrace 1 and terrace 2. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 1999–2001
2σ: cal AD 1998–2001

Final comment: A G Brown (8 October 2007), this date would appear to be too young due to the incorporation of modern organic material.

Laboratory comment: English Heritage (21 December 2007), this result shows the influence of carbon derived from modern atmospheric nuclear weapons teasting, and has been calibrated using data from Kueppers *et al* (2004).

References: Kueppers *et al* 2004

GrA–31988 1030 ±40 BP

$\delta^{13}C$: -29.5‰

Sample: T1C12 2.14m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from the base of a core from a palaeochannel located between terrace 1 and terrace 2. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone.The sample was waterlogged at the time of collection.The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel. To provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 980–1030
2σ: cal AD 890–1120

Final comment: A G Brown (8 October 2007), this date is consistent with a medieval date of abandonment of this palaeochannel.

OxA–15890 1174 ±35 BP

$\delta^{13}C$: -27.5‰

Sample: T1C12 1.93m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from a depth of 1.93m in a core from a palaeochannel located between terraces 1 and 2. The core also had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 770–900
2σ: cal AD 730–980

Final comment: A G Brown (8 October 2007), along with the three other dates on this palaeochannel, the age suggests that the palaeochannel was abandoned in the early medieval period and subsequently underwent very rapid infilling.

SUERC–13204 1275 ±35 BP

$\delta^{13}C$: -28.1‰

Sample: T1C12 2.04–6m, submitted in January 2007 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments) (A G Brown 2006)

Initial comment: the sample came from near the base of core T1C12. The sample was 2.04–6m below surface, in a palaeochannel, cutting an area of terrace 1. The sample was well below the watertable, in a silty clay matrix.

Objectives: this basal date will provide the date of abandonment of this channel.

Calibrated date: *1σ:* cal AD 670–780
2σ: cal AD 660–860

Final comment: A G Brown (8 October 2007), the sample is consistent with a medieval date of abandonment of this palaeochannel.

Trent/Soar rivers confluence: Trent terrace 1, core 14, Leicestershire

Location: SK 48322920
Lat. 52.51.28 N; Long. 01.16.56 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: two samples were dated from core C14, a proposed late Devensian/early Holocene sequence.

Objectives: to provide a chronological framework for core C14 from terrace 1, and to contribute to the development of the chronostratigraphic model for the river Trent/Soar confluence.

Final comment: A G Brown (31 October 2007), two samples were dated from core C14, a proposed late Devensian/early Holocene sequence. The two results are consistent with their relative stratigraphic order, although they suggest that the sequence spans the Bronze Age to Anglo-Saxon periods.

References: Brown *et al* 2007

GrA–31492 3005 ±35 BP

$\delta^{13}C$: -27.6‰

Sample: T1C14 0.90m, submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: this sample is from the base of a core from a palaeochannel located on terrace 1. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel, and to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 1320–1210 cal BC
2σ: 1390–1120 cal BC

Final comment: A G Brown (8 October 2007), this result is consistent with an abandonment date in the late Bronze Age for this channel associated with terrace 1.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurement must therefore be treated with caution.

OxA–15973 1309 ±28 BP

$\delta^{13}C$: -28.6‰

Sample: T1C14 0.45m, submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: from 0.45m in a core from a palaeochannel located on terrace 1. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 660–770
2σ: cal AD 650–780

Final comment: A G Brown (8 October 2007), this result provides a minimum date for the abandonment of this lower palaeochannel. A medieval date is not at variance with the archaeology or the chronostratigraphic model.

Laboratory comment: English Heritage (19 September 2006), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurement must therefore be treated with caution.

Trent/Soar rivers confluence: Trent terrace 1, core 2, Leicestershire

Location: SK 48062998
Lat. 52.51.53 N; Long. 01.17.10 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the study area between the archaeological resource and geomorphology. These dates will provide a chronological framework through dating a series of palaeochannels from terrace 1. Twenty samples were submitted across nine cores from palaeochannels that form series T1.

Objectives: to establish the basal date for core C2 from Terrace 1 and contribute to the development of the chronostratigraphic model for the river Trent/Soar confluence.

Final comment: A G Brown (8 October 2007), this date forms part of the testing and further development of the chronostratigraphic model of the confluence reach of the rivers Trent and Soar.

References: Brown *et al* 2007

OxA–15887 1430 ±80 BP

$\delta^{13}C$: -25.9‰

Sample: T1C2 1.24m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: from the base of core 2 from a palaeochannel associated with terrace 1.

Objectives: to give a basal date for this palaeochannel.

Calibrated date: *1σ*: cal AD 560–670
2σ: cal AD 430–770

Final comment: A G Brown (8 October 2007), this date from the palaeochannel would appear to be too young to date the abandonment of the palaeochannel which on archaeological grounds should be prior to the Bronze Age. It is most likely that it dates minor reworking of organics into the fill of the palaeochannel by later stream activity.

Trent/Soar rivers confluence: Trent terrace 1, core 3, Leicestershire

Location: SK 48182955
Lat. 52.51.39 N; Long. 01.17.03 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area.

Objectives: to provide a chronological framework for core C3 from terrace 1, and to contribute to the development of the chronostratigraphic model for the confluence of the rivers Trent and Soar.

References: Brown *et al* 2007

GrA–31774 1370 ±35 BP

$\delta^{13}C$: -28.7‰

Sample: T1C3 1.6m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from the base of a core from a palaeochannel associated with terrace 1. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel.

Calibrated date: *1σ*: cal AD 640–670
2σ: cal AD 610–690

Final comment: A G Brown (8 October 2007), this date would appear to be far too recent for the abandonment of a palaeochannel on the terrace and suggests reworking in the early medieval period.

Trent/Soar rivers confluence: Trent terrace 1, core 4, Leicestershire

Location: SK 48653042
Lat. 52.52.07 N; Long. 01.16.38 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area.

Objectives: to provide a basal date for core C4 from terrace 1, and to contribute to the development of the chronostratigraphic model for the confluence of the river Trent and Soar.

References: Brown *et al* 2007

OxA–15971 2561 ±30 BP

$\delta^{13}C$: -26.9‰

Sample: T1C4 0.98m, submitted in April 2006 by A G Brown

Material: sediment (>5g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: from the base of a core from a palaeochannel associated with terrace 1. The palaeochannel marks the boundary between terrace 1 and the current floodplain. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel.

Calibrated date: *1σ*: 800–670 cal BC
2σ: 810–590 cal BC

Final comment: A G Brown (8 October 2007), this date is probably too young for the initial abandonment and formation of the palaeochannel but does date fluvial reworking of the infill of the channel incorporating organic matter.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (19 September 2006), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a dispaportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurment must therefore be treated with caution.

Trent/Soar rivers confluence: Trent terrace 1, core 6, Leicestershire

Location: SK 48803036
Lat. 52.52.05 N; Long. 01.16.30 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area.

Objectives: to provide a chronological framework for core C6 from terrace 1, and to contribute to the development of the chronostratigraphic model for the river Trent/Soar confluence.

References: Brown *et al* 2007

GrA–31949 1.1 ±0.004 fM

$\delta^{13}C$: -28.7‰

Sample: T1C6 1.61m, submitted in April 2006 by A G Brown

Material: waterlogged wood (fragment of twig) (A G Brown 2006)

Initial comment: the sample is from the base of a core from a palaeochannel associated with terrace 1. The palaeochannel marks the boundary between terrace 1 and the current floodplain. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel.

Calibrated date: *1σ*: cal AD 1957–1999
2σ: cal AD 1956–2000

Final comment: A G Brown (8 October 2007), this is almost certainly modern reworking of the upper 1m or more of sediment within the borehole.

Laboratory comment: English Heritage (31 October 2007), the modern material at this depth is probably the result of a gouge corer being used to sample the sediment. This result has been calibrated using data from Kueppers *et al* (2004).

References: Kueppers *et al* 2004

Trent/Soar rivers confluence: Trent terrace 1, core 7, Leicestershire

Location: SK 48903028
Lat. 52.52.03 N; Long. 01.16.25 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: seven samples were submitted from six levels down core C7, a proposed early Holocene sequence with excellent preservation for palaeoenvironmental analysis, from terrace 1.

Objectives: to provide a chronological framework for core C7 from terrace 1; and to contribute to the development of the chronostratigraphic model for the confluence of the rivers Trent and Soar.

Final comment: P Marshall (31 October 2007), the result on monocotyledonous plant fragments from the base of the sequence (OxA-15889) calibrates to the modern period and is likely to be the result of contamination through the use of the gouge corer. The two results from 1.51m (OxA-16159 and OxA-16160) are not consistent and are significantly older than the dates on plant macrofossils from almost half a metre below (GrA-31951 and SUERC-13205). It should also be pointed out that the bulk sediment date from 0.95m is also older than GrA-31951. The lack of consistency within and between the two sample types (bulk sediment and macrofossil) means that this core must remain “undated” with the radiocarbon measurements providing no means to correlate the changes in land-use evident in the pollen record to the existing archaeological record from the area.

References: Brown *et al* 2007

GrA–31950 1020 ±35 BP

$\delta^{13}C$: -29.5‰

Sample: T1C7 0.95m, submitted in April 2006 by A G Brown

Material: sediment (>5g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: the sample is from 0.95m down a core in a palaeochannel located between terrace 1 and the current lower floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ*: cal AD 990–1030
2σ: cal AD 900–1120

Final comment: A G Brown (8 October 2007), again surprisingly young for the palaeochannel, suggesting some contamination with younger carbon (*see* GrA-31949).

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon date must therefore be treated with caution.

GrA–31951 590 ±35 BP

$\delta^{13}C$: -28.4‰

Sample: T1C7 2m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from 2m down a core in a palaeochannel located between terrace 1 and the current lower floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 1300–1410
2σ: cal AD 1290–1420

Final comment: A G Brown (8 October 2007), not an impossible date for the abandonment of the palaeochannel (medieval) but the result clearly conflicts with the humin and humic acid fractions dates above it.

OxA–15888 129 ±31 BP

$\delta^{13}C$: -27.4‰

Sample: T1C7 0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: from 0.5m down a core in a palaeochannel located between terrace 1 and the current lower floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 1680–1955*
2σ: cal AD 1660–1955*

Final comment: A G Brown (8 October 2007), this date would appear to be too young for the abandonment of this palaeochannel and is most likely the result of later penetration by plant rootlets.

OxA–15889 1.22 ±0.009 fM

$\delta^{13}C$: -28.2‰

Sample: T1C7 2.25m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: from the base of a core from a palaeochannel located between terrace 1 and the current lower floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel, and to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* cal AD 1960–1985
2σ: cal AD 1959–1986

Final comment: A G Brown (8 October 2007), this date would appear to be too young for the abandonment of this palaeochannel and is most likely the result of later penetration by plant rootlets.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (19 September 2006), this sample produced less than 0.5mg of carbon and so the result must be treated with caution.

Laboratory comment: English Heritage (21 December 2007), this result shows the influence of carbon derived from modern atmospheric nuclear weapons testing, and has been calibrated using data from Kueppers *et al* (2004).

References: Kueppers *et al* 2004

OxA–16159 2638 ±31 BP

$\delta^{13}C$: -30.4‰

Sample: T1C17 1.5m, submitted in April 2006 by A G Brown

Material: sediment (humin fraction, bulk sample) (A G Brown 2006)

Initial comment: from 1.5m down a core from a palaeochannel located between terrace 1 and the current lower floodplain. The core also has had pollen evaluation counts carried out at 0.14m intervals, from 50mm contiguous sampling. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the core. Pollen counts were made at 0.14m intervals, from contiguous 50mm samples, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 820–790 cal BC
2σ: 840–780 cal BC

Final comment: A G Brown (8 October 2007), this sample provides an older humin fraction date for the minimum date of the abandonment of this lower palaeochannel. A Roman to medieval date is not at variance with the archaeology or the chronostratigraphic model.

Laboratory comment: English Heritage (31 October 2007), the measurements on the humin (OxA-16159) and humic acid (OxA-16160) fractions of this bulk sediment sample are not statistically consistent (T′=811.7; T′(5%)=3.8; v=1; Ward and Wilson 1978). Furthermore, both of these dates are significantly older than the resulting dates on monocotyledon fragments from almost a half metre below (GrA-31951 and SUERC-13205). The small size of the bulk samples (they were measured by AMS) means that a small amount of contamination will have a disproportionately large effect on the radiocarbon age.

