

The Atlas of Hillforts of Britain and Ireland Hillfort survey (v2 October 2013)

Important information:

This form must be used with the accompanying Notes for Guidance which are downloadable from the Project website (<http://www.arch.ox.ac.uk/hillforts-atlas.html>). Please read the notes before attempting to fill in this form.

Once completed this form can be either posted or emailed to us, alternatively you can transcribe the information into the web-based form and submit electronically – see the Notes for details.

Access to sites and Health and Safety:

The project and its host Institutions bear no responsibility for any access or health and safety issues that may arise during your participation in this project.

Disclaimer:

The Co-directors of this project and their institutions are not responsible for issues of access to sites and health and safety of participants in the survey. By taking part in this survey you are acknowledging that access and health and safety are your responsibility.

Section 1.

Introductory comments

Thank you for taking part in this survey, by doing so you are agreeing that all information provided can be used and published by the project. You will remain anonymous unless you indicate here that you want to be named on the project website:

1.1. YES – Name to be used: C.L.A.S.P.
(+ Jim Aveling and Rob Close)

Basic information about you

1.2. Your name: Community Landscape Archaeology Survey Project (CLASP)

1.3. Contact phone number: c/o G.W. Hatton, 01788 822411

1.4. email address: c/o ghatton@toucansurf.com

1.5. Did you visit this site as part of an archaeological society/group, if so which one:
See answers to 1.1 and 1.2 above

Section 2.

Basic information about the site

- 2.1. Name of the site: Rainsborough Hill Fort
2.2. Alternative name of the site: Rainsborough Camp
2.3. National Grid Reference: SP526348
2.4. Any known reference numbers: By Camp Farm
2.5. Current county/Unitary authority: Northants CC
2.6. When did you visit the site (month/year): 23/6/2015

Landscape setting of the site

- 2.7. Altitude (metres): 146m
2.8. Topographic position: [you can tick more than 1]
HILL TOP **Y**
ASPECT (if slope) The Hill Fort is at the western end of a long promontory.
Thus there is a restricted view towards the east.

2.9. Maximum visibility/view:

NE: [tick 1 only]
MEDIUM

SE: [tick 1 only]
SHORT

SW: [tick 1 only]
SHORT

NW: [tick 1 only]
LONG

Comments:

Visibility to the East is medium, South is long, West is long, North is short.
See viewshed diagram in Appendices for exact distances in all directions.

2.10. Water source inside: [you can tick more than 1]

No stream is visible within the camp. Perhaps the camp may have been originally provided with a well, since it is clear that the water table is reachable by digging – see 2.11 below – however, there is no mention of this possibility in the RCHME report, which refers to fully documented extensive excavations between 1961 and 1965.

2.11. Water source nearby:

There are two ponds between the nearby Camp Farm and the site of the fort – however, these are probably medieval or post-Enclosure in origin. The OS map shows the nearest natural watercourse to have its source about 300m WNW of the hillfort site and below the level of the fort, at the 120m contour OD (the fort itself is at 145m OD).

2.12. Current land category (over whole site footprint) (you can tick more than 1)

PASTURE (GRAZED)	X
HEATH	X

Comments: Currently permanent grassland for sheep grazing

2.13. Pre-hillfort activity:

No record of pre-IA activity in or near this site, see RCHME report.

2.14. Post-hillfort activity:

Roman occupational activity within the site in 1st century AD and again in 3-4th centuries, see copy of RCHME report in Appendices.

Surface morphology of the site

Note (see the Notes for guidance document): from this section onwards we are assuming that you are working with a plan of the site. If it is a published plan then we do not expect you to record every item, only those which are different/additional to the plan you are working with. If you are drawing your own plan you can annotate details on it.

2.15. Which plan are you using:

RCHME report, see copy of plan drawing in Appendices.

2.16. Have you used any other sources of information (tick any that apply):

HER	X.
NMR	X.
PUBLISHED SOURCE (details):	RCHME.
OTHER (details):	"The History of Banbury: Including Copious Historical and Antiquarian Notices of the Neighbourhood", Alfred Beesley, 1841.

2.17. Is there an annex (see diagram in Notes for Guidance):

YES	.
NO	X.

Note: Sections 3 and 5 are for every site, section 4 only applies to sites with an annex.

Section 3. Enclosed area

3.1 General overall shape of enclosed area: [you can tick more than 1]

SUB-CIRCULAR/OVAL	X.
RECTANGULAR	X.

Comments: The enclosed area is approximately 2.6ha (as is the area at Whittlebury hillfort, for example), and is bounded by a double bank and ditch.

3.2. Maximum dimensions of internal area (see diagram in Notes for Guidance):

1. 200m.
2. 220m.

3.3. Maximum dimensions of whole site footprint (see diagram in Notes for Guidance):

1. 240m.
2. 260m.

Entrances

3.4. Number of breaks/entrances through the rampart by position: [give a number for each]

N	Made in C17 for local traffic.
NE	.
E	Halfway up east side. RCHME dates this provisionally to the Roman period.
SE	.
S	.
SW	.
W	Halfway up west side. RCHME states that this was the <u>only</u> original entrance.
NW	Made in C17 for local traffic.

Comments:

3.5. How many are apparently secondary breaks: [give a number for each]

Gaps towards N and NW, see comments in 3.4 above.

3.6. (see diagram in Notes for Guidance):

For each entrance that is not a simple gap, is it most like any of the following (e.g. in-turned), if so record which position it is in:

IN-TURNED: [you can tick more than 1]

N .
NE .
E .
SE .
S .
SW .
W X.
NW .

OUT-TURNED: [you can tick more than 1]

N .
NE .
E .
SE .
S .
SW .
W .
NW .

BOTH (IN- AND OUT-TURNED): [you can tick more than 1]

N .
NE .
E .
SE .
S .
SW .
W .
NW .

HORNWORK: [you can tick more than 1]

N .
NE .
E .
SE .
S .
SW .
W .
NW .

OVER-LAPPING: [you can tick more than 1]

N .
NE .
E .
SE .
S .
SW .
W .

NW .
OUTWORKS: [you can tick more than 1]
N .
NE .
E .
SE .
S .
SW .
W .
NW .
Comments: .

OTHER FORMS:
Comments: .

Enclosing works - ramparts/banks/walls and ditches

3.7. Number of ramparts/banks/walls per quadrant:

NE: .
SE: .
SW: .
NW: .

Comments: Two banks and one ditch (originally probably two ditches) per quadrant. RCHME states: "The inner bank is up to 3m high above the interior, with an outer ditch 4m deep below the summit. Beyond is an outer bank, reduced by cultivation on the W and N to no more than 0.5m high and completely removed on the E. On the S it still survives up to 1m high. The outer ditch has disappeared completely, except for slight traces along the W side. The main inner rampart has a dry-stone wall, in places still 0.75m high, set halfway up the outer slope. This is visible over large lengths of the rampart and was presumably once a continuous feature".

3.8. Number of DITCHES per quadrant:

NE: .
SE: .
SW: .
NW: .

Comments: See 3.7 above.

3.9. Form of rampart/bank/wall

Same all the way around:

Y Probably – see comments in 3.7 above.
N .

