Topographic survey of barrows revealed by landscape analysis and Lidar in Charlton Forest, East Dean, West Sussex.

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Cover Page. The Downland block between the Cocking Gap and the head of the River Lavant. Note the steep South Downs’ escarpment and the southern edge of the Weald, to the right of the image. Charlton Forest is located in the centre of the photograph.

Rear Cover. Looking southwards towards Institute students surveying at Reservoir Clump, Goodwood, in 2015. Chichester Harbour and the English Channel are in the background.
1/. Background

The 2016 surveying course will take place in November, on land within the demesne of and owned by the Goodwood Estate, in West Sussex. This land at East Dean Woods, within Charlton Forest, is leased to the Forestry Commission. The survey area is situated some 3.4km to the ENE of the West Dean Estate and 3.5km south of the Cowdray Estate boundary on the Downland scarp crest. The course will involve surveying the topography of, and monuments on, a c. 400 x 400m block of woodland on the dipslope of the South Downs, overlooking the valley of the River Lavant to the south. At least four flint cairns, a double lynchet trackway, other field boundary lynches and a post-Medieval lime kiln are located in the survey area (Figs. 1-3). These and a host of other features were revealed in their entirety by Lidar as part of the South Downs National Park “Secrets of the High Woods Project”.

![Charlton Forest in the area of East Dean. Blue square = 1km².](image_url)
As well as the academic teaching aims of the course (see below), the research aim is to provide an up to date topographic survey of the monuments, subsidiary monuments, and their immediate landscape setting. The data generated will be combined with that already compiled in the Historic Environment Record (HER), and will form part of a complete, integrated, topographic and monument survey of the downland block between Fairmile Bottom and the western margins of Bow Hill.

Four principal cairns are visible on the ground in the study area, although they are not shown on any Ordnance Survey maps of the area, from the first edition up to the present day. The Lidar data also show the other archaeological features mentioned above; these will be tied into
Fig. 3. OS 1:25k map overlain by the lidar image, showing the location of the survey.

Fig. 4. Enhanced Local Relief Model Lidar (LRM) of the central area of Charlton Forest. The study area is within the lightened rectangle.
our survey of the cairns to enable the two data sets to be linked. Three of the cairns have been marked-up during work on the Lidar data for the National Mapping Programme (NMP) (Fig. 5).

The features to be surveyed are located within the Parish of East Dean, some 11km NNE of Chichester, the county town of West Sussex (Fig. 2) and 18km north of the current coastline of the English Channel at Bognor Regis. The lynchets and cairns are to be found towards the northern boundary of the parish some 500m SE of the intersection of four parishes: Heyshott, Graffham, Singleton and East Dean (Figs. 1, 3, 4).

The sites are situated on the Seaford Chalk Member, which constitutes part of the eroded Cretaceous Chalk surface of the southern limb of the Weald-Artois Anticlinorum (Figs. 6, 7): these lithologies produce a Brown Rendzina soil (343i), which although thin on the higher ground and slopes, thickens considerably, as a consequence of gravitational slope movement into the dry valley systems. At and within the lynchets remnants of the original Late Pleistocene loess cover are found; usually in a condition altered by prolonged cultivation (Macphail and Crowther 2016; pers comm). On this part of the downland block, known as the
South Downs, the solid geology comprises the Upper and Middle Chalk Formations of the Chalk Group that, with minor structural exceptions, young and dip southwards towards the downland dip slope (Aldiss 2002). In the Lavant feeder coombes such as Limekiln, Stonepit and Brockhurst Bottoms (Fig. 1), and in the Lavant itself, to the south of the study area, the older Lewes Chalk, basal member of the Upper Chalk, and the New Pit and Holywell Middle Chalks are exposed. To the north in the scarp face, at the junction of the South Downs and

![Geological map](image)

Fig. 6. Geological map, showing structural features, drainage and the location of barrows on the South Downs and Folkestone Beds.