References: Ward and Wilson 1978

OxA–16160 1406 ±30 BP

δ¹³C: -28.6‰

Sample: T1C17 1.5m, submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: as OxA-16159

Objectives: as OxA-16159

Calibrated date: *1σ:* cal AD 620–660
2σ: cal AD 590–670

Final comment: A G Brown (8 October 2007), this provides a minimum date for the abandonment of this lower palaeochannel. A medieval date is not at variance with the archaeology or the chronostratigraphic model.

Laboratory comment: see OxA-16159

SUERC–13205 210 ±35 BP

δ¹³C: -27.1‰

Sample: T1C7 2.10–2m, submitted in January 2007 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments) (A G Brown 2006)

Initial comment: the sample is from near the base of palaeocore T1C7. The sample was 2.1–2m below the surface, in a palaeochannel bisecting part of terrace 1. The sample was well below the water table, in a silty clay matrix.

Objectives: the basal date will provide a date of abandonment of the palaeochannel.

Calibrated date: *1σ:* cal AD 1650–1955*
2σ: cal AD 1640–1955*

Final comment: A G Brown (8 October 2007), this is younger than the date stratigraphically above it and other dates in the sequence suggests some incorporation of younger organic material.

Trent/Soar rivers confluence: Trent terrace 1, core 8, Leicestershire

Location: SK 48213008
Lat. 52.51.57 N; Long. 01.17.02 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area.

Objectives: to provide a chronological framework for core C8 from terrace 1, and to contribute to the development of the chronostratigraphic model for the confluence of the rivers Trent and Soar.

References: Brown *et al* 2007

GrA–31986 1820 ±30 BP

δ¹³C: -28.6‰

Sample: T1C8, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossils (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample is from the base of a core from a palaeochannel associated with terrace 1. The palaeochannel bisects part of terrace 1. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to give a basal date for this palaeochannel.

Calibrated date: *1σ:* cal AD 130–240
2σ: cal AD 90–320

Final comment: A G Brown (8 October 2007), the date is too young for the initial abandonment of the terrace channel but may date a later period of infilling.

Trent/Soar rivers confluence: WQF, monolith CH1, Leicestershire

Location: SK 47783002
Lat. 52.51.55 N; Long. 01.17.25 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. Samples were extracted from monolith tins taken from exposed sections of the working quarry at Sawley in the study area.

Objectives: to establish dates for a series of channels seen in section on the quarry faces, with associated environmental sequences.

Final comment: A G Brown (8 October 2007), this series of dates has helped construct a chronological model of the confluence zone of the river Trent and river Soar.

References: Brown *et al* 2007

GrA–31953 2580 ±35 BP

δ¹³C: -28.1‰

Sample: WQF CH1 +0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossils (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: this sample was taken from a section of a palaeochannel in a quarry. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The watertable was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the monolith tin. Pollen counts were made at 0.14m intervals, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 800–770 cal BC
2σ: 810–600 cal BC

Final comment: A G Brown (8 October 2007), along with the other dates this result suggests channel abandonment in the early to mid Bronze Age.

OxA–15891 2730 ±160 BP

$\delta^{13}C$: -28.8‰

Sample: WQF CH1 0.68m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossils (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: the sample was taken from the section of a palaeochannel in a quarry. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the monolith tin. Pollen counts were made at 0.14m intervals, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 1060–780 cal BC
2σ: 1380–410 cal BC

Final comment: A G Brown (8 October 2007), the date is consistent with a Bronze Age abandonment of this palaeochannel.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (8 October 2007), this sample had a low target current, hence the reason for the poor precision.

OxA–16128 3517 ±30 BP

$\delta^{13}C$: -29.1‰

Sample: WQF CH1 0.24m, submitted in April 2006 by A G Brown

Material: sediment (humin fraction, bulk sample) (A G Brown 2006)

Initial comment: the sample was taken from the section of a palaeochannel in a quarry. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The water table was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the monolith tin. Pollen counts were made at 0.14m intervals, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 1900–1770 cal BC
2σ: 1940–1740 cal BC

Final comment: A G Brown (8 October 2007), along with the other dates this result suggests channel abandonment in the early to mid Bronze Age and infilling in the later Bronze Age, but this measurement is considerably older than the humic acid and macrofossil dates on the same channel.

Laboratory comment: English Heritage (31 October 2007), these two results from 0.24m (OxA-16128–9) were made on the humin and humic acid fractions, respectively, of a bulk sediment sample. These results are not statistically consistent (T′=166.0; T′(5%)=3.8; v=1; Ward and Wilson 1978). The small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurement must therefore be treated with caution.

References: Ward and Wilson 1978

OxA–16129 2989 ±28 BP

$\delta^{13}C$: -29.3‰

Sample: WQF CH1 0.24m, submitted in April 2006 by A G Brown

Material: sediment (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: as OxA-16128

Objectives: as OxA-16129

Calibrated date: *1σ:* 1300–1130 cal BC
2σ: 1380–1120 cal BC

Final comment: A G Brown (8 October 2007), along with the other dates this result suggests channel abandonment in the early to mid Bronze Age and infilling in the later Bronze Age.

Laboratory comment: see OxA-16128

Trent/Soar rivers confluence: WQF, monolith CH2, Leicestershire

Location: SK 47583006
Lat. 52.51.56 N; Long. 01.17.35 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. Samples were extracted from a monolith tin taken from exposed sections of the working quarry at Sawley in the study area.

Objectives: to establish dates for a series of channels seen in section on the quarry faces, with associated environmental sequences.

Final comment: P Marshall (31 October 2007), these results have helped construct a chronological model of the confluence zone of the river Trent and river Soar.

References: Brown *et al* 2007

GrA–31940 2500 ±35 BP

$\delta^{13}C$: -27.2‰

Sample: WQF CH2 M2 0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: this sample was taken from a section of a palaeochannel in a quarry. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The watertable was 1m below the surface.

Objectives: to provide a chronology for the palaeo-environmental sequence from the monolith tin. Pollen counts were made at 0.14m intervals, to evaluate the preservation of the palaeoenvironmental resources in this palaeochannel.

Calibrated date: *1σ:* 770–540 cal BC
2σ: 790–410 cal BC

Final comment: A G Brown (8 October 2007), the date suggests along with the other dates on this channel that channel abandonment occurred in the late Bronze Age or early Iron Age – rather later than channel 1.

GrA–31999 2820 ±35 BP

$\delta^{13}C$: -30.8‰

Sample: WQF CH2 M3 0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: as GrA-31940

Objectives: as GrA-31940

Calibrated date: *1σ:* 1020–910 cal BC
2σ: 1060–890 cal BC

Final comment: see GrA-31940

OxA–15892 1.04 ±0.004 fM

$\delta^{13}C$: -26.1‰

Sample: WQF CH2 M1 0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: as GrA-31940

Objectives: as GrA-31940

Calibrated date: *1σ:* cal AD 1956–1957
2σ: cal AD 1955–1958

Final comment: A G Brown (8 October 2007), the date is consistent with a Bronze Age abandonment of this palaeochannel.

Laboratory comment: English Heritage (21 December 2007), this result shows the influence of carbon derived from modern atmospheric nuclear weapons testing, and has been calibrated using data from Kuepper *et al* (2004).

References: Kueppers *et al* 2004

Trent/Soar rivers confluence: WQF, monolith CH3, Leicestershire

Location: SK 47863011
Lat. 52.51.58 N; Long. 01.17.20 W

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. This series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. Samples were extracted from monolith tins taken from exposed sections of the working quarry at Sawley in the study area.

Objectives: to establish dates for a series of channels seen in section on the quarry faces, with associated environmental sequences.

Final comment: P Marshall (31 October 2007), these results have helped to construct a chronological model of the confluence zone of the river Trent and river Soar.

References: Brown *et al* 2007

GrA–31941 3075 ±35 BP

$\delta^{13}C$: -29.1‰

Sample: WQF CH3 0.5m, submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: this sample was taken from a section of a palaeochannel in a quarry. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The watertable was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the monolith tin. Pollen counts were made at 0.14m intervals, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 1410–1300 cal BC
2σ: 1430–1260 cal BC

Final comment: A G Brown (8 October 2007), the date indicates that the channel was abandoned in the Bronze Age.

Laboratory comment: English Heritage (21 December 2007), the humin fraction of this sample failed to produce sufficient carbon for dating.

Laboratory comment: English Heritage (31 October 2007), the two measurements are not statistically consistent (T′=461.6; T′(5%)=3.8; v=1; Ward and Wilson 1978). The earlier result (OxA-15932) is from the humic acid fraction of sediment, while the later result (GrA-31941) is on monocotyledon fragments. The later result provides a better estimate for the age at this depth. The small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon date must therefore be treated with caution.

References: Ward and Wilson 1978

OxA–15932 4078 ±30 BP

$\delta^{13}C$: -28.2‰

Sample: WQF CH3 0.5m (a), submitted in April 2006 by A G Brown

Material: sediment (>5g) (bulk sample, humic acid fraction) (A G Brown 2006)

Initial comment: as GrA-31941

Objectives: as GrA-31941

Calibrated date: *1σ:* 2840–2570 cal BC
2σ: 2860–2490 cal BC

Final comment: A G Brown (8 October 2007), this date is consistent with a late Neolithic abandonment of this palaeochannel.

Laboratory comment: see GrA-31941

Trent/Soar rivers confluence: WQF, monolith CH5, Leicestershire

Location: SK 47512994
Lat. 52.51.52 N; Long. 01.16.15 E

Project manager: A G Brown (University of Exeter), 2005–7

Archival body: Southampton University

Description: the site is a study area of 2km by 4km, which is the confluence of the rivers Trent and Soar. The study area is a dynamic riverine environment, with a series of palaeochannels and associated terraces. The study area also has an extremely significant archaeological resource. There is a clear relationship in the area between the archaeological resource and geomorphology. These series of dates will provide a chronological framework through dating a series of palaeochannels within the study area. Samples were extracted from monolith tins taken from exposed sections of the working quarry at Sawley in the study area.

Objectives: to establish dates for a series of channels seen in section on the quarry faces, with associated environmental sequences.

Final comment: P Marshall (31 October 2007), these results have helped construct a chronological model of the confluence zone of the river Trent and river Soar.

References: Brown *et al* 2007

GrA–31943 13870 ±60 BP

$\delta^{13}C$: -28.2‰

Sample: WQF CH5 0.36m, submitted in April 2006 by A G Brown

Material: sediment (>5g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: this sample was taken from a section of a palaeochannel in a quarry. The local geology is Mercian mudstone. The sample was waterlogged at the time of collection. The watertable was 1m below the surface.

Objectives: to provide a chronology for the palaeoenvironmental sequence from the monolith tin. Pollen counts were made at 0.14m intervals, to evaluate the preservation of the palaeoenvironmental resource in this palaeochannel.

Calibrated date: *1σ:* 14790–14350 cal BC
2σ: 14980–14180 cal BC

Final comment: A G Brown (8 October 2007), this date confirms a late Glacial palaeochannel representing infill of a channel probably abandoned at the end of the older Dryas.

Laboratory comment: English Heritage (31 October 2007), the small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a disproportionately large effect on the radiocarbon age. The accuracy of the radiocarbon date must therefore be treated with caution.

GrA–32001 12060 ±50 BP

$\delta^{13}C$: -29.4‰

Sample: WQF CH5 0m (b), submitted in April 2006 by A G Brown

Material: sediment (>5g) (humic acid fraction, bulk sample) (A G Brown 2006)

Initial comment: as GrA-31943

Objectives: as GrA-31943

Calibrated date: *1σ:* 12040–11880 cal BC
2σ: 12100–11830 cal BC

Final comment: see OxA-15893

Laboratory comment: English Heritage (31 October 2007), the two measurements on samples from 0m depth in the monolith are not statistically consistent (T′=55.3; T′(5%)=3.8; v=1; Ward and Wilson 1978). The earliest result (GrA-32001) came from bulk sediment while the later result (OxA-15893) was from monocotyledon plant fragments. The later result provides a better estimate for this depth. The small size of the bulk sample of sediment (it was measured by AMS) means that a small amount of contamination could have a dispaportionately large effect on the radiocarbon age. The accuracy of the radiocarbon measurment must therefore be treated with caution.