If yes: [tick one only]

EARTHEN BANK .
STONE WALL .
BOTH X.
PALISADING .
VITRIFICATION .

OTHER BURNING .
 Comments: .
 If NO then by quadrant:
 NE: [you can tick more than 1]
 EARTHEN BANK .
 STONE WALL .
 BOTH .
 PALISADING .
 VITRIFICATION .
 OTHER BURNING .
 Comments: .
 SE: [you can tick more than 1]
 EARTHEN BANK .
 STONE WALL .
 BOTH .
 PALISADING .
 VITRIFICATION .
 OTHER BURNING .
 Comments: .
 SW: [you can tick more than 1]
 EARTHEN BANK .
 STONE WALL .
 BOTH .
 PALISADING .
 VITRIFICATION .
 OTHER BURNING .
 Comments: .
 NW: [you can tick more than 1]
 EARTHEN BANK .
 STONE WALL .
 BOTH .
 PALISADING .
 VITRIFICATION .
 OTHER BURNING .
 Comments: .

3.10. For each quadrant how many of each of the bank/wall/ditch combinations are there (see diagram in Notes for Guidance):

NE:
 BANK/WALL (NO DITCH) .
 BANK/DITCH .
 BANK/DITCH/BANK .
 OTHER .
 Comments: See comments in 3.7, plus diagram in appendices.
 SE:
 BANK/WALL (NO DITCH) .
 BANK/DITCH .
 BANK/DITCH/BANK .

OTHER .
 Comments: See comments in 3.7, plus diagram in appendices.

SW:
 BANK/WALL (NO DITCH) .
 BANK/DITCH .
 BANK/DITCH/BANK .
 OTHER .
 Comments: See comments in 3.7, plus diagram in appendices.

NW:
 BANK/WALL (NO DITCH) .
 BANK/DITCH .
 BANK/DITCH/BANK .
 OTHER .
 Comments: .

3.11. Chevaux de Frise (tick if YES, you can tick more than 1]

NE .
 SE .
 SW .
 NW .
 Comments: See comments in 3.7, plus diagram in appendices.

Interior features

3.12. Tick all that are present, mark where on the plan and send to us: [you can tick more than 1]

NO APPARENT FEATURES X
 STONE STRUCTURES .
 PLATFORMS .
 QUARRY HOLLOWES .
 PITS .
 OTHER .
 Comments: No interior features because it was under cultivation in the past.

Section 4.

If the site has an annex (see notes for definition of an annex), continue here with information about the annex, otherwise go to section 5 below:

4.1. Shape of the annex [tick only 1]

LOBATE .
 CONCENTRIC .
 CIRCULAR .
 SUB-CIRCULAR .
 RECTANGULAR .
 SUB-RECTANGULAR .
 POLYGONAL .
 IRREGULAR .
 OTHER .

4.2. Number of annex ramparts: .

4.3. Number of annex ditches: .

4.4. Number of annex entrances: .

4.5. Comments on the annex:

Section 5.

5.1. Any general comments (including comments on erosion/damage, especially if recent):

Up to date information on the state of the monument can be seen in the photographs in the Appendices.

5.2 Geology

The fort sits on a promontory of Great Oolite Limestone, with deposits of Northants Sand & Ironstone very nearby to the north and west. The surrounding lower land is chiefly Upper Lias Clay. A nearby tributary of the R. Swere (which runs to the west of this site) has its source nearby and cuts into the underlying Lias Clay, just north-west of the hillfort site, it may have been a reliable source in the Iron Age

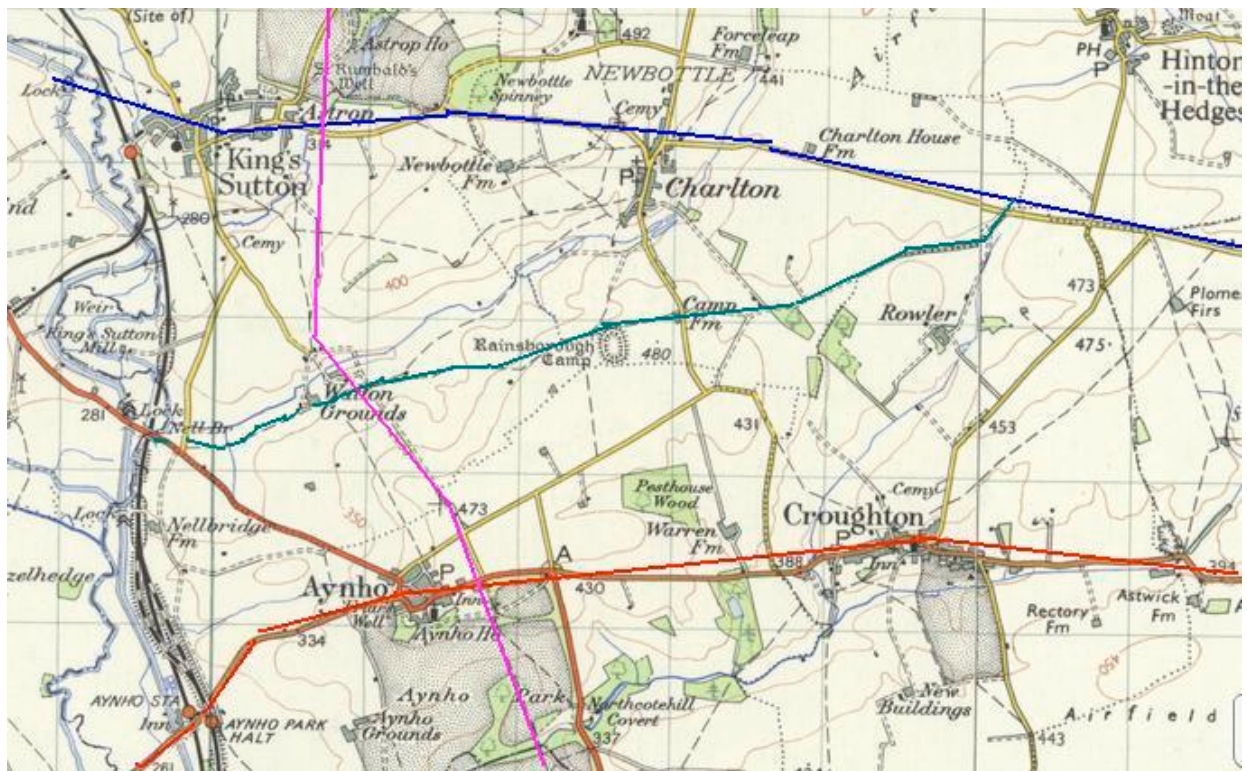


MapInfo details; geological data by courtesy of NCC

5.3 Communication Routes

The Road from Alchester is numbered 56 in Margery, it joins Akeman Street between Bicester and Towcester. There is significant evidence that Evenley was a substantial trading and probable ritual centre, for which evidence comes from both the very large coin hoards discovered there together with the spread of Iron Age coins including Dobunnic (from west of the Cherwell), Catuvellanuni (from the south), Corieltavi (to the north) and Addemaros, the Catuvellanuni ally (to the south east).

There appears to be no ancient communication routes in direct proximity to the Rainsborough fort.