the Weald, the full range of Middle and Lower Chalks is exposed in a downward aging profile. At the base of the scarp the older deposits of the Upper Greensand Formation, Gault Formation and Lower Greensand Group exhibit a parallel disposition to the scarp face (Fig. 6). Younger deposits overlying the Chalk are the reworked Palaeogene cover known as “Clay-with-flints”; valley sediments associated with the River Lavant, dry valleys and their feeders/tributaries; and mixed Head deposits which are preserved at the heads of some of the dipslope coombes, such as the Limekiln Bottom, a northern/right bank feeder of the Lavant Valley (Fig. 1). These
superficial head deposits are also found, albeit at a fraction of the volume of the dipslope material, at the base of the downland scarp slope extending out northwards onto the Gault Formation.

The extant topography of the landscape across the South Downs, is largely the result of subaerial weathering on the gently uplifting solid geology (Fig. 8). Initial uplift and exposure of the Chalk probably predated the major episodes of tectonism but it is the latter, orogenetically driven, events that are associated with the formation of the major anticlinal and synclinal structures of the region. Subsequent to these major tectonic pulses, the anticlinororum was breached and the sub-Chalk Cretaceous geology of the Weald exposed. During the Pleistocene Epoch, the final shaping of the downs took place, with most landscape contouring occurring at the end of glacial periods when snow and ice field melt carried vast amounts of material off

![Digital terrain model of the downland block of the study area, looking NW.](image)

the Downs and over the scarp and dip slopes (Figs. 6-8). This process occurred as a result of blanket mass movement deposition and also sediment discharge through valley systems both fluvial and dry (coombes).
It is upon the post-Devensian Glacial Stage surface of the Downs, that the archaeological monuments of the past twelve thousand years were constructed and remain to this day, largely unaffected by natural process but greatly affected by anthropogenic activity, especially over the last hundred years. In the study area, the East Dean Woods spur has coombes to the west and east, Forest Hanger and Brockhurst Bottom respectively, and a smaller, southerly coombe that has its head within East Dean Woods itself. This latter coombe and Brockhurst Bottom feed into Limekiln Bottom, a principal feeder valley into the Lavant; the Forest Hanger coombe feeds into the Charlton/North Lane feeder valley.

Fig. 8. Overhead view of the Downs and the downland escarpment in the vicinity of the study area.

(Fig. 1). Under temperate conditions, such as the present day, the coombes carry little surface water, especially higher up the dipslope, however as the aquifer rises the lower reaches of the coombes carry water, adding to the discharge from the springs that are present along the valley sides. The River Lavant is a seasonal river known as winterbourne, which is dependent upon the rising acquifer, fed by winter rain, for its source. The river begins to flow in the early Spring and has normally run dry by mid-Summer. The Lavant is an underfit river, in that the
size of its valley is far greater than the present ephemeral stream, this is because, as mentioned above, the Lavant is primarily a snow melt carrier during and at the end of cold stages. During these episodes a very high energy braided river system would flow through the current valley.

The cairns sit on the southern slope of Charlton Down at heights between 160 and 195m OD (Figs 2-6). Their view-shed is dependent upon their altitude on the dip slope; the higher positions allow a panorama taking in all of the Downland block (Figs. 2, 7, 8), the Coastal Plain, and the Channel but are restricted northwards to the scarp crest. The cairns’ location has no relationship with the topography, as opposed to the conventionally constructed ditch and mound barrows, which tend to align down the centre of spurs (Upwaltham Group, Goodwood Racecourse), along the scarp crest (Heyshott Group), perpendicular to the spur long axis (Devil’s Jumps Fig. 9), or along the line of a ridge (Devil’s Humps).

Fig. 9. The spur perpendicular alignment of the Devil’s Jumps at Treyford, conventionally constructed ditch and mound barrows, 8km west of East Dean woods.
The Lidar survey revealed a wealth of archaeological features in its mapping of downland woodland between Arundel in West Sussex and Queen Elizabeth County Park in Hampshire. The most striking of these are the extensive field systems that mantle the upper half of the dipslope. The fields in the study area are based on a co-axial system and are orientated for the most part NE-SW (Fig. 2) (Bradley 1977, Fleming 1987). There is considerable variability between the field sizes, with those in the study area being larger than those to the east and west.