References: Ward and Wilson 1978

OxA–15893 11505 ±55 BP

$\delta^{13}C$: -27.5‰

Sample: WQF CH5 0m (a), submitted in April 2006 by A G Brown

Material: waterlogged plant macrofossil (monocot fragments, some possible rootlets) (A G Brown 2006)

Initial comment: as GrA-32001

Objectives: as GrA-32001

Calibrated date: *1σ:* 11460–11330 cal BC
2σ: 11510–11290 cal BC

Final comment: see GrA-31943

Laboratory comment: see GrA-32001

Wasperton Anglo-Saxon cemetery, Warwickshire

Location: SP 265585
Lat. 52.13.25 N; Long. 01.36.43 W

Project manager: C Spall (Field Archaeology Specialists Ltd, York), 1980–5 and 2005–7

Description: the village of Wasperton is situated five miles south of Warwick on the eastern bank of the river Avon. A large area to the immediate south-west of the village was stripped and excavated in advance of gravel quarrying between 1980 and 1985. Several phases of prehistoric and Roman occupation were encountered. A field enclosure was reused in the late Roman to early Anglo-Saxon period as a cemetery. A total of 215 inhumations and 26 cremations were excavated, being the entire cemetery. The burials are dated by grave goods to the late Roman to early Anglo-Saxon period. There were 21 cremations with material suitable for radiocarbon dating. Based upon computer simulations using OxCal (v3.10), a total of nine cremations had material submitted with the results being used to either confirm the postulated chronology or identify early/late cremation activity.

Objectives: to provide a model for understanding the transition from late Roman to Anglo-Saxon burial; to provide a chronological framework for understanding the longevity and date of cremation burial; to provide a chronological model to test the initial archaeological phasing of burials and the spatial groupings; and to provide a comparative mathematical means to examine the chronology of the inhumations and cremations.

Final comment: M Carver (18 October 2007), the series proved extremely valuable as a factor in the argument for chronology and spatial analysis. Results showed that burial activity began within the enclosure in *cal AD 125–330* (*95% probability*; *start*), or most probably *cal AD 200–310* (*68% probability*). Burial activity within the enclosure ends in *cal AD 490–700* (*95% probability*; *end;* fig 4/22), or more likely *cal AD 540–640* (*68% probability*). Activity within the enclosure persisted for *180–420 years* (*95% probability*), or perhaps *240–360 years* (*68% probability*). Inhumations within the enclosure began in *cal AD 180–340* (*95% probability*; *start inhumations*). Inhumations are likely to have ceased in *cal AD 450–640* (*95% probability*; *end inhumations*), or more likely *cal AD 540–610* (*68% probability*). Cremations within the enclosure began in *cal AD 230–400* (*95% probability*; *start cremations;* fig 4/22), or more likely *cal AD 260–370* (*68% probability;* fig 4/22). They ceased in *cal AD 470–590* (*95% probability*; *end cremations;* fig 4/22), or more likely in *cal AD 510–560* (*68% probability;* fig 4/22; Hamilton *et al* in press). Cr12 (GrA-32241; 2370 ±30 BP) is anomalously old, being Iron Age in date. Since the cremation was found within a clearly identified Anglo-Saxon vessel, this anomalous date is more likely the result of recognised, but insufficiently understood, problems that can arise when radiocarbon dating cremated bone. The model would suggest that both inhumation and cremation activity began at approximately the same time and were concurrent at the Wasperton cemetery. While it is possible that inhumation activity slightly pre- and post-dates cremation activity, the lower number of samples (33% fewer inhumations than cremations dated) results in reduced precision for both the start and end dates.

Laboratory comment: English Heritage (31 January 2008), the amino acid profile (although hydroxyproline was not run) suggests that the protein in this sample was moderately well-preserved. The skeleton, however, was poorly preserved, and the second sample from the pilot series, which failed to produce sufficient protein for analysis, was from a skeleton that was well-preserved. This shows that skeletal preservation does not necessarily have a simple relationship with protein reservation in the surviving bone.

References: Carver *et al* in press
Hamilton *et al* in press
Scheschkewitz 2006
Wise 1991

Wasperton Anglo-Saxon cemetery: cremations, Warwickshire

Location: SP 265585
Lat. 52.13.25 N; Long. 01.36.43 W

Project manager: C Spall (Field Archaeology Specialists Ltd, York), 1980–5 and 2005–7

Archival body: Warwick Museum

Description: 24 cremated bone assemblages were identified; these are concentrated in the central area of the cemetery (Group 7), but some are more scattered. Most cannot be phased on the basis of grave goods.

Objectives: to determine the age range of this burial practice at Wasperton.

Final comment: see final comment under project (Wasperton Anglo-Saxon cemetery).

References: Carver *et al* in press
Wise 1991

GrA–32135 1570 ±35 BP

Sample: CR 1a F51/1000/2, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed long bone shaft fragments) (C Spall 2006)

Initial comment: cremation 1a (F51/1000/2) consisted of two heavily truncated pots found standing next to each other. The fill of both vessels were recovered. 1a was the larger of the two pots. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: the Wasperton cemetery is suspected, from its grave goods, to span the late Roman, early Saxon, and middle Saxon phases of the settlement. It is one of the very few Anglo-Saxon cemeteries to be completely excavated and this represents a good population sample. It is also one of the most interesting Anglo-Saxon cemeteries to have been excavated. The cemetery contained 215 inhumations, of which 13 were suitable for radiocarbon dating, and 26 cremations, of which 21 are suitable for radiocarbon dating. The cremations therefore offer the best chance of mapping the development of the cemetery.

Calibrated date: 1σ: cal AD 420–550
2σ: cal AD 410–580

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

GrA–32136 1595 ±35 BP

Sample: Cr 6 F371/1311, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed unidentified fragments) (C Spall 2006)

Initial comment: cremation 6 (F371/1311) took the form of the lower part of a cremation urn in the top of a ditch, F244. A small amount of burnt bone fragments were recovered. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: 1σ: cal AD 410–540
2σ: cal AD 390–550

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

GrA–32241 2370 ±30 BP

Sample: Cr 12 F1504/3008, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed unidentified fragments) (C Spall 2006)

Initial comment: cremation 12 (F1504/3008) was an irregular ovoid pit with a cremation urn placed centrally (only the lower part of the urn survived). The bone fragments were in the fill of the pot.

Objectives: as GrA-32135

Calibrated date: 1σ: 410–390 cal BC
2σ: 520–390 cal BC

Final comment: M Carver (16 October 2007), this result is anomalously old, being Iron Age in date. Since the cremation was found within a clearly identified Anglo-Saxon vessel, this anomalous date is more likely the result of recognised, but insufficiently understood, problems that can arise when radiocarbon dating cremated bone.

GrA–32242 1550 ±30 BP

Sample: Cr 14 F1506/3031, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed long bone shaft fragments) (C Spall 2006)

Initial comment: cremation 14 (F1506/3031) was a cemetery urn in a circular pit. Burnt bone fragments were recovered from the fill of the pot. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: 1σ: cal AD 430–560
2σ: cal AD 420–600

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

OxA–15962 1609 ±32 BP

Sample: Cr 3 F76=F1511/3209, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed long bone shaft fragments) (C Spall 2006)

Initial comment: cremation 3 (F76=1511/3209) consisted of a sub-rectangular shallow pit with a cluster of sherds of a pot. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: 1σ: cal AD 410–540
2σ: cal AD 380–550

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

OxA–15963 1565 ±29 BP

Sample: Cr 10 F1502/3004, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed unidentified fragments) (C Spall 2006)

Initial comment: cremation 10 (F1502/3004) was an irregular, elongated pit with steep and regular sides. A pot (lower part only survived) had been placed at the north end. Burnt bone and charcoal was recovered from the pot. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: 1σ: cal AD 430–550
2σ: cal AD 410–570

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

OxA–15964 1735 ±55 BP

Sample: Cr 20 F3006/3307, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed unidentified fragments) (C Spall 2006)

Initial comment: cremation 20 (F3006/3007) was an almost circular pit with a pot placed upright slightly off-centre. The fill of the pot contained burnt bone fragments. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: *1σ*: cal AD 230–390
2σ: cal AD 130–430

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2006), the low target current in the AMS of 6.2 mA resulted in the higher than usual standard deviation.

OxA–15965 1566 ±30 BP

Sample: Cr 22 F3021/3307 HUB 027, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed long bone shaft fragments) (C Spall 2006)

Initial comment: cremation 22 (F3021/3307) was an incomplete pit, containing a pot with a fill which contained burnt bone fragments. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: *1σ*: cal AD 420–550
2σ: cal AD 410–570

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

OxA–15985 1687 ±28 BP

Sample: Cr 26 F1589/3279 HUB 027, submitted on 12 May 2006 by C Spall

Material: cremated human bone (mixed long bone shaft fragments) (C Spall 2006)

Initial comment: cremation 26 (F1589/3279) consisted of sherds of a cremation urn and burnt bone fragments scattered in the fill of inhumation 117 (that had disturbed it). A burnt equal armed brooch was also present. The burials of the Wasperton cemetery were cut into a gravel terrace beside the Warwickshire Avon. The cemetery was discovered and excavated after it had been truncated by a box grader removing the topsoil and part of the subsoil.

Objectives: as GrA-32135

Calibrated date: *1σ*: cal AD 260–410
2σ: cal AD 250–430

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Wasperton Anglo-Saxon cemetery: inhumations, Warwickshire

Location: SP 265585
Lat. 52.13.27 N; Long. 01.36.48 W

Project manager: C Spall (Field Archaeology Specialists Ltd, York), 1980–5 and 2005–7

Archival body: Warwick Museum

Description: 215 graves were excavated in the cemetery but only 58 contained human remains; of these, 13 had viable amounts of bone for radiocarbon dating, but only 6 of these apparently contained sufficient collagen.

Objectives: to determine the date range of inhumation burial at Wasperton.

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: English Heritage (21 December 2007), before dating sub-samples of the thirteen skeletons which, superficially, appeared to have sufficient bone for radiocarbon analysis, they were sent to the Rafter Radiocarbon Laboratory for carbon and nitrogen stable isotope analysis (Beavan-Athfield *et al* 2001). The six individuals with C:N ratios within the optimum range of 2.9–3.6, suggested by DeNiro (1985), were subsequently submitted for dating.

Laboratory comment: SUERC Radiocarbon Dating Laboratory (AMS) (24 October 2006), another sample, from inhumation 16 (F271/C1270), failed to produce sufficient collagen for dating.

References: Beavan-Athfield *et al* 2001
DeNiro 1985
Wise 1991

GrA–32671 1670 ±30 BP

$\delta^{13}C$: -20.0‰

Sample: inhumation 34 F346/C1265, submitted on 25 July 2006 by C Spall

Material: human bone (right femur shaft) (C Spall 2006)

Initial comment: inhumation 34 (F346/C1265) identified as a narrow, shallow rectangular grave which had cut earlier inhumation 35 and truncated an earlier boundary ditch (F259). The bone was relatively well-preserved and parts of the skull, left humerus and radius, and both femora and tibia were represented. It was cut predominantly into the fills of two earlier features, but also into the well-drained gravel subsoil at the site. The feature was identified following the removal of topsoil and upper layer of natural gravel subsoil by box grader.

Objectives: the Wasperton cemetery is dated by grave goods to the mid-fourth to mid-seventh centuries AD (ie late Roman and early Anglo-Saxon to middle Anglo-Saxon period). The cemetery is one of the most interesting Anglo-Saxon cemeteries and was also excavated in its entirety. A total of nine cremations have also been submitted for dating and together these dates will test the date range for burial at the site.

Calibrated date: *1σ:* cal AD 340–420
2σ: cal AD 260–430

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: English Heritage (2007), the stable isotope measurements were carried out at the Rafter Radiocarbon Laboratory and, for this sample (R-29292-4), are as follows: δ^{13}C: -20.0 ±0.3; δ^{15}N:+8.6 ±0.3; C/N ratio: 3.4.

GrA–32672 1740 ±30 BP

δ^{13}C: -19.9‰

Sample: Inhumation 46, submitted on 25 July 2006 by C Spall

Material: human bone (?tibia/long bone shaft fragment) (C Spall 2006)

Initial comment: inhumation 46 was identified as a long, narrow, sub-rectangular grave, which had been truncated slightly to the north of inhumation 25. The bone preservation was relatively good with teeth, jaw, and some axial and long bones surviving. It was cut into the natural gravel subsoil at the site. There were no known contaminants, although the feature was truncated by a box grader during removal of the top soils and uppermost level of natural subsoil.

Objectives: as GrA-32671

Calibrated date: *1σ:* cal AD 240–350
2σ: cal AD 230–400

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: English Heritage (2007), the stable isotope measurements were carried out at the Rafter Radiocarbon Laboratory and, for this sample (R-29292-9), are as follows: δ^{13}C: -19.8 ±0.3; δ^{15}N:+12.0 ±0.3; C/N ratio: 3.6.