However on close examination of the OS Map (see above) an interesting footpath network is discernible. From the west side, a footpath leads to the fort from the the deserted settlement of Walton Grounds. The name Walton means “settlement of the Welsh” aka Celtic British. The current view is that settlements such as this were home to isolated but tolerated groups of Celtic British people. It is therefore of interest that apart from this route, Walton also appears to be served by the N-S Portway and an extension of the route from Rainsborough to the early crossing of The Cherwell at Nell Bridge. To the north-east of the fort a footpath leads to the early west-east route and therefore Evenley.

(NB: In nearby Croughton there is a substantial RB villa, and in Kings Sutton an early, possibly nucleated, small RB settlement.)

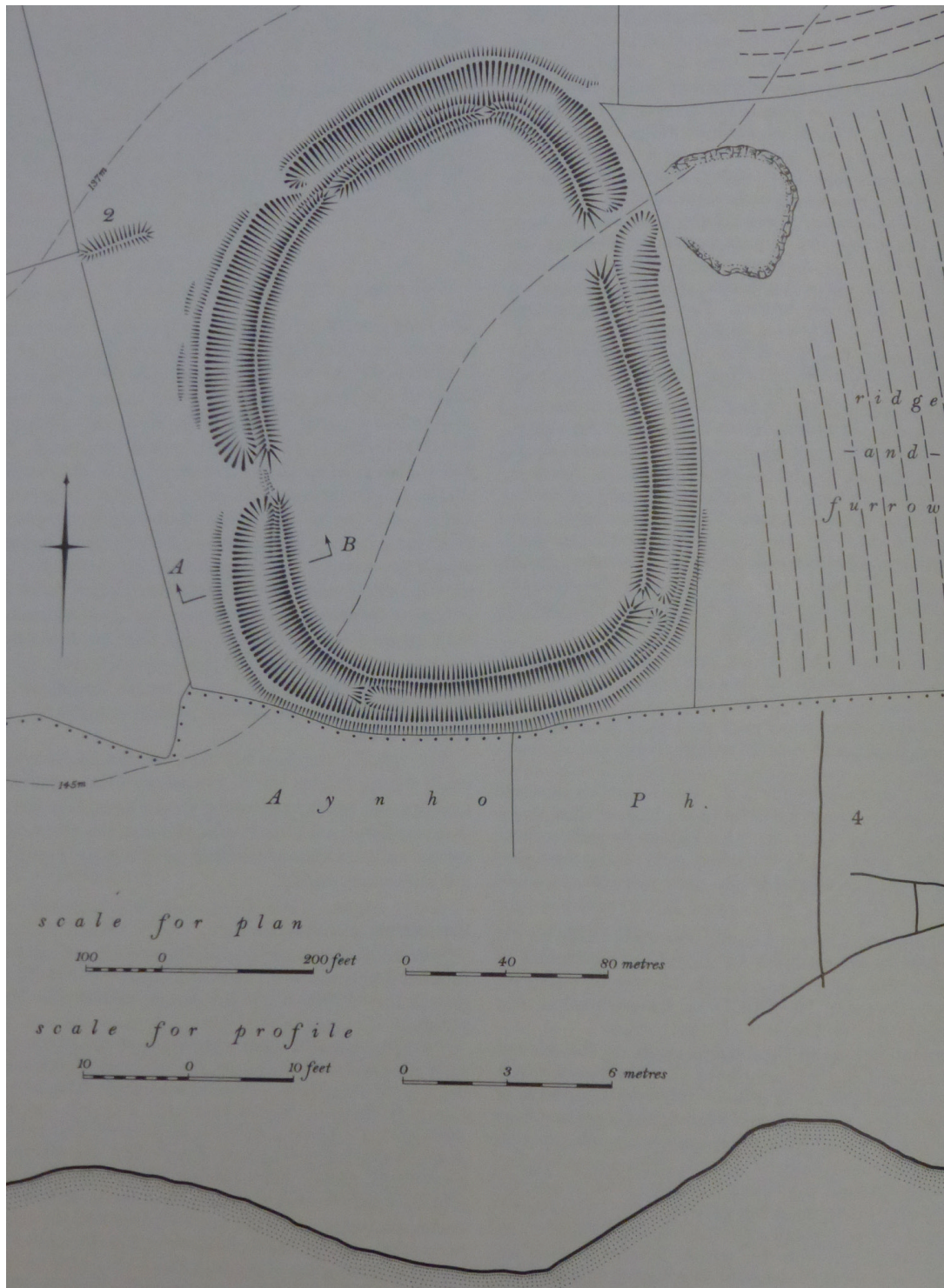
6. Appendices

- 6.1 Map of area around Rainsborough hillfort, OS 6in map 1882
- 6.2 Diagram of Rainsborough hillfort (from RCHME)
- 6.3 Viewshed diagram
- 6.4 Report: "A re-investigation of the scientific dating evidence from the hillfort at Rainsborough", Clelland and Batt, Northamptonshire Archaeology, Vol. 36, 2010, 1-7
- 6.5 Site photographs and supplementary information

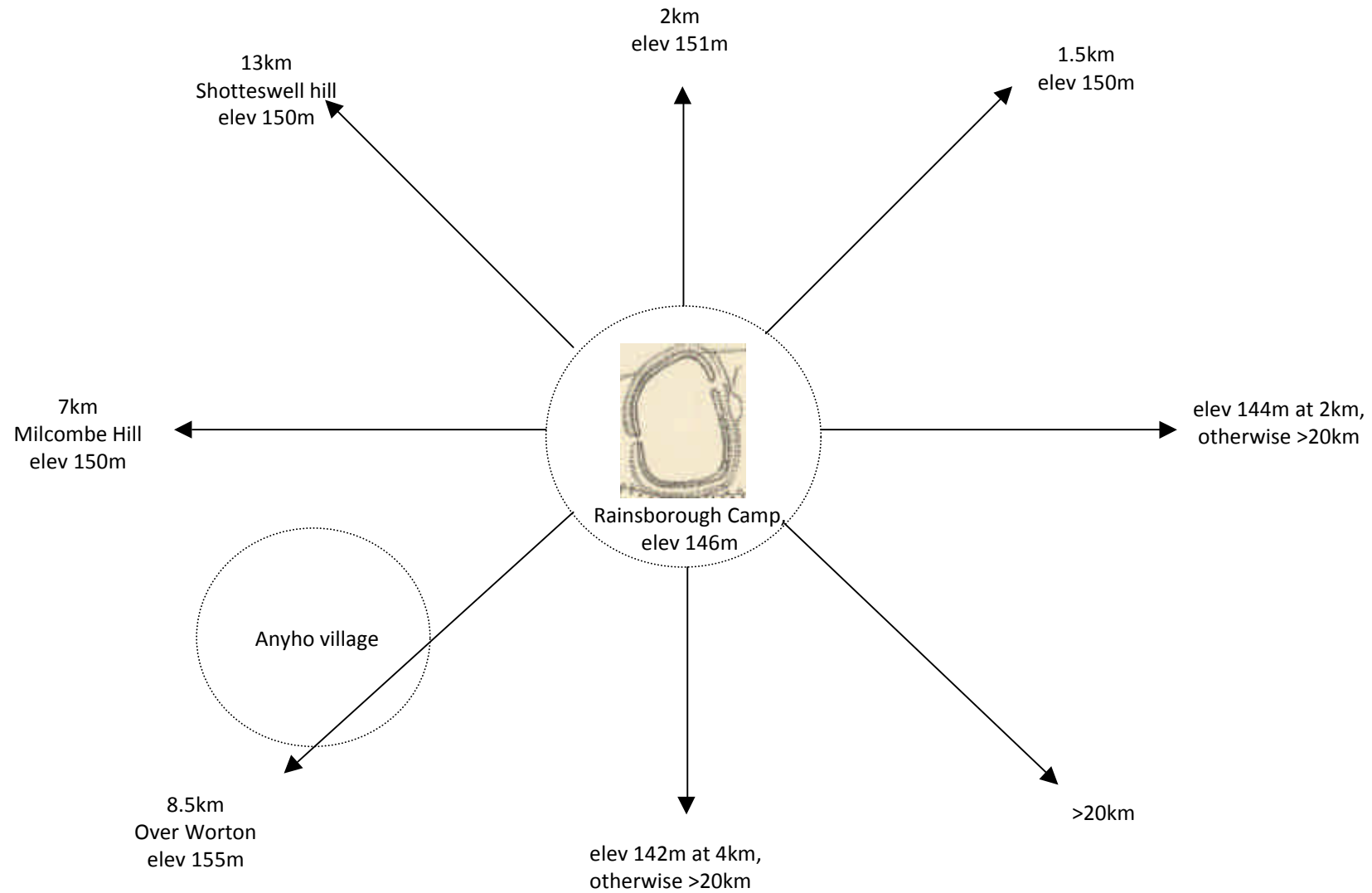
6.1 Map of area around Rainsborough hillfort, OS 6in map 1882