It is considered likely that the fields would have been worked on a rotational system and that a transhumance based system of field manuring would have taken place; as always on the Chalk, whenever livestock are brought into the equation, a consideration of the availability of water must be made. This point notwithstanding there are a number of fields and features that appear related to stock management rather than arable farming (Fig. 10).

Fig. 10. Field designed for the management of livestock 200m NW of the study area.

The field systems would have to have been designed and laid out prior to construction, what is not clear is whether this was a system that was accretional i.e. the system grew gradually or whether it was part of a widespread clearance and planned agricultural/economic event,
although co-axial systems are thought to fall into the latter group (Bradley 1977; Fleming 1987). Close analysis of the Lidar images illustrates that there are multi phases of construction, with older field systems underlying newer ones, implying that the system was redesigned at various times. The excavations carried out under the direction of the author in 2015 and 2016, revealed that over 90% of the large fields were down to the bare Chalk, with a thin covering (100mm) of topsoil and leaf litter. However at the field boundaries up to 0.75m of loessic ploughsoil and flints were evident (Favis-Mortlock et al. 1997) (Fig. 11).

Fig. 11. Section through a lynchet/field boundary in East Dean Woods

To form the field boundaries it would have been necessary to either leave strips of uncultivated ground between the fields or, more likely, introduce hedges of both growing and cut material, thus allowing the fields to eventually become stock proof (Fowler 1983; Pollard et al. 1996; Pryor 1996). Flints removed from the soil during cultivation were added to the hedgerow forming the lynchets visible today (Fig. 11). Ultimately, however the upland fields were abandoned, and the limited evidence available to date (Fig. 12), suggests that this occurred at some time during the Roman period. It might have been that the ploughing technology reached an efficiency such that soils were quickly removed from the main bodies of the fields, or perhaps a combination of this and economic factors, such as alternative sources of grain becoming available to the Empire.
It is clear that the field systems would have contained the loessic soils on the spurs and gentler valley sides, lessening the downslope and intra valley build-up seen on other parts of the Downs (Bell 1977, 1983, 1992). How the cairns fit into the agricultural system is less clear, the large numbers of flint nodules in the lynchets and cairns are not present in the wind-blown loessic cover but could have been present in a veneer of Clay-with-flints beneath the aeolian sediment blanket, although no traces of such a cover are recorded in Charlton Forest. Alternatively, they could have been produced by direct ploughing of the Chalk, as they are at the present day, when new areas of downland upland are cultivated (Fig. 13).

As stated above the cairns do not appear to respect the lay-out of the fields, they occur within them and also at points along the lynchets themselves. It is difficult without excavation to elucidate the temporal relationship between the cairns and the field systems, although if the loess blanket was intact as the forest was cleared then the flints cannot have been produced until the fields were cultivated. Accordingly, the cairns might simply be clearance cairns, where it was easier to place unwanted nodules centrally and lose part of the field rather than taking them to the field boundaries; there appears to be no correlation between field size and presence of cairns. However, some of the cairns are large >30m low mounds of flints, which...
resemble barrows (Fig. 14). If they were merely clearance cairns it would be more efficacious to build them higher with a reduced base diameter, thus taking up less of the field. It is probably safer to say at this stage of the project that they might be a combination of burial monuments and discard heaps.

Fig. 13. A recently ploughed field on the Seaford Chalk at Sutton Down, 4km ESE of East Dean Woods. Note the huge quantities of flint that pose no problem for modern machinery.