GrA–32674 1580 ±25 BP

δ^{13}C: -19.7‰

Sample: Inhumation 169 F3110/C3614, submitted on 25 July 2006 by C Spall

Material: human bone (femur shaft) (C Spall 2006)

Initial comment: inhumation 169 was identified as a long sub-rectangular grave cut into earlier gullies F3116 and F3117 and cut by later inhumation 165. The bone preservation was good with all but some axial bones represented. It was cut into natural grave subsoil. There were no known contaminants, although the feature was identified following removal of topsoil and the upper level of natural subsoil with a box grader.

Objectives: as GrA-32671

Calibrated date: *1σ:* cal AD 420–540
2σ: cal AD 410–550

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: English Heritage (2007), the stable isotope measurements were carried out at the Rafter Radiocarbon Laboratory and, for this sample (R-29292-12), are as follows: δ^{13}C: -19.9 ±0.3; δ^{15}N:+9.7 ±0.3; C/N ratio: 3.4.

Laboratory comment: English Heritage (8 January 2008), replicate measurements on the stable isotopes were carried out at Reading University and the measurements for WASP-169 were as follows: δ^{13}C was -20.2 ±0.2‰; δ^{15}N was +10.9 ±0.2‰; and the C/N ratio was 3.5. The two δ^{13}C measurements on this skeleton (WASP-169 and R-29292-12) are statistically consistent (T'=0.7; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-20.1 ±0.2‰; Reimer *et al* 2004). The two δ^{15}N measurements on the same skeleton are, however, not statistically consistent (T'=11.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978). For more information on the Reading University stable isotope analysis of the human bone collagen from the Wasperton cemetery please see Carver *et al* (in press).

Laboratory comment: Rafter Radiocarbon Laboratory (29 January 2008), *see* laboratory comment by SHES, University of Reading.

Laboratory comment: SHES, University of Reading (29 January 2008), while the δ^{15}N in the two lab comparison samples are not in statistical agreement, the actual difference of 0.9‰ and 1.2‰ does not affect the interpretation of diet.

References: Carver *et al* in press
Reimer *et al* 2004
Ward and Wilson 1978

OxA–14459 1806 ±31 BP

δ^{13}C: -19.8 ±0.3‰
δ^{15}N (diet): +11.9 ±0.3‰
C/N ratio: 3.3 *%C:* 2.7 *%N:* 0.6

Amino Acid class: 3 (Stafford *et al* 1988)

Hydroxyproline	Aspartic	Glutamic	Proline	Glycine	Alanine	Arginine
–	51.0	91.0	121.0	363.0	138.0	58.0

Sample: WN82/F3235/C1294, submitted on 25 January 2005 by C Spall

Material: human bone (distal femur) (M Houst 2005)

Initial comment: grave F325 was identified as a large rectangular steep-sided, flat-bottomed feature cut directly into subsoil with no other stratigraphic relationships. The skeleton was very poorly preserved, but apparently fully articulated. Only the skull, a fragment of the right humerus and femur survived. The grave was cut into the gravel and sand subsoil which is believed to be acidic.

Objectives: the sample represents one of two bone samples selected for a pilot-study for radiocarbon suitability. Within the overall project design a well-preserved skeleton and a poorly-preserved skeleton were selected to test for collagen presentation in bones within the assemblage. This sample represents a poorly preserved skeleton. If dating proves to be successful, the date itself is of intrinsic interest, but it will also serve to establish radiocarbon recommendations for the assemblage for the future. Indeed, should the sample prove insufficient, this will also be used to inform the next stage of the project design.

Calibrated date: *1σ:* cal AD 130–250
2σ: cal AD 120–330

Final comment: M Carver (18 October 2007), of the 13 inhumation burials with enough material available for both stable isotope and radiocarbon dating, only six had C:N ratios that were optimal, and of those, one failed, due to insufficient preserved collagen.

References: Stafford *et al* 1988

SUERC–11973 1700 ±35 BP

$\delta^{13}C$: -20.0‰

Sample: Inhumation 27 F309/C1259, submitted on 25 July 2006 by C Spall

Material: human bone (skull fragments) (C Spall 2006)

Initial comment: inhumation 27 consisted of a long, narrow grave cut into subsoil and was found to contain a body and fragmentary unburnt bones identified as femora and a tibia. The skeleton was partly preserved, although identifiable bones appeared undisturbed. The inhumation was cut directly into well-drained natural gravel subsoil of the first gravel terrace of the river Avon, Warwickshire. There were no known contaminants, although the feature was defined following box grading at the site.

Objectives: as GrA-32671

Calibrated date: *1σ:* cal AD 260–410
2σ: cal AD 240–430

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: English Heritage, the stable isotope measurements were carried out at the Rafter Radiocarbon Laboratory and, for this sample (R-29292-3), are as follows: δ^{13}C: -19.7 ±0.3; δ^{15}N:+11.4 ±0.3; C/N ratio: 3.3.

Laboratory comment: English Heritage (8 January 2008), replicate measurements on the stable isotopes were carried out at Reading University and the measurements for WASP-27 were as follows: δ^{13}C was -19.5 ±0.2‰; δ^{15}N was +12.3 ±0.2‰; and the C/N ratio was 3.2. The two δ^{13}C measurements on this skeleton (R-29292-3 and WASP-27) are statistically consistent (T′=0.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-19.6 ±0.2‰; Reimer *et al* 2004). The two δ^{15}N measurements on the same skeleton are, however, not statistically consistent (T′=6.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978). For more information on the Reading University stable isotope analysis of the human bone collagen from the Wasperton cemetery please see Carver *et al* (in press).

Laboratory comment: Rafter Radiocarbon Laboratory (29 January 2008), *see* laboratory comment by SHES, University of Reading under GrA-32674

References: Carver *et al* in press
Reimer *et al* 2004
Ward and Wilson 1978

SUERC–11974 1460 ±35 BP

$\delta^{13}C$: -20.8‰

Sample: Inhumation 174 F3122/C3683, submitted on 25 July 2006 by C Spall

Material: human bone (skull fragments) (C Spall 2006)

Initial comment: inhumation 174 was identified as a large sub-rectangular grave cut into earlier ditch F3026. The excavation revealed a composite stone coffin and fragment of skull and long bones. Cut predominantly into the fill of an earlier gully but also into well-drained natural gravel subsoil. The feature was identified following removal of topsoil and of the upper level of the natural subsoil by box grader.

Objectives: as GrA-32671

Calibrated date: *1σ:* cal AD 570–650
2σ: cal AD 540–660

Final comment: see final comment under Wasperton Anglo-Saxon cemetery.

Laboratory comment: English Heritage (2008), the stable isotope measurements were carried out at Rafter Radiocarbon Laboratory and, for this sample (R-29292-13), are as follows: δ^{13}C: -19.9 ±0.3; δ^{15}N:+10.2 ±0.3; C/N ratio: 3.3.

Laboratory comment: English Heritage (8 January 2008), replicate measurements on the stable isotopes were carried out at Reading University and the measurements for WASP-174 were as follows: δ^{13}C was -20.5 ±0.2‰; δ^{15}N was +10.8 ±0.2‰; and the C/N ratio was 3.5. The two δ^{13}C measurements on this skeleton (WASP-174 and R-29292-13) are statistically consistent (T′=2.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (-20.3 ±0.2‰; Reimer *et al* 2004). The two δ^{15}N measurements on the same skeleton are also statistically consistent (T′=2.8; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (+10.6 ±0.2‰; Reimer *et al* 2004). For more information on the Reading University stable isotope analysis of the human bone collagen from the Wasperton cemetery please see Carver *et al* (in press).

References: Carver *et al* in press
Reimer *et al* 2004
Ward and Wilson 1978

Willington Quarry, Derbyshire

Location: SK 294285
Lat. 52.51.10 N; Long. 01.33.48 W

Project manager: M G Beamish (ULAS, University of Leicester), 1998–9

Description: excavations prior to the extension of a sand and gravel quarry at Willington, south Derbyshire have produced remarkable evidence of prehistoric activity on the floodplain of the river Trent. Areas of wooded, low, gravel islands surrounded by active streams were a focus of early to middle Neolithic activity in the fourth millennium cal BC until around 3000 cal BC. Peterborough Ware was the predominant pottery used on the site and non-animal foodstuffs appear to be dominated by wild resources, although evidence of dairying has also been identified. Radiocarbon dating of the pottery has supported the notion that Peterborough Ware belongs mostly to the second half of the fourth millennium cal BC and is not a late Neolithic tradition. In the latter half of the third millennium cal BC fire clearance of the woodland started, and was to continue for several centuries. A burnt mound may have been used for feasting within a partial clearing. The subsequently alluviating landscape was abandoned, save for the siting of a grave pit and ceremonial ring ditch, during the (early) Bronze Age. Several hundred years later, in the late second millennium cal BC, a stream was the site of further burnt mound activity with surviving waterlogged remains of outstanding quality, including a substantial rectangular roundwood-lined trough.

Objectives: to provide a chronological framework for interpreting the environmental sequence from the palaeochannel deposits; to date and ascertain the significance of human activity in the vicinity of fallen trees; to date the fire-clearance of the floodplain; to provide overall estimates of the start, end, and duration of the use of the burnt mounds; to date the alluviation; and to provide precise dates for the Peterborough Ware (and its sub-styles) ceramic assemblage.

References: Beamish 2001
Beamish 2007

Willington Quarry: alluviation, Derbyshire

Location: SK 27782725
Lat. 52.50.30 N; Long. 01.35.15 W

Project manager: M G Beamish (University of Leicester Archaeological Service), 1998–9 and 2004–7

Archival body: Derby Museum

Description: samples from deposits that might provide a chronological framework for alluviation were selected for measurement.

Objectives: to date the alluviation.

Final comment: M G Beamish (12 October 2007), modelling of samples from features recorded as having alluvium below them allows a *terminus ante quem* (Beamish 2007) for alluviation to be estimated of 2200-1980 cal BC. OxA-15044 provides a *terminus post quem* for the onset of alluvial conditions at the end of the fourth millenium cal BC.

References: Beamish 2000
Beamish 2001
Beamish 2007

OxA–15044 4566 ±34 BP

$\delta^{13}C$: -24.3‰

Sample: Context 2076 sample 149 (A), submitted in August 2005 by M G Beamish

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: the deposit comes from the base of a partly stone-lined feature, interpreted as an oven. The upper fill of the oven (2068 fired clay, interpreted as an oven roof) had collapsed into the feature.

Objectives: the date for the charcoal will give a *terminus post quem* for the alluviation of the site on the following argument: the deposit of charcoal has probably been deposited in the oven either during the last usage, or has been dumped back into the feature following final usage. The feature has collapsed. Subsequent flooding had washed some of the scorched fire-reddened clay roof (2068) down-slope toward a nearby stream channel. This must have occurred before the feature had become integrated into the soil that would have regenerated over the feature following abandonment of the site. The washing of the feature is clear evidence that the site has started to flood. The stream channels have then alluviated, and the whole site been buried by silty clay.

Calibrated date: *1σ:* 3370–3190 cal BC
2σ: 3490–3110 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15044 and SUERC-7595) are not statistically consistent (T′=14.2; T′(5%)=3.8; ν=1; Ward and Wilson, 1978) and therefore date material of different ages. The washing of the fill of the oven feature down-slope may have happened either because of initial flooding soon after deposition which was not part of succeeding alluviation, or alternatively because soil that had developed over the deposits was washed away by flooding thereby exposing earth-fast archaeology within the more consolidated glacial sandy clay to fluvial erosion.

Laboratory comment: Oxford Radiocarbon Accelerator Unit (28 April 2005), a number of charcoal samples from Willington Quarry disclosed extremely low yields of carbon. This amount of carbon is much lower than we would usually expect from the vast majority of charcoal. Given the fact that these samples were identified to species, probably the most parsimonious explanation for these low yields is that the charcoal is degraded chemically in the post-depositional environs of the site. Whether or not this influences the radiocarbon age is very difficult to answer on the basis of the current evidence. Certainly in some cases we correlate degraded charcoal of this type with erroneous radiocarbon determinations, but this is usually confined to very old samples of charcoal, for example of Palaeolithic age.