6.2 Diagram of Rainsborough hillfort (from RCHME)



Viewshed diagram for Rainsborough Camp, Aynho





A re-investigation of the scientific dating evidence from the hillfort at Rainsborough

by

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SUMMARY

A chronological framework is an integral part of any archaeological interpretation but it is often restricted by the lack of precision in the dates available to the archaeologist. This is a particular problem in the Iron Age, due to the limitations of radiocarbon dating in this period; specifically the period between 700-400BC where the radiocarbon calibration curve provides large errors. Archaeomagnetic dating is predominately a method of dating materials that have been heated in antiquity. Therefore archaeomagnetic studies offer an underexploited opportunity to provide dates for the Iron Age through the study of past geomagnetic field, as recorded by archaeological materials. As with radiocarbon, archaeomagnetic dating requires a calibration curve to provide calendar dates. However, in order to produce a calibration curve it is necessary to assign a calendar date to every magnetic direction used to construct it. One of the main problems with the current method of calibrating magnetic directions is the imprecision of the calendar dates attributed to the magnetic direction determinations used in it. This ongoing research is attempting to improve on the independent dating associated with each data point in the current calibration curve. Unlike radiocarbon dating, there is evidence that the direction of the geomagnetic field was undergoing rapid changes between 700-100BC, so archaeomagnetism should be capable of high resolution dating during this period. This paper describes how evidence from the Iron Age hillfort at Rainsborough is being used to improve the current archaeomagnetic calibration curve for the UK.

INTRODUCTION

The British Iron Age marks the end of prehistory, yet the archaeological record is unclear whether this was a time of upheaval and migration or prosperity and trade. Archaeologists want to answer these questions and comment on the rate and causes of changes but these discussions are limited by poor chronological resolution (Haselgrove *et al* 2001). Perhaps most prominent of these is the 'plateau' in the radiocarbon calibration curve (Fig 1). Any radiocarbon determinations that fall on the section of the calibration curve between 700-400BC provides

calibrated radiocarbon dates with poor precision (Reimer *et al* 2004). This 'plateau' exists because during this 300 year span the production of radiocarbon in the upper atmosphere was changed. The cause of this interference is still unclear but possibilities include sunspot activity or fluctuations in the geomagnetic field (Damon & Linick 1986; Van der Plicht 2004). The geomagnetic field protects the Earth from the effect of solar activity and it changes in intensity and direction from year to year. This secular variation in the geomagnetic field has been directly monitored since the 17th century (Tarling 1983, 3) and its application to archaeological investigations as a method of dating has been realised since the beginning of the 20th century (Belshé 1957). This is called archaeomagnetic dating and it exploits two naturally occurring physical phenomena: that the geomagnetic field changes over time and that under certain conditions iron oxides present in archaeological materials can record the ambient geomagnetic field (Tarling 1975; Linford 2006). Of most relevance to archaeology is the action of heat on clay, when features made of clay cool down from over 600°C, the direction of the local geomagnetic field is captured and will be archived as long as the feature remains *in situ*. Archaeomagnetism is an under-exploited dating technique with particular relevance to Iron Age archaeology due to the increase in pyrotechnological applications during this period, for example: metalworking, ceramic production, salt manufacture, corn drying and enamelling. This method provides a date of last use for any feature that has been subjected to intensive heating so can provide a *terminus post quem* for settlement sites or industrial activity.

Like radiocarbon dating, archaeomagnetic dating requires a calibration curve in order to produce a date in calendar years. However, due to the nature of the geomagnetic field it is necessary to have different calibration curves for different regions (Aitken 1990, 228). These calibration curves are records of the secular variation in the geomagnetic field so are called secular variation curves (SVC). The current SVC for the UK is the accumulation of 60 years of research by geophysicists (Aitken & Weaver 1962; Aitken & Hawley 1967; Clark *et al* 1988; Batt 1997; Zananiri *et al* 2007) and currently the section of the curve that relates to the first millennium BC is described by just under 100 magnetic directions of known date. Research is currently being undertaken

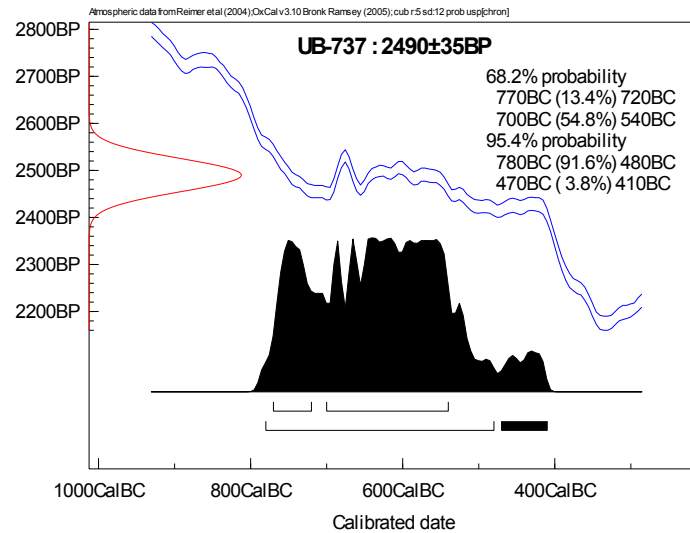


Fig 1 Calibrated radiocarbon date (using OxCal 3.10), showing the plateau in the curve (blue line) 700-400 BC

to improve the UK reference curve, so consequently our ability to date the archaeological record in the first millennium BC in Britain using archaeomagnetic dating. This is being achieved by focusing on improving the precision of the data used to construct the British archaeomagnetic reference curve and increasing the number of suitable data points. As part of this work the dating evidence from the site of Rainsborough, Northampton was re-examined.