The survival of the field systems, cairns and other archaeological features over a period of approximately 3500 years is probably due to the fact that upon abandonment of the agricultural system the downs reverted to woodland, interspersed with pasture (plains) for sheep grazing. Much of the woodland in the 11th century probably fell within the greater estate of Earl Godwin father of Harold II, in turn after the Conquest the land was granted to Roger de Montgomery, whose seat was at Arundel. Eventually, in the 13th century the estate came to the Fitzalans, when they became earls of Arundel. The downland and woods of Overholt were part of a huge hunting area (par force de chiens) running from Angmering in the east into Hampshire in the west: the free chase or Forest of Arundel. Parts of the forest passed into private hands after the
Fig. 14. A partially robbed-out cairn in the study area (No 1. Fig. 3).

Fig. 14. Hunting red deer in the forest (From the Livre de la Chasse by Gaston Phoebus).
break-up and sale of the western part of the Arundel estate from 1580 but the area now known as Charlton forest passed into the hands of the Duke of Richmond and Gordon in the late 18th and has remained so ever since. It is important to consider the development of the woodland cover when considering the degree of preservation of all the archaeological features in Charlton Forest. In 1924, the forest was described in a paper by A.S. Wyatt as climax beech woodland, which on the Chalk downland follows the vegetation cover cycle: grassland, scrub, ash and oak dominant mix, beech dominant mix, beech dominant. Most of the Charlton Forest beech was felled and sold to pay death duties after 1924, and then in the 1930s began the gradual leasing out of blocks of the forest to the Forestry Commission. The natural tree cover is now restricted to the edges of the forest close to land boundaries, elsewhere there is a predominance of planted beech and some softwoods. Coppice stools of chestnut found amongst the plantation beeches suggest a short period of regeneration between the felling of the natural beech and plantation (Fig. 15).

Fig. 15. A chestnut coppice stool amongst the beech plantation.
Aims and objectives

The combined topographic and geophysical survey is designed to:

- Identify the precise number of cairns in the study area.
- Identify the size and types of cairns more accurately.
- Elucidate the spatial and temporal relationships of the cairns to each other and to the lynchets and trackways of the field systems.
- Establish the chronological and spatial relationship between the field systems and cairns, and the surrounding conventional barrows and cross dykes.
- Identify other features within and outside the main monument groups.
- Link the monuments into the topography of the downland block.
- Provide information germane to an excavation of one of the cairns in 2017.
- Formulate recommendations for future research and management at the sites. All the features to be surveyed, are under commercially managed forestry.

The latter point is of the utmost importance, given the mechanised nature and procedure for thinning and clear felling. In Charlton Forest, MBR has worked with the Forestry Commission during thinning operations at the Scrubbs and around Stonepit Bottom (Fig. 1), to ensure that contractors treat the preserved field systems as present day entities, with single access and egress points.
2/. The Survey Course (Specific)

A major aim of the course is to produce an accurate digital map of the topography of, and archaeological monuments on, a spur and valley edge in East Dean Woods, Charlton Forest, within the Goodwood Estate, similar to that generated during the 2008 - 2015 survey courses and the 2009-16 field courses (Figs. 16 - 23).

Fig. 16. Devil’s Humps postmap SC2009, showing location of all recorded heights, taken as spot heights and strings.

Fig. 17. LISCAD generated model of the Devil’s Humps SC2009.
At the beginning of the course, the sites will be walked to establish the parameters and features of the monuments that will be surveyed. This exercise will be followed by an attempt to locate any other features not marked up on the NMP map (Fig. 2, Appendix 2), and to link the monuments to the broader topography (Fig. 18).

![Google Earth image of the downland block in the survey area. The southern edge of the Weald is visible in the foreground and the northern Coastal Plain in the background.](image)

Having established the features to be surveyed, a series of benchmarks will be set up across the site. The source of the 2016 survey course benchmarks will be established by GPS (Global Positioning Satellites), which provide 3D co-ordinates; these comprise an Easting, Northing and height above sea-level. The co-ordinates will be measured to a set of permanent master bench marks set up on the first morning of the course; from these benchmarks each group will transfer co-ordinates into temporary bench marks (TBM) in their own survey area. Following this process, which will be taught as a single group exercise, the group shall split into four separate teams, each of which will survey a specific part of the area that includes some of the monuments outlined in Appendix 2. The accumulated data will be ‘drawn-up’ during the late afternoon at Goodwood; during periods of very inclement weather the same resource will be utilised. Each group will survey their features using a combination of spot heights and strings, to produce a basic but complete coverage of their allotted features (Figs. 19, 20). At the end
of the course the initial drawing will have been completed, and the data generated to create the drawing will be utilised by other software packages such as SURFER and QGIS to create a rendered model that illustrates the monuments in their topographic context (Figs 19, 21, 21-23).