References: Ward and Wilson 1978

SUERC–7595 4740 ±35 BP

$\delta^{13}C$: -24.2‰

Sample: Context 2076 sample 149 (B), submitted in August 2005 by M G Beamish

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as OxA-15044

Objectives: as OxA-15044

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: see OxA-15044

Willington Quarry: Burnt Mound 1, Derbyshire

Location: SK 27802722
Lat. 52.50.29 N; Long. 01.35.14 W

Project manager: M G Beamish (University of Leicester Archaeological Service), 1998–9 and 2004–7

Archival body: Derby Museum

Description: samples relating to Burnt Mound 1 were measured. The burnt mound included middle Neolithic pottery in its layers and fills, and sealed layers containing early Neolithic material.

Objectives: to determine the origin and chronology of the Burnt Mound.

Final comment: M G Beamish (12 October 2007), chronological modelling provides estimates for Burnt Mound 1: *2340–2060 cal BC (95% probability; start burnt mound)* to *2120–1840 cal BC (95% probability; end burnt mound;* fig 118; Marshall *et al* 2007). The burnt mound was of late Neolithic or early Bronze Age date, but was located above, and included residual pottery from, earlier Neolithic activity.

Laboratory comment: English Heritage (23 December 2007), a further sample, a residue on a Neolithic bowl sherd, was dated from context 1980, a layer immediately beneath the mound. It was dated to 3700–3530 cal BC (OxA-14481; 4849 ±35BP; Reimer *et al* 2004).

References: Beamish 2000
Beamish 2001
Beamish 2007
Marshall *et al* 2007
Reimer *et al* 2004

OxA–15046 4607 ±35 BP

$\delta^{13}C$: -24.1‰

Sample: Context 1817, sample 123 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: 1817 was a dark greyish brown mottled silty clay up to 0.12m thick, and the lowest burnt mound layer in quadrant 3. The layer was cut by the central feature 1651. As layer 1759 in quadrant 4, it was also cut by pit 1892, a possible secondary hearth.

Objectives: the charcoal is derived from a charcoal-rich deposit stratigraphically directly related to, and part of, the burnt mound. The deposit pre-dates the upper burnt mound layer and the central trough 1651. The date should give an indication of the earlier phase of the Burnt Mound.

Calibrated date: *1σ:* 3500–3350 cal BC
2σ: 3500–3340 cal BC

Final comment: M G Beamish (12 October 2007), the base of the burnt mound incorporated residual material from earlier Neolithic activity (SUERC-7605–6 and OxA-15046). The three measurements are statistically consistent (T′=4.2; T′(5%)=6.0; ν=2; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

OxA–15111 3610 ±29 BP

$\delta^{13}C$: -26.8‰

Sample: Context 1487, sample 111 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: 1487 was the predominant (and latest) burnt mound layer, a dark greyish brown charcoal-rich deposit up to 0.1m thick, with abundant fire-cracked stones. It was sampled in 1m^2 boxes, and this sample came from just to the north of the central features in quadrant 1.

Objectives: the charcoal is derived from a charcoal-rich deposit, stratigraphically the latest layer of the burnt mound. The deposit post-dates the lowest burnt mound layer. The deposit is most probably derived from spent fuel cleaned out of the central features, and will date from a later phase of the burnt mound's use.

Calibrated date: *1σ:* 2030–1920 cal BC
2σ: 2040–1880 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15111 and SUERC-7598) from [1487] a charcoal-rich layer derived from spent fuel and stone cleaned out of the central features are not statistically consistent (T′=13.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and therefore date material of different ages. The results clearly show that the base of the burnt mound incorporates residual material from earlier Neolithic activity (SUERC-7605–6 and OxA-15046). In fact these three measurements are statistically consistent (T′=4.2; T′(5%)=6.0; ν=2; Ward and Wilson 1978) and could be of the same actual age.

Laboratory comment: see OxA-15044

References: Beamish 2007
Ward and Wilson 1978

OxA–15112 3721 ±30 BP

$\delta^{13}C$: -24.3‰

Sample: Context 1582, sample 81 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: layer 1582 was immediately above the primary fill of an elongated pit 1483, adjacent to the northeast of the Burnt Mound hearth/oven 1704. The layer was black and comprised mostly charcoal with some clay, and occasional burnt gravels. Charcoal pieces up to 60mm were noted. The deposit probably represents a dump of spent fuel from the adjacent hearth/oven.

Objectives: the charcoal is derived from a deposit near the base of a substantial pit adjacent to the hearth/oven 1704, and is likely to have been dumped into the pit following an episode of burnt mound activity. The date will give comparative evidence to the other dates from Burnt Mound 1, in particular the date from the top of the hearth feature, indicating longevity or otherwise.

Calibrated date: *1σ:* 2200–2040 cal BC
2σ: 2210–2020 cal BC

Laboratory comment: English Heritage (2007), the two measurements from this deposit (OxA-15112 and SUERC-7602) are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

OxA–15113 3754 ±28 BP

$\delta^{13}C$: -24.9‰

Sample: Context 1653, sample 152 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Sorbus* sp., single fragment (R Gale 2005)

Initial comment: 1653 was the second fill of the central trough feature (pit 1651); up to 0.30m deep, an extremely charcoal-rich very dark grey sandy clay with gravel and some burnt stones. The deposit probably represents a dump of material back into the trough following the last usage.

Objectives: the charcoal is derived from a charcoal-rich deposit near the base of the central burnt mound feature interpreted as the trough. It seems most likely that this context is a dump of material in the base of the feature following the last usage of the burnt mound. The date will give an indication of the last usage of the monument.

Calibrated date: *1σ*: 2210–2130 cal BC
2σ: 2280–2040 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15113 and SUERC-7909) from 1691, a charcoal and fire-cracked stone rich fill of a pit (oven or hearth 1704) are statistically consistent (T′=0.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

OxA–15114 3695 ±29 BP

δ¹³C: -26.2‰

Sample: Context 1691, sample 91 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: Pomoideae, single fragment (R Gale 2005)

Initial comment: 1691 was the uppermost fill of a pit containing several layers of silty clays, rich with charcoal and fire-cracked stone. Context 1691 was distinct in that it comprised *c* 50% pebbles, and these stones appeared cracked *in situ*. The deposit is probably contemporary with the last usage of the burnt mound. It would appear to be continuous with the uppermost burnt mound layer, 1487, but was a distinct deposit by virtue of the density and the state of fire-cracked stones.

Objectives: the charcoal is derived from a charcoal and fire-cracked stone-rich deposit on the top of one of the principal burnt mound features interpreted as an oven or hearth. This deposit may represent the remains of the last ?cooking to have occured in the feature, or be the last stones heated within it. The date will give an indication of the last usage of the monument.

Calibrated date: *1σ*: 2140–2030 cal BC
2σ: 2200–1970 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15114 and SUERC-7604) from 1691, a charcoal-rich fill of the central pit (trough) of the burnt mound, are statistically consistent (T′=1.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

Laboratory comment: see OxA-15044

References: Ward and Wilson 1978

OxA–15115 3649 ±33 BP

δ¹³C: -24.7‰

Sample: Context 1881, sample 122 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Fraxinus excelsior*, single fragment (R Gale 2005)

Initial comment: a small pit deposit in quadrants 3/4 of Burnt Mound 1. It clearly cut the lower burnt mound layer (1759 in quadrant 4), and was partially sealed by the upper layer (1487). The pit contained intense charcoal and fire-cracked stone. Traditionally this feature would be interpreted as a hearth, but it might also be a deposit of burnt material.

Objectives: the charcoal is derived from a charcoal-rich deposit stratigraphically directly related to the burnt mound. The deposit post-dates the lower burnt mound layer. The relationship with the last burnt mound layer is ambiguous, as it appeared to be partly sealed by the layer but is not earlier than the layer's start. The charcoal is likely to be derived from an episode of burnt mound activity in the later phase of the burnt mound's life.

Calibrated date: *1σ*: 2120–1950 cal BC
2σ: 2140–1920 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15115 and SUERC-7606) from 1881, a charcoal-rich deposit post-dating the earliest spread 1817, are not statistically consistent (T′=473.1; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and therefore date material of different ages.

Laboratory comment: see OxA-15044

References: Ward and Wilson 1978

SUERC–7598 3775 ±35 BP

δ¹³C: -25.9‰

Sample: Context 1487, Sample 111 B, submitted in August 2005 by M G Beamish are A Monckton

Material: charcoal: *Fraxinus excelsior*, single fragment (R Gale 2005)

Initial comment: as OxA-15111

Objectives: as OxA-15111

Calibrated date: *1σ*: 2280–2130 cal BC
2σ: 2300–2040 cal BC

Final comment: see OxA-15111

SUERC–7602 3690 ±35 BP

δ¹³C: -26.2‰

Sample: Context 1582, sample 81 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Fraxinus excelsior*, single fragment (R Gale 2005)

Initial comment: as OxA-15112

Objectives: as OxA-15112

Calibrated date: *1σ*: 2140–2020 cal BC
2σ: 2200–1960 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15112 and SUERC-7602) from 1582 a primary fill of a substantial pit or tank adjacent to the hearth/oven 1704 and derived from an episode of burnt mound activity are statistically consistent (T′=0.5; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

SUERC–7604 3740 ±35 BP

δ¹³C: -24.4‰

Sample: Context 1691, sample 91 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Fraxinus excelsior*, single fragment (R Gale 2005)

Initial comment: as OxA-15114

Objectives: as OxA-15114

Calibrated date: *1σ:* 2210–2040 cal BC
2σ: 2280–2030 cal BC

Final comment: see OxA-15114

SUERC–7605 4695 ±35 BP

δ¹³C: -25.1‰

Sample: Context 1817, sample 123 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as OxA-15046

Objectives: as OxA-15046

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: see OxA-15046

SUERC–7606 4695 ±35 BP

δ¹³C: -24.6‰

Sample: Context 1881, sample 122 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: as OxA-15115

Objectives: as OxA-15115

Calibrated date: *1σ:* 3630–3370 cal BC
2σ: 3640–3360 cal BC

Final comment: see OxA-15115 and OxA-15046

Laboratory comment: English Heritage (23 December 2007), this fragment of charcoal is residual in this context.

SUERC–7909 3780 ±50 BP

δ¹³C: -25.8‰

Sample: Context 1653, sample 152 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: Pomoideae, single fragment (R Gale 2005)

Initial comment: as OxA-15113

Objectives: as OxA-15113

Calibrated date: *1σ:* 2290–2130 cal BC
2σ: 2430–2030 cal BC

Final comment: see OxA-15113

Willington Quarry: clearance, Derbyshire

Location: SK 27752725
Lat. 52.50.30 N; Long. 01.35.17 W

Project manager: M G Beamish (University of Leicester Archaeological Service), 1998–9 and 2004–7

Archival body: Derby Museum

Description: samples were taken from a number of deposits interpreted as the remains of fire clearance.

Objectives: to date the fire clearance of the floodplain. The clearance of woodland from the floodplain represents an important change in local landscape development. Fire clearance was a precursor to providing increased grazing or land for cultivation or both. The identification of well-dated clearance episodes is regionally and nationally important. The evidence may represent one or more episodes of clearance. Is the clearance of the floodplain related chronologically to the cursus monument? The clearance may be specifically related to the Trent, and the provision of an access corridor along or across the valley.

Final comment: M G Beamish (12 October 2007), the results suggest clearance of the floodplain was concentrated in the mid-third to mid-second millennia cal BC.

References: Beamish 2000
Beamish 2001
Beamish 2007

GrA–31787 3410 ±40 BP

δ¹³C: -25.7‰

Sample: Context 78, sample 6, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: Rosaceae, twig (R Gale 2005)

Initial comment: from a 2.1m × 1m area of charcoal-rich soil with some scorched red clay pockets. The charcoal was sampled from plant excavation, and was exposed in an evaluation trench to the east of the island occupation.

Objectives: the charcoal is derived from a charcoal-rich (albeit degraded) deposit immediately related to a less extensive oxidised fire-reddened clay. The charcoal appears to be derived from a fire that also reddened the clay adjacent to it. The archaeological interpretation is that evidence of burning relates to tree clearance by fire (ie a tree or stump is pulled down and then burnt, with charcoal and burnt soil from the roots becoming incorporated into a sub-surface hollow). Thus the charcoal relates to the burning episode and will date the clearance.

Calibrated date: *1σ:* 1750–1660 cal BC
2σ: 1880–1610 cal BC

Final comment: M G Beamish (12 October 2007), a single fragment of charcoal came from [78] a 2.1x1m area of charcoal-rich soil with some scorched red clay pockets.