Rainsborough is an Iron Age fort located in South Northamptonshire (SP 526 348, Fig 2), and is arguably one of the earliest forts to display a stone-faced rampart (Cunliffe 2005, 359). This site was originally excavated between 1961 and 1965 (Avery *et al* 1967) and was one of the first hillfort sites to be sampled by archaeomagnetic dating (Aitken & Hawley 1966). The sampling at Rainsborough was carried out on an *in situ* hearth within the northern guard chamber of the excavated entrance. The magnetic data collected from Rainsborough is part of the current British SVC, so is one of the 96 sites that are being reviewed in order to improve the precision of this curve. As the excavations were carried out in the 1960s, the sampling regimes employed for radiocarbon were not as rigorous or intensive as those of a modern excavation. Therefore in order to make the most of the dating evidence available it is necessary to consider the phasing of the entire site in order to provide a date range that is independent of any tautological statements involving reference to other similar archaeological sites. It is important to obtain an independent assessment of the date of last use of this hearth if it is to remain in the UK SVC.

SUMMARY OF THE HISTORY OF RAINSBOROUGH'S RAMPART

Two phases of rampart construction were identified at Rainsborough, the first rampart was later replaced by a double rampart and ditch complex (Avery *et al* 1967,

210f). This re-working of the outer perimeter into a double rampart has been classed as phase 2a. During this phase, two stone-lined C-shaped rooms were set into the return of the inner entrance and as one was placed on either side they have been interpreted as 'guard houses'. The occupation of these guard houses is phase 2b, and during this phase the 'guardroom' floors were remade. Phase 3a marks the end of use of the guardrooms when the fort was deliberately burnt and the roof of these rooms collapsed inwards. The excavation record suggests that subsequent occupation at this site ignored the guardroom entrance (Avery *et al* 1967). A total of five radiocarbon dates have been obtained for this site (Pearson & Pilcher 1975, 228) (Table 1), two of them relate to the guardrooms at the entrance of the hill fort: one from the northern guardroom (UB-737) and from the southern guardroom (UB-853). Both these dates were obtained from wood charcoal, so it is likely that the radiocarbon dates are distinctly earlier than the use of the guardrooms in which they were eventually incorporated. In addition, one set of archaeomagnetic samples were extracted from

Table 1: Radiocarbon dates from Rainsborough Camp

Sample number	Context	Conventional date BP	Calibrated date Cal BC 68% confidence 95% confidence
UB-737	Oak charcoal from north guard room	2490+/-35	770-540 780-410
UB-736	Charcoal from pit K	2460+/-70	760-410 770-400
UB-855	Carbonised grain	2450+/-75	750-410 780-400
UB-853	Ash charcoal from south guard room	2430+/-75	750-400 770-390
UB-854	Charcoal from hollow	2305+/-115	550-150 800-100

Calibration: OxCal 3.10



A RE-INVESTIGATION OF THE SCIENTIFIC DATING EVIDENCE FROM THE HILLFORT AT RAINSBOROUGH

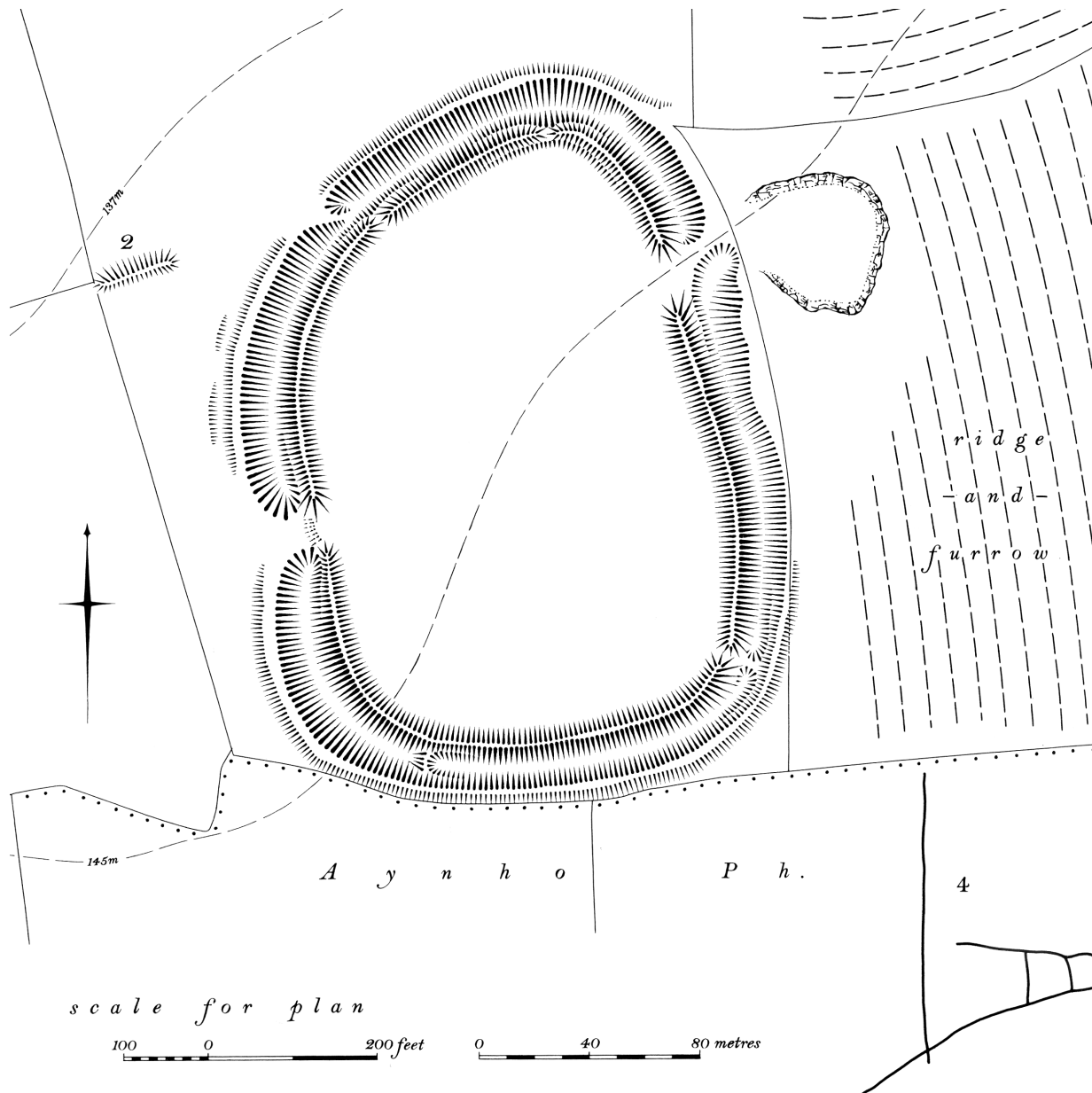


Fig 2 Survey of Rainsborough Camp (from RCHME 1982, fig 87)

the hearth in the north guard house (Aitken & Hawley 1966). The archaeomagnetic event being dated is the last use of the hearth; this can be assumed to be concurrent with the burning down of the fort.