Fig. 19. DTM of the Stonehill Clump barrow, showing damage on in the vicinity of the barrow from tree throws generated by the 1987 storm (SC2015).

In addition to the Total Station survey, the course will also consider other methods of recording, such as those utilised by Dave McOmish at the Bow Hill ‘British Camp’, which include the use of the plane table and alidade (Fig. 20).
In the field, students will also be asked to consider and evince the setting, chronology and possible future excavation of the monuments and adjacent features, and ascertain how the survey can be tailored and used to facilitate these objectives. Back at the Institute, group tutorials will examine further manipulation of the survey data, including image enhancement and draping the monuments on the downland topography (Figs. 6, 21-22).
Fig. 21. Digital terrain model of Goosehill Camp looking SW, showing the relationship of the monument to the valley side relief. Colour scale in m OD.

Fig. 22. Surface relief model of the Heyshott Down Barrow Group.
Fig. 23. Final plan of the Charlton Down/Goodwood Racecourse Barrow Group, produced in QGIS format (SC2015).
3/. The Survey Course (General)

Aims of the course
The course seeks to provide students with an understanding of the principal surveying techniques employed by field archaeologists and provide training in undertaking a detailed survey of archaeological remains using a Total Station; together with writing-up and interpreting the resultant survey in a broader archaeological context.

Objectives of the course
This course is designed to give students

1. An overview of the issues involved in archaeological surveying.
2. Practical understanding and experience in topographical surveying.
3. The opportunity to develop teamwork skills along with the ability to prioritise and structure tasks within a set time period.
4. The ability to download data from the total stations and undertake preliminary analysis.
5. The ability to undertake the production of maps and images of the topographic survey.
6. Experience of combining other archaeological information with the survey to produce a written report and discussion of the site.
7. The basic knowledge from which to critically assess the applicability of individual methods to specific survey situations, and assess survey data presented by others.
8. A sharpened awareness of the processes involved in presenting the results of an archaeological survey, through the completion of a written report.

Course Information
This handbook contains the core information about the content and administration of the course. Further information on coursework guidelines is available at [http://www.ucl.ac.uk/archaeology/administration/students/handbook](http://www.ucl.ac.uk/archaeology/administration/students/handbook) and should be read prior to coming on the course and during the production of the course work. Additional information regarding the area to be surveyed, surveying techniques and instruments to be used will be provided during the course and via the reading list. If students have queries about the objectives, structure, content, assessment or organization of the course, they should consult the Course Teachers, one of whom is the course co-ordinator.
**Teaching Methods**

The Course will be taught by Mark Roberts and Robert Kaleta.

The majority of the course will be taught during a five-day field course on the Goodwood Estate, with the students staying in the racehorse stable complex at Goodwood. The first day will be spent introducing the course, undertaking an initial review of the area to be surveyed and discussing the equipment to be used. The majority of the following four days will be spent in the field undertaking a detailed survey. The students will be divided into small groups, each with its own total station. In the late afternoons students will return to Goodwood to download that day’s survey data and discuss the results. There will also be de-briefing meetings to distribute the raw data and discuss the assessment exercise that will be undertaken in the weeks following the course, back at the Institute of Archaeology. For general points of interest or enquiry during the course, students should approach Mark Roberts who is the course co-ordinator.