GrA–31789 3730 ±40 BP

δ¹³C: -27.3‰

Sample: Context 4108, sample 183, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Alnus* sp., single fragment (R Gale 2005)

Initial comment: from a mid-dark grey silt clay, friable, with common degraded charcoal, rare pebbles and patches of scorched earth within an 3m × 2.25m area. The charcoal was sampled during controlled quadrant excavation. The context was situated on southern edge of excavated site.

Objectives: as GrA-31787

Calibrated date: 1σ: 2200–2030 cal BC
2σ: 2280–2020 cal BC

Final comment: M G Beamish (12 October 2007), a single fragment of charcoal was dated from [4108]. The sample derived from a charcoal rich (albeit degraded) deposit immediately related with pockets of more oxidised fire-reddened clay that appears to be derived from a fire used as part of tree clearance. The charcoal is thought to have been incorporated into the tree pit or hole during the felling of the tree.

GrA–31796 4425 ±45 BP

$\delta^{13}C$: -27.9‰

Sample: Context 4489, sample 276, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: from a 2.1m × 0.8m area of scorched red clay with charcoal pockets. The charcoal was sampled in plan.

Objectives: as GrA-31787

Calibrated date: 1σ: 3270–2930 cal BC
2σ: 3340–2910 cal BC

Final comment: M G Beamish (12 October 2007), a single fragment of hazel charcoal was dated from [4489] a 2.1m × 0.8m area of scorched red clay with charcoal pockets.

GrA–31797 4670 ±45 BP

$\delta^{13}C$: -27.1‰

Sample: Context 63, sample 3 (A), submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus/Alnus* sp., single fragment (R Gale 2005)

Initial comment: from a mid-grey silty clay with some degraded charcoal, rare pebbles, and patches of scorched earth within a 5m × 2.5m area. There was charcoal sampled during controlled segment excavation. The context was sited on south-western edge of the excavated site.

Objectives: as GrA-31787

Calibrated date: 1σ: 3520–3360 cal BC
2σ: 3630–3350 cal BC

Final comment: M G Beamish (12 October 2007), two charcoal samples derived from a charcoal-rich (albeit degraded) deposit [63] immediately related with pockets of more oxidised fire reddened clay which appears to be derived from a fire used as part of tree clearance. The charcoal is thought to have been incorporated into the tree pit or hole during the felling of the tree. The two measurements (OxA-15898 and GrA-31797) are not statistically consistent (T'=5.3; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and therefore date material of different ages.

References: Ward and Wilson 1978

OxA–15081 3981 ±27 BP

$\delta^{13}C$: -25.3‰

Sample: Context 4490, sample 278 (A), submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Fraxinus excelsior*, probably root (R Gale 2005)

Initial comment: from a context sealed by alluvium, and excavated, recorded, and sampled in hurried conditions. The deposit was formed of charcoal-rich clay 1.5m across, overlain by reddened clay (scorched?). The location, context, and broad morphology of the deposit, and its similarity to other features recorded in more detail, has led to its interpretation as a burnt deposit resulting from fire clearance and it was sampled specifically to recover suitable material for radiocarbon dating.

Objectives: as GrA-31787

Calibrated date: 1σ: 2570–2460 cal BC
2σ: 2580–2460 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15081 and SUERC-7592) from 4490, a deposit of charcoal rich clay (1.5m in diameter) overlain by reddened ?scorched clay, are statistically consistent (T'=0.1; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

OxA–15082 3645 ±28 BP

$\delta^{13}C$: -26.3‰

Sample: Context 135, sample 17 (A), submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: from burnt deposits recorded within an evaluation trench. The feature was recognised by extensive deposits of reddened clay (134) interpreted as scorched by burning. This overlay a more reduced layer of grey charcoal-rich clay (135) that was in places black with charcoal. This was sampled at both ends of the available section. The submitted material was derived from sample 17 at the southern end.

Objectives: as GrA-31787

Calibrated date: 1σ: 2110–1950 cal BC
2σ: 2140–1930 cal BC

Final comment: see SUERC-7593

OxA–15083 3508 ±28 BP

$\delta^{13}C$: -29.4‰

Sample: Context 4156/7, sample 187 (A), submitted in August 2005 by M G Beamish

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: from a 3m diameter deposit of fire-reddened charcoal and scorched clay, filling feature 4159 whose plan, form and profile are consistent with that of a tree-throw. 4156 is a fire-reddened clay sealing 4157, which was black with charcoal. All layers were sealed by alluvium.

Objectives: as GrA-31787

Calibrated date: 1σ: 1890–1770 cal BC
2σ: 1930–1740 cal BC

Final comment: see SUERC-7594

OxA–15898 4535 ±38 BP

$\delta^{13}C$: -26.9‰

Sample: Context 63, sample 3 (B), submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Betula* sp., single fragment (R Gale 2005)

Initial comment: as GrA-31797

Objectives: as GrA-31787

Calibrated date: 1σ: 3360–3110 cal BC
2σ: 3370–3090 cal BC

Final comment: see GrA-31797

SUERC–7592 3995 ±35 BP

$\delta^{13}C$: -25.3‰

Sample: Context 4490, sample 278 (B), submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Fraxinus excelsior*, single fragment (R Gale 2005)

Initial comment: as OxA-15081

Objectives: as GrA-31787

Calibrated date: 1σ: 2570–2470 cal BC
2σ: 2580–2460 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (OxA-15081 and SUERC-7592BP) from [4490] a deposit of charcoal rich clay (1.5m in diameter), overlain by reddened ?scorched clay, are statistically consistent (T'=0.1; T'(5%)=3.8; ν=1;Ward and Wilson 1978) and could be of the same actual age.

References: Beamish 2007
Ward and Wilson 1978

SUERC–7593 3700 ±35 BP

$\delta^{13}C$: -24.6‰

Sample: Context 135, sample 17 (B), submitted in March 2006 by M G Beamish

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as OxA-15082

Objectives: as GrA-31787

Calibrated date: 1σ: 2140–2030 cal BC
2σ: 2200–1970 cal BC

Final comment: M G Beamish (12 October 2007), 134, a feature of extensive deposits of reddened clay representing an intense burning event, overlay a more reduced deposit of charcoal-rich clay, 135, that was in places black with charcoal. Two measurements (OxA-15082 and SUERC-7593) were obtained from fragments of charcoal from 135 that are statistically consistent (T'=1.5; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

SUERC–7594 3440 ±35 BP

$\delta^{13}C$: -25.8‰

Sample: Context 4156/7, sample 187 (B), submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as OxA-15083

Objectives: as GrA-31787

Calibrated date: 1σ: 1870–1690 cal BC
2σ: 1890–1640 cal BC

Final comment: M G Beamish (12 October 2007), two samples of charcoal from a 3m diameter deposit of fire-reddened charcoal and scorched clay 4156, filling 4159 a feature whose plan, form, and profile are consistent with that of a tree pit. The two measurements (OxA-15083 and SUERC-7594) are statistically consistent (T'=2.3; T'(5%)=3.8; ν=1; Ward and Wilson 1978) and could be of the same actual age.

References: Ward and Wilson 1978

Willington Quarry: fallen trees and associated features, Derbyshire

Location: SK 27762724
Lat. 52.50.30 N; Long. 01.35.16 W

Project manager: M G Beamish (University of Leicester Archaeological Service), 1998–9 and 2004–7

Archival body: Derby Museum

Description: samples taken from tree holes and adjacent features were measured in order to assess the relationship between the two.

Objectives: to determine the nature of the Neolithic settlement.

Final comment: M G Beamish (12 October 2007), a phase of occupation in the vicinity of fallen trees lasting from *c* 3500-3000 cal BC is interpreted. Material dating to *c* 2000 cal BC within some contexts (eg 1451 and 1328) is probably intrusive and related to later clearance activity.

References: Beamish 2000
Beamish 2001
Beamish 2007

GrA–31770 4490 ±40 BP

$\delta^{13}C$: -25.5‰

Sample: Context 1448, sample 65 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus* sp., single fragment (R Gale 2005)

Initial comment: context 1448 was a lens of charcoal-rich black clay in the pit fill of 1056. It was an homogenous context and as such represents an event of deposition. As it does not have a post-ghost profile, it is more likely that the deposit was placed into an abandoned structural pit when the structure was dismantled.

Objectives: the charcoal has probably been deposited in the postpit when a ?structure was dismantled. The charcoal may represent occupation debris. If the date of the charcoal is similar to the later dates from adjacent pit/post-pits (contexts 1328 and 1455) and tree-throw (context 1451), there will be evidence for the structure and the adjacent tree-throw being contemporary, and also perhaps connnected with the burnt mound activity.

Calibrated date: *1σ:* 3340–3090 cal BC
2σ: 3360–3020 cal BC

Final comment: M G Beamish (12 October 2007), a single fragment of hazel charcoal came from 1448 a lens of charcoal rich clay with the fill 1056 of pit 1447. This was one of two pits to the north-east of a probable root-void silting.

Laboratory comment: (10 July 2006), a second fragment of charcoal from this deposit failed to produce sufficient carbon for dating.

GrA–31785 3800 ±40 BP

$\delta^{13}C$: -27.1‰

Sample: Context 1451, sample 114 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as OxA-15110

Objectives: as OxA-15110

Calibrated date: *1σ:* 2300–2140 cal BC
2σ: 2430–2130 cal BC

Final comment: see OxA-15110

Laboratory comment: English Heritage (2007), the two measurements on this piece of charcoal are statistically consistent ($T'=3.0$; $T'(5\%)=3.8$; $\nu=1$;Ward and Wilson 1978). There weighted mean is 3750 ±24, which calibrates to 2270–2040 cal BC (Reimer *et al* 2004).

References: Reimer *et al* 2004
Ward and Wilson 1978

GrA–31786 3665 ±40 BP

$\delta^{13}C$: -25.8‰

Sample: Context 1453, sample 112, submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: 1451 was a plausible post pit - one of a pair to the southeast of a similarly filled tree-throw. 1453 was the upper fill consisting of brownish grey silty clay with frequent charcoal. It probably represents ?domestic material incorporated into the top of the post during its life, or in the dismantling of a structure.

Objectives: the deposit represents an episode of burning, probably redeposited in the upper fill of a pit that has held the post of a structure. The pit is adjacent to another pit that also contains archaeological material and might also have been used as part of the structure. If the radiocarbon dates from the post pits and adjacent tree-throws are similar, it would support the interpretation that tree-throws are being used as part of structures at this time. There would also be evidence to suggest that the structure is contemporary with the use of Burnt Mound 1.

Calibrated date: *1σ:* 2140–1970 cal BC
2σ: 2200–1930 cal BC

Final comment: M G Beamish (12 October 2007), a fragment of blackthorn came from 1453 the upper fill of 1455 a plausible post pit.

GrA–31799 4750 ±40 BP

$\delta^{13}C$: -25.0‰

Sample: Context 458, sample 57 (A), submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus* sp., single fragment (R Gale 2005)

Initial comment: from the dark brownish-black sandy clay fill of a small pit-type feature. The deposit was rich in environmental and ceramic remains, including Mortlake-style Peterborough Ware. Analysis of the environmental sample identified some modern straw contamination - unfortunately there was machine activity above this area before excavation could be undertaken. To the west of the pit is a probable burnt tree-throw (420). 458 is the lower and the predominant of two fills.

Objectives: the dating of this charcoal will hopefully provide a date for the deposition of the pit group, and allow comparison with the date of a probable burnt-out tree/shrub (301) to the south.

Calibrated date: *1σ:* 3640–3380 cal BC
2σ: 3640–3370 cal BC

Final comment: M G Beamish (12 October 2007), the results only provide a *terminus post quem* for the associated ceramic assemblage.

Laboratory comment: see OxA-15899

GrA–31800 3655 ±40 BP

$\delta^{13}C$: -26.5‰

Sample: Context 302, sample 28, submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: from a grey clay fill of an irregular area 2.2m × 2m with in places 80% charcoal. The feature had an irregular lower profile consisting of sharply defined narrow channels/gullies up to 0.15m deep. It was skirted on its western side by another sharply defined narrow linear feature. The deposit overlay a short section of linear feature for which there is no other dating. The linear feature was aligned with the medieval/postalluvial drainage features, but as the alluviation separates the short linear feature from the post-alluvial features, the alignment can only be a coincidence.

Objectives: the charcoal is a major component in the filling of an irregular feature that is probably the base of a small tree or shrub that has been burnt out. The charcoal is associated with a reduced grey clay (not scorched red) and represents the evidence of the burning - in this instance with no tree-throw formed by earlier felling into which oxidised material was trapped. The dating of the charcoal will therefore provide a date for this phase of clearance.