It has been argued that the construction of the double rampart and ditch dates to the 5th century BC (Cunliffe 2005, 357), but this is based on using individual radiocarbon dates which cannot be directly related to the construction of the rampart or use of the guard houses. The other associated dating evidence can be interpreted in several ways so definitive dating of the double rampart and ditch complex remains unproven. The original phasing of the site (Avery *et al* 1967) places phase 3a, the deliberate burning of the entrance as occurring during 450-300BC. This dating is based on the discovery of a broken bronze ring in the ash near the hearth in the north

guardroom. Although at the time there were no direct parallels for this ring in Britain, a 4th century BC date was reached by considering the technique of manufacture of this object, leading to the conclusion that it was at least Halstatt period. By considering aspects of the design it was suggested that it is La Tène Ia, mainly due to the spiral motif (Avery *et al* 1967, 288).

RESEARCH METHODOLOGY IN GENERAL

Archaeomagnetic dating is a derivative dating method, matching regionally specific patterns of secular changes in geomagnetism, therefore needs a calibration curve, the SVC. The pattern of change for each magnetic phenomenon has to be established by other chronometric methods, typically: historical records, radiocarbon or



dendrochronology, as the secular variation pattern of geomagnetism is not predictable (Batt 1997). It is therefore necessary to assign a date to every magnetic direction used to construct the SVC. The main problems with the current British SVC relates to the chronological placement afforded to the majority of magnetic direction determinations that comprise it. At the moment these date ranges are based on the date range estimated whilst the excavation was ongoing, so many points had just been described as Iron Age and were ascribed the date range 700BC-43AD. The problem is that at present it does not include any of evidence that came to light post-excavation; consequently, the temporal assignments of many points are ill defined with little confidence in their reliability (Clark *et al* 1988). In order to address this issue it was decided to review the archaeological evidence associated with each archaeomagnetic direction in the reference curve as it should be possible to improve on the current situation and may enable the age range associated with each data point to be reduced from 750 years. Having identified this problem with the current reference curve the question remains, how to provide an independent date for each of the magnetic directions when they are recovered from a pre-Roman site and produce a realistic measure of the errors associated with that date? This is a complex issue, particularly as it is essential to provide a rigorous and transparent methodology that avoids any tautological arguments.

The common element of the stratigraphic record was used to combine all the available chronological indicators to answer a single question: when were each of the hearths last used. The focus on this aspect is because it is the event that is dated by archaeomagnetic dating. The British SVC has undergone a series of developments and is currently in its third incarnation, the first only covered the last two millennia, the 'Aitken curve' (Aitken & Hawley 1967); the second and third SVC, the 'Clark' (Clark *et al* 1988) and 'Zananiri' curves (Zananiri *et al* 2007) respectively, cover the last three millennia, including the first millennium BC. In order to avoid circular arguments by referring back to the dates provided by earlier calibration curves it was deemed necessary to attempt to provide a completely independent, yet reliable date for each of the magnetic directions selected for reanalysis. It is envisaged that an independent measure of when the hearth was last used will be obtained one of two ways:

- 1 The most straightforward case would be if the hearth was directly dated by another method. An independent date available from the same context sampled to provide the magnetic direction could be used to directly date the last burning event. This will be applied with caution as predominantly the independent dating method involved will be radiocarbon, so the material sampled needs to be a short lived single entity, for example a charred cereal grain, and other criteria for assessing the reliability of radiocarbon determinations will be observed (Ashmore 1999).
- 2 If the hearth cannot be directly dated then the location of the last use of the hearth will be

identified within the stratigraphic record and transferred to the sequence of dates for that structure. Then Bayesian analysis will be used to provide posterior density estimates for each of the dated events in the sequence by taking into account the restrictions imposed by the stratigraphic sequence (Buck *et al* 1996) and finally the age range that should be assigned to the magnetic direction from each hearth will be calculated to within 95% probability.

This methodology was applied to the site of Rainsborough and attempted to incorporate the radiocarbon dating evidence (Pearson & Pilcher 1975) and the stratigraphic details available (Avery *et al* 1967) to model the events that created the archaeological record. The hypothesis is that by applying Bayesian logic it should be possible to calculate the most likely date range that the hearth in the north guardroom was last used given all the other stratigraphic relationships, a posterior density estimate (Bronk Ramsey 2008). This analysis was done using OxCal v3.10 (Bronk Ramsey 1995 & 2001) as it allows the user to enter archaeological information, which will constrain the radiocarbon dates.

RESULTS

The results of applying this method to the data from Rainsborough are provided in Figure 3. Overall this sequence shows excellent agreement, A=92.0%, with the agreement indexes for the individual radiocarbon determinations well above the critical value of 60.0%. This demonstrates that the radiocarbon determinations match their stratigraphic positions so the modelled dates are valid. The posterior density estimate for the hearth suggests that the hearth in the north guardroom was in use between 640 and 370BC at 95% probability, see Figure 4. This shows some overlap with the date range for the end of use of the guard house proposed by Avery of 450-300BC but has been obtained using the radiocarbon dates so is independent of any typological assumptions. It is not possible to improve the precision any further for two reasons: firstly the nature of the material sampled for radiocarbon dating and secondly the lack of a direct relationship between the hearth and samples UB-854 and UB-855. The stratigraphically earliest of the samples submitted for dating were wood timbers from the construction of the guard houses. It was possible to apply a correction to UB-853, as this sample was of 25 year old ash wood but this was not possible for the oak timber sampled for UB-737 as there was no estimate of the age of the tree. It is difficult to relate the cutting down of a tree to the use of a building but these dates were more likely to represent the construction of the guard houses. The model suggests that this happened between 1020-500BC. Only one sample UB-736 could be directly related to the destruction of the entrance as it was sampled from debris from the burning. Finally the last two samples UB-854 and UB-855 had no direct stratigraphic relationship to the hearth in the north guardroom. As all of these radiocarbon determinations are conventional radiocarbon dates, coupled with the

A RE-INVESTIGATION OF THE SCIENTIFIC DATING EVIDENCE FROM THE HILLFORT AT RAINSBOROUGH

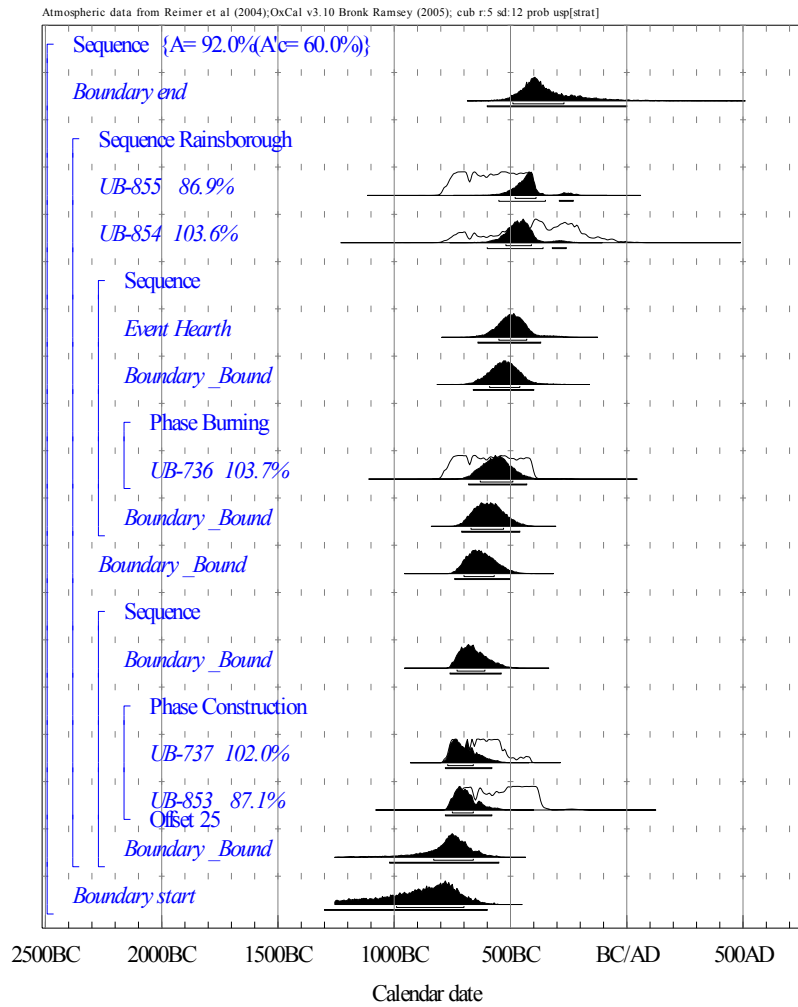
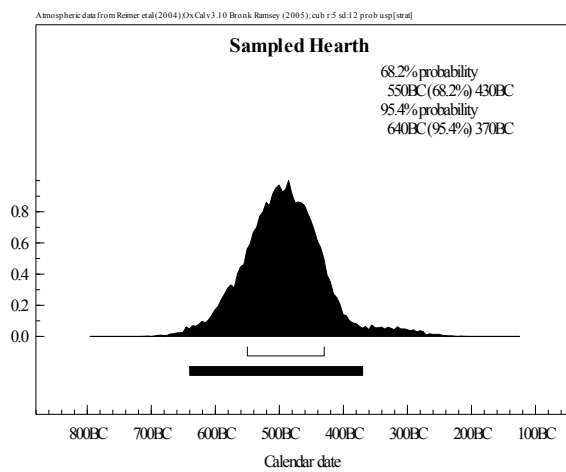


Fig 3 Probability distributions for the radiocarbon determinations from Rainsborough



lack of relationship between the contexts sampled for radiocarbon dating has meant that in this case the date ranges obtained are still quite broad. The details of this analysis will be incorporated into the new SVC and Table 2 shows the magnetic and chronological data recovered from this site as they will be incorporated into the British SVC.

Fig 4 Posterior density estimate for the burning event as calculated within the sequence of events recorded at Rainsborough

Table 2: Table summarising the magnetic and chronological information from Rainsborough that will be included in the archaeomagnetic master curve

Sample	Dec	Inc	Alpha-95	Date range in Zanani database	'Event' date range	Data in revised database
RAB	357.6	67.5	2.8	375BC±75	640-370BC	505BC±135

CONCLUDING REMARKS

Traditionally, assemblages of material culture have been used as chronological indicators but it can be difficult to identify contemporaneous cultures when the wider landscape is considered. This becomes even more challenging when Britain as an entity is considered, due to the degree of regionality that can be identified within the archaeological record for this period (eg Hill 1995a; Harding 2004, 3-5). Furthermore the dating evidence from Rainsborough has previously been considered problematic as it could be interpreted in different ways. Archaeomagnetic dating is predominately a method of dating objects that have been heated in antiquity and is currently an underexploited method to provide dates for the Iron Age. The results from the re-evaluation of Rainsborough have lent some support to the original dates proposed by Avery but in this case have not been able to offer more precision. The evidence from the radiocarbon dates does suggest that the burning event may have happened earlier than originally proposed but there are insufficient data to make any claims in this direction. This is due to the choice of material sampled for radiocarbon, the small number of radiocarbon determinations, and the lack of clear and direct stratigraphic relationships between the contexts sampled for radiocarbon dating.

This is part of a larger research project where the primary aim is to use studies of the geomagnetic field, as recorded by archaeological and geological materials, to identify and characterise short (decadal) timescale changes in the Earth's magnetic field. Once completed these data should be able to improve our ability to define the chronology of the British Iron Age. This research is still incomplete but some interim statements can be made on the progress so far. It has been possible to propose an approach to improving the dating of the magnetic directions in the current SVC and demonstrate its validity. Originally there were 78 magnetic directions from 40 different sites in the British SVC, and Rainsborough was one of them. So far this has been increased by the collection of more samples during fieldwork (15 directions from 7 new sites) and from identifying new sites in literature searches (71 new directions from 30 new sites). This provides a total of 200 magnetic directions from 96 sites. Of these, 100 magnetic directions have had their associated date re-evaluated and the new date ranges are substantially smaller than the original dates, generally ± 100 years, unfortunately Rainsborough is one of the exceptions. This success in general demonstrates that the proposed methodology works, so will be applied to the remaining magnetic directions and the additional magnetic data collected.

Once the British SVC is reconstructed with the new data it will be possible to investigate the impact of this work on our understanding of the geomagnetic field. Changes in the geomagnetic field have far reaching consequences, as it protects the Earth from the effects of solar radiation (Evans & Heller 2003, 245). Increased understanding of the geomagnetic field will impact on the ability to calibrate radiocarbon determinations; as fluctuations in the amount of cosmic radiation that enter the Earth's upper atmosphere directly affects the

concentrations of ^{14}C present in the atmosphere (Evans & Heller 2003, 111; Van der Plicht 2004). This has major implications for the use of radiocarbon dating in the period in question. As it is apparent that the direction of the geomagnetic field undergoes a rapid change whilst the production of radiocarbon in the upper atmosphere is affected over a prolonged period; this suggests that there may be some connection between these two systems. It will also be possible to investigate the factors that underpin chronological models of the British Iron Age, via architectural features and structural sequences where there is fired material *in situ*. These dates have a direct relationship to the archaeology under investigation, as they provide a date of abandonment for domestic structures or date of last use for kilns and furnaces. It is hoped that improvements to the resolution of the British SVC may provide some insights to these and other questions relating the archaeology of the British Iron Age.

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6.5 Site photographs and supplementary information

To supplement the survey by Jim Aveling and Rob Close we have set out the actual positioning of Rainsborough.

North East corner

- The Hill Fort is at the W end of an escarpment that includes Camp Farm 1km to the E at roughly the same altitude. This, and several hedge rows restricts the view from the top NE corner of the field looking E.
- Directly N the horizon is around 2km a little beyond Green lane. The rooftops of Charlton Village 1km can be seen at 10 degrees. The top of Stony Brake Mast 4k and 10 degrees can be seen in the distance.
- Just outside the fort looking W the horizon is only as far as Newbottle farm at 330 degrees and 1.8km and then Kings Sutton 2.6km at 290 to 300 degrees. Looking further W the horizon is beyond the faint Church spire at Addersbury 5km at 280 degrees and the even fainter church spire at Bloxham 9.4 km and also 280 degrees.