Calibrated date: *1σ:* 2130–1950 cal BC
2σ: 2150–1910 cal BC

Final comment: M G Beamish (12 October 2007), a single fragment of blackthorn came from 302. This base of a small tree or shrub that had been burnt out. This date was also included in the modelling of fire clearance dates (Beamish 2007).

References: Beamish 2007

GrA–31801 4515 ±45 BP

δ¹³C: -25.5‰

Sample: Context 1477, sample 68, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus* sp., single fragment (R Gale 2005)

Initial comment: from a a small pit containing fire-cracked stones sealed by a dark grey sandy clay. (1477) with which a concentration of charcoal was found sealed by a substantial spread. The spread was rich in Mortlake-style Peterborough Ware.

Objectives: the charcoal is contained in the rich fill of a pit that also contained diagnostic Mortlake-style Peterborough Ware. The layer also contained environmentally identifiable material including sloe stones and hazelnut shells. The dating of the charcoal will hopefully provide a date for the cooking that probably took place in the pit. This date will be compared with other Neolithic/Beaker occupation dates from the island occupation. This date will provide a *terminus ante quem* for the deposition of the substantial Mortlake sherds in the overlying spread which will form comparative evidence for the other directly dated Peterborough Ware sherds and indirectly dated deposits.

Calibrated date: *1σ:* 3360–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: M G Beamish (12 October 2007), this date provides a *terminus post quem* for the associated Mortlake substyle of Peterborough Ware ceramics.

References: Beamish 2007

GrA–31803 3650 ±40 BP

δ¹³C: -26.1‰

Sample: Context 1328, sample 64, submitted in August 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: from group 2503. Reassessment of 2503 reclassifies the sausage-shaped pit as a tree-throw, with four associated structural pits that contain dateable material. The nearest of these pits was 102. 1328 was a charcoal lens toward the base of 102 within pit 103, which was 0.85m across and 0.40m deep. The charcoal appeared to be a placed layer, rather than the result of *in situ* burning, as the grains of the charcoal pieces were not aligned; the deposit may be filling the base of a post-pipe. The upper fill of the pit (102) appeared similar to the upper fill of the tree-throw to the northwest.

Objectives: the deposit represents an episode of burning, probably redeposited in the base of a pit that has held the post of structure. The pit is adjacent to a tree-throw pit that also contains archaeological material and might have been used as part of a structure. If the later radiocarbon date of the charocal from 1328, and that from the tree-throw (and adjacent post pit 1455) are similar, it would support the interpretation that tree-throws are being used as part of structures at this time. There would also be evidence to suggest that the structure is contemporary with the Burnt Mound 1 activity. As there are contrasting dates for this context, it is hoped that these samples will resolve the issue of the later date, and show the earlier material to be residual.

Calibrated date: *1σ:* 2130–1950 cal BC
2σ: 2140–1900 cal BC

Final comment: M G Beamish (12 October 2007), four samples came from 1328 a lens of charcoal within 102, the fill of pit 103. Replicate measurements on sample 64A, (OxA-15045 and OxA-15109) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and allow a weighted mean to be calculated (3646 ±21 BP, which calibrates to 2130–1945 BC; Reimer *et al* 2004). The other samples from 1328 were SUERC-7596, GrA-31803, and OxA-15900. The measurements on the four charcoal fragments from [1328] are not statistically consistent (T′=701.2; T′(5%)=7.8; ν=3; Ward and Wilson 1978).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15045 3641 ±33 BP

δ¹³C: -26.4‰

Sample: Context 1328, sample 64 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as GrA-31803

Objectives: as GrA-31803

Calibrated date: *1σ:* 2120–1950 cal BC
2σ: 2140–1910 cal BC

Final comment: see GrA-31803

Laboratory comment: English Heritage (2007), the two measurements (OxA-15045 and OxA-15109) are statistically consistent (T′=0.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

The weighted mean is 3650 ±21 BP, which calibrates to 2130–1940 cal BC (Reimer *et al* 2004).

References: Beamish 2007
Reimer *et al* 2004
Ward and Wilson 1978

OxA–15084 4434 ±30 BP

$\delta^{13}C$: -26.1‰

Sample: Context 1499, sample 71 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: from pit 1500 on the southern edge of group 2508, which consisted of artefact rich spreads (middens?) with some cut features. Pit 1500 a thick charcoal-rich fill, 1499. The spread contains Neolithic Peterborough Ware (Fengate style) and lithics.

Objectives: the deposit represents an episode of burning, probably cooking on the edge of a spread of material, some of which seals it. The deposit is 3m to the north of a tree-throw that is associated with post pits and may form a structure. The data will demonstrate contemporaneity between the possible structure to the south, and also provide a *terminus post quem* for the spread that seals the pit.

Calibrated date: *1σ*: 3270–3020 cal BC
2σ: 3330–2920 cal BC

Final comment: M G Beamish (12 October 2007), two samples were submitted from 1499 the charcoal-rich fill of pit 1500 that cut and was sealed by deposits containing Peterborough (Fengate) Ware and lithics. The two measurements (OxA-15084 and SUERC-8156) are statistically consistent (T′=1.7; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and could therefore be of the same actual age.

References: Ward and Wilson 1978

OxA–15109 3650 ±28 BP

$\delta^{13}C$: -25.3‰

Sample: Context 1328, sample 64 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: replicate of OxA-15045

Objectives: as GrA-31803

Calibrated date: *1σ*: 2120–1970 cal BC
2σ: 2140–1930 cal BC

Final comment: see GrA-31803

Laboratory comment: see OxA-15045

OxA–15110 3714 ±29 BP

$\delta^{13}C$: -25.4‰

Sample: Context 1451, sample 114 A, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: from group 2503. Reassessment of 2503 reclassifies the sausage-shaped pit 1452 as a tree-throw, with several associated structural pits that contain dateable material. To the north of 2503 is 2508, which consisted of artefact-rich spreads (middens?) with some cut features. On the southern edge of this spread, pit 1500/1499 cuts a lower layer of spread/soil, and is sealed by an upper layer. It contained a thick charcoal-rich fill 1499. The spread contains Neolithic Peterborough (Fengate) pottery and lithics. 1451 was a dark brownish grey compact clay containing some charcoal. The fill profile of 1451 undercuts 92 and, with other indicators, the feature is interpreted retrospectively as a tree-throw. This charcoal deposit was not as homogenous as others, and cannot be described as a clear context episode as the others submitted with it.

Objectives: the charcoal has probably been deposited in the tree-throw while the *in situ* roots are rotting. There is absolutely no indication that the fallen tree was burned *in situ*, and the evidence points toward the roots remaining *in situ*. If the date of the charcoal is similar to the date from the adjacent pit/post-pit (context 1328), there will be evidence that the tree-throw and the area around the tree-throw is being used for a quasi-domestic purpose at this time, and that the tree-throw has been utilised for a structure.

Calibrated date: *1σ*: 2200–2030 cal BC
2σ: 2210–2020 cal BC

Final comment: M G Beamish (12 October 2007), two samples came from 1451 the fill of sausage-shaped pit 1452, classified as a root-void silting. The charcoal is thought to have been deposited while the *in situ* roots were rotting and is not interpreted as evidence that the fallen tree was burned *in situ*. Two fragments of the same piece of blackthorn charcoal [114A] were dated in Groningen (GrA-31785) and Oxford (OxA-15110) and gave statistically consistent results (T′=3.0; T′(5%)=3.8; ν=1; Ward and Wilson 1978), thus allowing a weighted mean to be calculated (3744 ±23 BP; which calibrates to 2270–2040 cal BC; Reimer *et al* 2004). The other sample dated was a fragment of hazel charcoal (SUERC-7597). The measurements on the two charcoal fragments from 1451 are not statistically consistent (T′=346.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and the context clearly contains material of different ages.

Laboratory comment: see GrA-31785

OxA–15116 4712 ±31 BP

$\delta^{13}C$: -25.4‰

Sample: Context 299, sample 34, submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: the group consists of a spread in the west that could be tree-throw related that contained a charcoal-rich deposit 299, a clear tree-throw with pottery from its main infill to the north-west (364/5), and some internal pits that contained pottery and charcoal (292 and 291). The tree-throw 364 did not contain dateable material – but both internal pits and spread to the west did. As the tree-throw contained an early to middle Neolithic pot from within the fill, and an early to middle Neolithic pot came from the internal pits and the spread, there is good argument for association. It is very unlikely that the pits predate the tree-throw, as they would have been destroyed in the formation of the tree-throw and therefore they would appear to all be contemporary. 299 was a distinct deposit of dark grey clay with charcoal. The deposit represents either a dump of burnt material, or an episode of burning. The deposit immediately overlies a pale silt, 317. This was probably continuous with 297/8 to the north, which contained Peterborough- and Mildenhall-style pottery.

Objectives: the charcoal is derived from a homogenous burnt deposit above a silt 317, filling an irregular spread that may be part of a tree-throw, 327. Silt (297/8) to the north, which was probably continuous with 317 contained early and middle Neolithic pottery, as did adjacent pits and another clearly defined tree-throw. The date will place an activity of burning in the immediate context of tree-throw features that are probably contemporary, and therefore provide evidence that tree-throw and the immediate area around tree-throws is being used in a quasi-domestic way at this time.

Calibrated date: 1σ: 3630–3370 cal BC
2σ: 3640–3370 cal BC

Final comment: M G Beamish (12 October 2007), a single fragment of charcoal was dated from 299, a homogenous burnt deposit above a silt, 317, filling an irregular spread that may be part of a root-void silting, 327.

Laboratory comment: see OxA-15044

OxA–15127 4790 ±32 BP

$\delta^{13}C$: -26.9‰

Sample: Context 291, sample 25 (A), submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: the group consists of a spread in the west that could be tree-throw related that contained a charcoal-rich deposit 299, a clear tree-throw with pottery from main infill to north-west (364/5), and some internal pits that contained pottery and charcoal (292 and 291). The tree-throw 364 did not contain dateable material – but both internal pits and spread to the west did. As the tree-throw contained an early to middle Neolithic pot from within the fill, and an early to middle Neolithic pot came from the internal pits and the spread, there is a good argument for association. It is very unlikely that the pits predate the tree-throw, as they would have been destroyed in the formation of the tree-throw and therefore they would appear to be all contemporary. 291 was a homogenous deposit of greyish orange sandy clay within a small pit that also contained Peterborough- and Plain Bowl-style pottery, and a single flake.

Objectives: the deposit represents human activity within the pit of a tree-throw which appears to be contemporary. The date will place activity in the immediate context of a tree-throw feature, and therefore provides evidence that tree-throws and the immediate area around tree-throws are being used in a quasi-domestic way at this time.

Calibrated date: 1σ: 3620–3370 cal BC
2σ: 3630–3360 cal BC

Final comment: M G Beamish (12 October 2007), two single fragments of charcoal were dated from [291] the fill of a small pit that also contained Peterborough- and Plain Bowl-style pottery. Replicate measurements on the sample sent to Oxford (OxA-15127–8) are statistically consistent (T′=3.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and thus a weighted mean can be taken before calibration (4649 ±22 BP, which calibrates to 3520–3360 cal BC; Reimer *et al* 2004). However, the measurements on the two charcoal fragments from 291 are not statistically consistent (T′=30.2; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and the context clearly contains material of different ages.

Laboratory comment: English Heritage (2007), the two measurements from this sample (OxA-15127 and OxA-15128) are statistically consistent (T′=3.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Reimer *et al* 2004
Ward and Wilson 1978

OxA–15128 4609 ±31 BP

$\delta^{13}C$: -26.9‰

Sample: Context 291, sample 25 (A), submitted in March 2006 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: replicate of OxA-15127 on the same fragment of charcoal.

Objectives: as OxA-15127

Calibrated date: 1σ: 3490–3350 cal BC
2σ: 3500–3340 cal BC

Final comment: see OxA-15127

Laboratory comment: Oxford Radiocarbon Accelerator Unit (2007), this is a replicate of OxA-15127

OxA–15899 4814 ±38 BP

$\delta^{13}C$: -27.7‰

Sample: Context 458, sample 57 (B), submitted in March 2005 by M G Beamish and A Monckton

Material: charcoal: Pomoideae, single fragment (R Gale 2005)

Initial comment: as GrA-31799

Objectives: as GrA-31799

Calibrated date: 1σ: 3650–3530 cal BC
2σ: 3660–3520 cal BC

Final comment: M G Beamish (12 October 2007), the two measurements (GrA-31799 and OxA-15899) on charcoal from [458], the rich fill of a pit that contained Peterborough Ware (Mortlake) ceramics, are statistically consistent (T′=1.3; T′(5%)=3.8; ν=1; Ward and Wilson 1978). However, given the lack of recognisable relationship between the charcoal and ceramics the results only provide a *terminus post quem* for the associated ceramic assemblage.