Mid E entrance

- The vista opens up to show RAF Croughton on the horizon 5km and its sprawling area of masts at 110-115 degrees

Bottom SE corner

- A continued good view of RAF Croughton.
- Restricted view looking SE, particularly 150-170 degrees because of Pesthouse Wood 1km.
- Ploughley Hill Mast just visible 4km at 160 degrees

S boundary

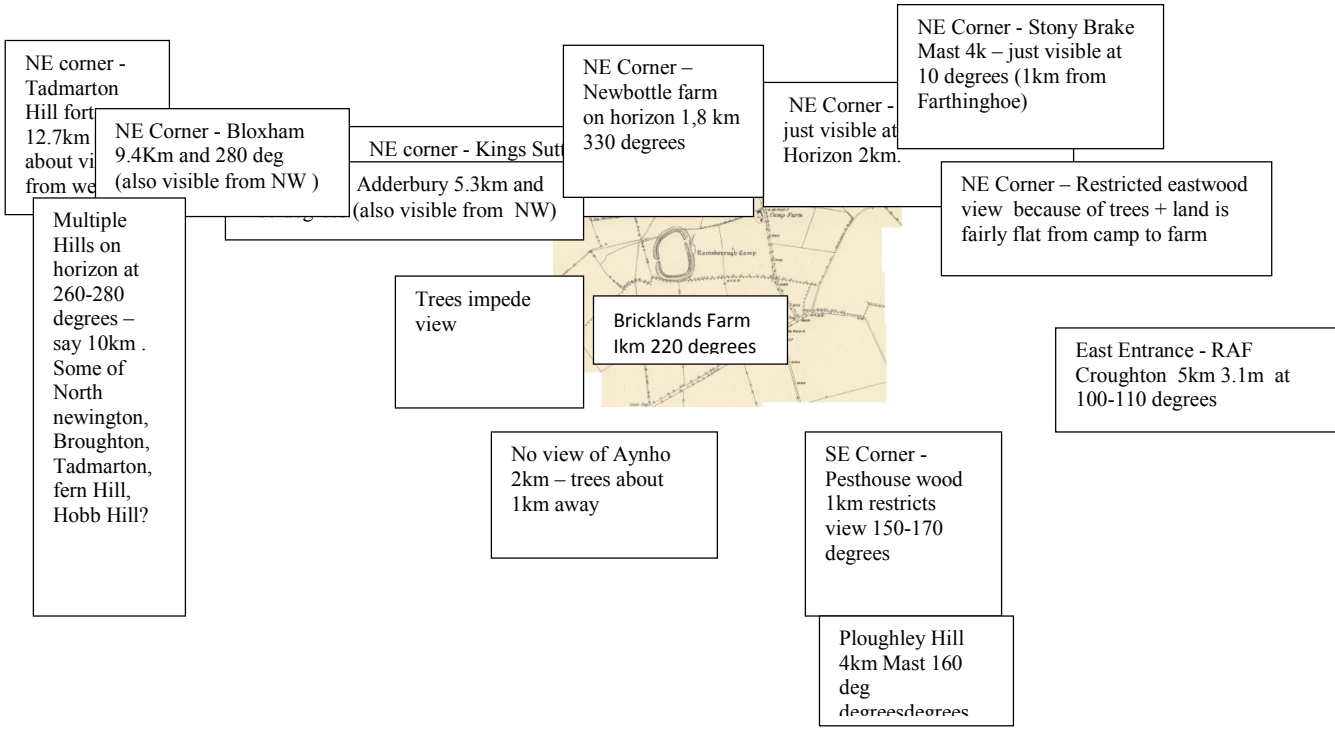
- apart from Ploughley Mast the horizon is limited by trees at 1km. Aynho village 2km away is completely hidden
- Bricklands farm can be seen 1km away at 220 degrees. Otherwise trees obscure the horizon

W entrance

- Trees restrict SW view until 260 degrees
- Multiple hills on the far horizon at 260 to 280 degrees (possibly North Newington, Broughton, Tadmarton, Fern Hill and Hobb Hill) say 10 km

NW corner

- views of Addersbury and Bloxham at 280 degrees
- **Tadmarton Hill (Fort) just about visible at 12.7km at about 280 degrees.**
- View of Kings Sutton by Charlton at 290 degrees which had not been visible from the NE corner.



1. NE Corner - looking into the Fort.JPG



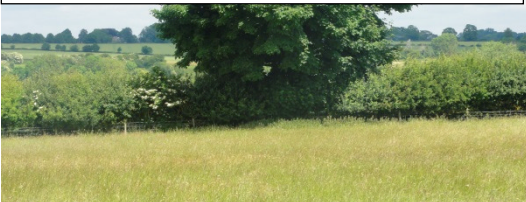
1.1 NE Corner -stone.JPG



1.2. North facing - ditch.JPG



2.1. NE Corner - Looking North with faint image of Charlton.JPG



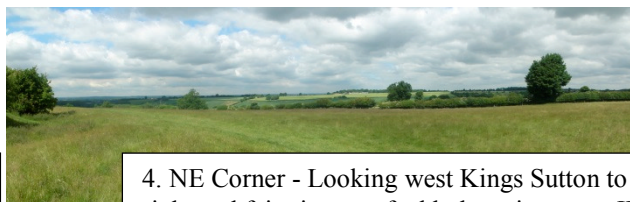
2.2 NE Corner - Charlton with faint view of mast.JPG



2.3 NE Corner - Panning in on Charlton and Mast.JPG



3.1 NE Corner - Looking west with Newbottle farm in distance.JPG



3.2 NE Corner - Looking west Panning in of Newbottle Farm.JPG

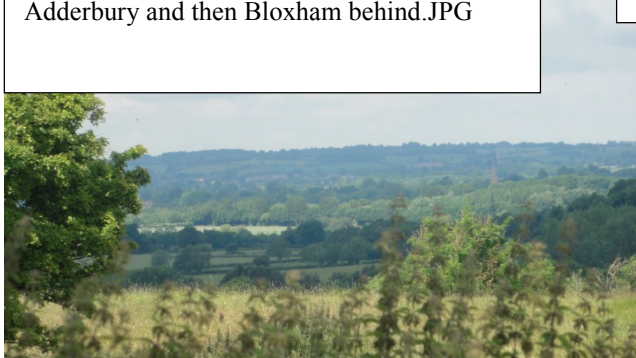
4. NE Corner - Looking west Kings Sutton to right and faint image of adderbury in centre.JPG



5. NE Corner - Looking west Church spires of Adderbury and then Bloxham behind.JPG



6.1 Facing East above Eastern entrance.JPG



6.2 Ditch at top of Eastern side.JPG



6.3. Eastern side - stone 1.JPG



6.4. Eastern side - stone 2.JPG



7.1 Eastern entrance looking in.JPG

8. Eastern Entrance looking west - RAF Croughton .JPG



9. Towards bottom of Eastern side.JPG



10. SE corner Bricklands farm.JPG



11.1 Southern ditch 2.JPG



11.2 Southern ditch.JPG



12. Bottom Western side.JPG



13.1 Western gate looking in.JPG



13.2 Western side Looking North.JPG



14.1 looking West.JPG



14.2 Looking West.JPG