Laboratory comment: see OxA-15044 and GrA-31799

References: Ward and Wilson 1978

OxA–15900 4472 ±36 BP

δ¹³C: -26.7‰

Sample: Context 1328, sample 113, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus* sp., single fragment (R Gale 2005)

Initial comment: as GrA-31803

Objectives: the deposit represents an episode of burning, probably redeposited in the base of a pit that has held the post of a Neolithic structure. The pit is adjacent to a tree-throw pit, that also contains archaeological material and might have been used as part of a structure. If the radiocarbon date of the charocal from 1328, and that from the tree-throw are similar, it would support the interpretation that tree-throws are being used as part of structures at this time.

Calibrated date: *1σ*: 3340–3030 cal BC
2σ: 3350–3020 cal BC

Final comment: see GrA-31803

Laboratory comment: see OxA-15044

References: Beamish 2007

SUERC–7596 4455 ±35 BP

δ¹³C: -25.5‰

Sample: Context 1328, sample 64 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Prunus spinosa*, single fragment (R Gale 2005)

Initial comment: as GrA-31803

Objectives: as GrA-31803

Calibrated date: *1σ*: 3330–3020 cal BC
2σ: 3340–2940 cal BC

Final comment: see GrA-31803

SUERC–7597 4510 ±35 BP

δ¹³C: -26.5‰

Sample: Context 1451, sample 114 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: as OxA-15110

Objectives: as OxA-15110

Calibrated date: *1σ*: 3350–3100 cal BC
2σ: 3370–3080 cal BC

Final comment: see OxA-15110

SUERC–7607 4875 ±35 BP

δ¹³C: -27.1‰

Sample: Context 291, sample 25 B, submitted in August 2005 by M G Beamish and A Monckton

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: as OxA-15127

Objectives: as OxA-15127

Calibrated date: *1σ*: 3700–3630 cal BC
2σ: 3710–3630 cal BC

Final comment: see OxA-15127

SUERC–8156 4500 ±40 BP

δ¹³C: -25.2‰

Sample: Context 1499, sample 71 B, submitted in August 2005 by M G Beamish and A Monkton

Material: charcoal: *Corylus avellana*, single fragment (R Gale 2005)

Initial comment: as OxA-15084

Objectives: as OxA-15084

Calibrated date: *1σ*: 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: see OxA-15084

Willington Quarry: pollen column, Derbyshire

Location: SK 28002722
Lat. 52.50.29 N; Long. 01.35.03 W

Project manager: M G Beamish (University of Leicester Archaeological Service), 1998–9 and 2004–7

Archival body: Derby Museum

Description: a gravel quarry in the Trent valley, with various organically-filled palaeochannels including this, column 1, which is being analysed.

Objectives: to date the top, middle, and bottom of an environmental sequence; however, the very top of the sequence contains too few plant remains for a date.

Final comment: M G Beamish (12 October 2007), radiocarbon dates from the base and middle of column 1 indicate an early post-Glacial date (SUERC-7351 and SUERC-7350). Measurements from the top of the column were not statistically consistent (GrA-31468 and OxA-15897).

References: Beamish 2000
Beamish 2007

GrA–31468 4245 ±35 BP

δ¹³C: -28.7‰

Sample: sample 194, column 0–0.1m (A), submitted in May 2005 by J Greig

Material: waterlogged plant macrofossil (*Ranunculus* sect., *Ranunculus* (three), *Corylus avellana, Persicaria lapathifolia* (two), *Rumex* sp., *Prunella vulgaris* (two), *Sambucus nigra, Carex* (three)) (J Greig 2005)

Initial comment: a pollen column through a palaeochannel peaty infill on the southern edge of the excavations. The column sampled two layers between which was a broad shift in deposit – the upper a mid grey silty peaty clay, and the lower a friable silty peat. Despite general homogeneity, a clast of material exposed to the side of the column may well indicate a channel rejuvenation. The plan form of the channel is not fully clear as channels had clearly intercut over a wide area.

Objectives: to date the top of the environmental sequence, and hopefully demonstrate contemporaneity with elements of the Neolithic occupation of the area as identified in excavations to the east.

Calibrated date: 1σ: 2900–2870 cal BC
2σ: 2910–2750 cal BC

Final comment: M G Beamish (12 October 2007), the two samples from 00–100mm comprised terrestrial seeds (GrA-31468) and twig fragments (OxA-15897). The two measurements are not statistically consistent (T′=8.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978) and thus contain material of different ages. This is not surprising given that both samples contain material from within a 0.1m section of the palaeochannel. The measurements at best therefore only provide a *terminus post quem* for the top part of the column.

Laboratory comment: see OxA-15897

OxA–15897 4395 ±36 BP

$\delta^{13}C$: -28.7‰

Sample: sample 194, column 0–0.1 (B), submitted in May 2005 by J Greig

Material: waterlogged wood (twig fragments) (J Greig 2005)

Initial comment: as GrA-31468

Objectives: as GrA-31468

Calibrated date: 1σ: 3090–2920 cal BC
2σ: 3270–2910 cal BC

Final comment: see GrA-31468

Laboratory comment: English Heritage (31 January 2007), the two measurements (OxA-15897 and GrA-31468) are not statistically consistent (T′=8.9; T′(5%)=3.8; ν=1; Ward and Wilson 1978).

References: Ward and Wilson 1978

SUERC–7350 11405 ±45 BP

$\delta^{13}C$: -26.2‰

Sample: WIL 1 0.48–0.50m, submitted in May 2005 by J Greig

Material: waterlogged plant macrofossil (*Ranunculus flammula*, *Betula* sp., *Alnus glutinosa*, *Carex* sp.) (J Greig 2005)

Initial comment: the sample came from a silty organic matter and is calcerous.

Objectives: to date a pollen sequence that may stretch from the late-Glacial to the Neolithic.

Calibrated date: 1σ: 11360–11270 cal BC
2σ: 11410–11230 cal BC

Final comment: M G Beamish (12 October 2007), this provides a date for the mid-point of the pollen column.

SUERC–7351 11780 ±45 BP

$\delta^{13}C$: -27.4‰

Sample: WIL 0.96–0.98m, submitted in May 2005 by J Greig

Material: waterlogged plant macrofossil (*Betula* sp., *Filipendula ulmaria*, Apiaceae, *Eleocharis* sp., *Scoenoplectus* sp., *Carex*) (J Greig 2005)

Initial comment: as SUERC-7350

Objectives: as SUERC-7350

Calibrated date: 1σ: 11780–11650 cal BC
2σ: 11820–11510 cal BC

Final comment: M G Beamish (12 October 2007), this provides a date for the base of column 1.

Willington Quarry: pottery, Derbyshire

Location: SK 27752720
Lat. 52.50.29 N; Long. 01.35.17 W

Project manager: M G Beamish (University of Leicester Archaeological Service), 1998–9 and 2004–7

Archival body: Derby Museum

Description: excavations prior to the extension of a sand and gravel quarry at Willington, south Derbyshire have produced remarkable evidence of prehistoric activity on the floodplain of the river Trent. Areas of wooded, low, gravel islands surrounded by active streams were a focus of early to middle Neolithic activity in the fourth millennium cal BC until around 3000 cal BC. Peterborough Ware was the predominant pottery used on the site and non-animal foodstuffs appear to be dominated by wild resources, although evidence of dairying has also been identified. Radiocarbon dating of the pottery has supported the notion that Peterborough Ware belongs mostly to the second half of the fourth millennium cal BC and is not a late Neolithic tradition.

Objectives: to date the Peterborough Ware.

Final comment: M G Beamish (12 October 2007), the results of the radiocarbon dating programme undertaken at Willington, and comparisons with other reliable dates for Peterborough Ware from around the country, suggest that the tradition was current for about five or six hundred years, between *3600–3350 cal BC (95% probability: start Peterborough Ware)* and *3010-2860 cal BC (95% probability: end Peterborough Ware)* (Beamish 2007). This is a considerably shorter span than that indicated by Gibson and Kinnes (1997) (*c* 3400-2500 cal BC), although it started at roughly the same time.

References: Beamish 2000
Beamish 2001
Beamish 2007
Gibson and Kinnes 1997

OxA–14481 4849 ±35 BP

δ¹³C: -26.5‰

Sample: Context 1980, submitted in March 2005 by M G Beamish and P Marshall

Material: carbonised residue (internal, Neolithic Plain Bowl)

Initial comment: from a layer of grey gravely clay immediately above undisturbed natural strata and sealed below burnt mound layer 1817 (eg may either originate from original burnt mound activity or activities predating burnt mound activity). There is a very low likelihood of intrusion, although residuality is possible within prehistory.

Objectives: the charred residue on the sherd is most probably derived from the usage of the Peterborough Ware vessel from which it came, in the fourth or third millennium BC. Thus the dating of the creation of the residue will provide a date for the use (and manufacture assuming a relatively short life expectancy) of Peterborough Ware.

Calibrated date: *1σ*: 3660–3630 cal BC
2σ: 3700–3530 cal BC

Final comment: M G Beamish (12 October 2007), this sherd was subsequently identified as a Neolithic bowl. The residue date is consistent with the Neolithic bowl as an early Neolithic form, and indicates earlier Neolithic activity below the later burnt mound.

OxA–14482 4416 ±36 BP

δ¹³C: -27.2‰

Sample: Context 1040, submitted in March 2005 by M G Beamish and P Marsden

Material: carbonised residue (internal, Peterborough Ware)

Initial comment: from the surface of a spread of archaeological material adjacent to ?cooking pit, and adjacent to a structure of Neolithic date.

Objectives: as OxA-14481

Calibrated date: *1σ*: 3100–2930 cal BC
2σ: 3330–2910 cal BC

Final comment: M G Beamish (12 October 2007), the measurement contributed to the modelled estimates of Peterborough Ware (Beamish 2007).

References: Beamish 2007

OxA–14483 4550 ±45 BP

δ¹³C: -29.2‰

Sample: Context 225, submitted in March 2005 by M G Beamish and P Marsden

Material: carbonised residue (internal, Peterborough Ware (Ebbsfleet))

Initial comment: from the fill of a wide gully or pit that is probably of Neolithic date. It may relate to human interference within a tree-throw feature.

Objectives: as OxA-14481

Calibrated date: *1σ*: 3370–3120 cal BC
2σ: 3500–3090 cal BC

Final comment: M G Beamish (12 October 2007), the measurement contributed to the modelled estimates of Peterborough Ware (Beamish 2007).

References: Beamish 2007

OxA–14484 4540 ±65 BP

δ¹³C: -28.1‰

Sample: Context 1004, submitted in March 2005 by M G Beamish and P Marsden

Material: carbonised residue (internal, Peterborough Ware)

Initial comment: from the fill of discrete shallow pit or posthole cut 1829 sealed below alluvium. Probably of Neolithic date. The sherd may have been derived from the surface of the fill.

Objectives: as OxA-14481

Calibrated date: *1σ*: 3370–3100 cal BC
2σ: 3500–3020 cal BC

Final comment: see OxA-14482

OxA–14485 4500 ±50 BP

δ¹³C: -26.6‰

Sample: Context 246, submitted in March 2005 by M G Beamish and P Marsden

Material: carbonised residue (internal, Peterborough Ware)

Initial comment: from the fill of a linear ?drainage gully that is probably an intrusive feature containing residual archaeological material from nearby discrete pits of Neolithic date.

Objectives: as OxA-14481

Calibrated date: *1σ*: 3350–3090 cal BC
2σ: 3370–3020 cal BC

Final comment: see OxA-14482

OxA–15047 4615 ±36 BP

δ¹³C: -27.4‰

Sample: Context 390, submitted in August 2005 by M G Beamish and P Marsden

Material: carbonised residue (internal, Peterborough Ware (Mortlake/Fengate))

Initial comment: recovered from the cleaning of a probable tree-throw feature.

Objectives: as OxA-14481

Calibrated date: *1σ*: 3500–3350 cal BC
2σ: 3510–3340 cal BC

Final comment: M G Beamish (12 October 200), the sherd was identified as belonging to the Mortlake/Fengate substyles, and the deposit as a probable silted tree hole. The measurement contributed to the modelled estimates of Peterborough ware (Beamish 2007).

References: Beamish 2007

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