**Teaching Schedule**

Teaching will take place from 08.30 to 16.00 and 18.00 to 19.00 each day with short breaks in the morning (10.30) and afternoon (14.30), in addition to a lunch break of 45 minutes (12.15-13.00). This timetable will require students to have prepared their lunch and be ready to leave Goodwood at 08.00 each morning, in order to make best use of the available day light: you will return to Goodwood around 16.40, when it gets dark. The last part of the working day will be used to download the survey data and discuss results.

**Prerequisites**

There is no formal requirement to take another course or courses before taking this course, but it is assumed that most students will have taken part in the first-year field archaeology course at Downley and will thus already have had some introduction to the survey area landscape and use of the total station.

**Workload**

The initial five-day field-course (c. 50 hours) is complemented by four hours of class discussion and computing practicals. You are expected to undertake more extensive background reading, research and computing work to complete your assignment, and you should allow around 90 hours for this.
Method of Assessment

This course is assessed by a single 4000 word illustrated report based on the survey you undertook.

The report should be in three parts.

1. An introduction to the Goodwood Estate survey areas including discussion of any other evidence for the prehistory and history of the area that may be relevant to understanding the survey (e.g. previous research; maps; data from the South Downs National Park Lidar Survey, Historic Environment Record – (HER); Archaeology Data Service – (ADS); Historic England’s Pastscape etc.). (30%).

2. The main body of the report should consist of work pertaining to the survey methods undertaken, which will include; description of the equipment used; methodologies employed during the survey; the aims and objectives of the survey; an assessment of the suitability of the methodology used; and technical and practical difficulties potentially affecting the results of the survey. (40%).

3. The final part of the report concerns the processing of the master survey data (which you will each be supplied with after the field course). This work will involve the production of plans; a discussion of those plans based on your observations during the survey course; integration of the plans and survey data with other lines of evidence (e.g. landscape survey) relevant to our understanding of the monuments on the downland dip slope, and the environment within which they are located. You might also wish to briefly discuss your recommendations for further research and by what methods (30%).

The report should be fully illustrated with location maps and survey drawings produced to publication standard, the usual use of references and a bibliography:-
http://www.ucl.ac.uk/archaeology/administration/students/handbook/referencing

The size of each component of the report should reflect the marking weighting, although some leeway is permissible.
Submission of the report

The deadline for submission has been set for 17.00 on Friday 24th February 2017. Turnitin Code:- 3228718.

Please see http://www.ucl.ac.uk/archaeology/administration/students/handbook for further details concerning the marking system, return of coursework etc.

Any questions then please come and see me in my office or e-mail me at mark.roberts@ucl.ac.uk

Health and safety

Everyone attending the course must have filled in a health and safety/personal details form before the start of the course. The Institute has a Health and Safety policy and code of practice that provides guidance on field and laboratory and work etc. All work undertaken in the Institute is governed by these guidelines and students have a duty to be aware of them and to adhere to them at all times. This is particularly important in the context of this practical field course. A copy of the completed risk assessment for this course will be available for consultation both in the field and at the Institute.

http://www.ucl.ac.uk/archaeology/administration/common/fieldwork/safety (Fieldwork section).

Please ensure that you are up to date with your tetanus injections.

a) You will need clothing to cope with all weathers but mainly the cold and wet. A complete set of waterproofs and strong waterproof shoes or boots are advisable. Staff shall refuse to allow inadequately equipped students to participate in the course.

b) Make yourself aware of the location of the First Aid Kit (there is always one kit in MBR’s vehicle). Any accident must be reported to the responsible member of staff at once and an Accident Report Form completed following any accident. If you become aware of a hazard, inform one of the course teachers or another responsible member of staff immediately.

c) All tools and equipment must be used as instructed. When not in use they should be stacked as instructed so as not to cause hazards.

d) Do not walk off on your own, please advise a member of staff if you need to leave the survey area or the Goodwood accommodation.

e) In general follow the relevant sections of the Country Code:

    Guard against all risks of fire.
Fasten all gates.
Keep to paths across farmland.
Avoid damaging fences, hedges and walls.
Leave no litter.
Safeguard water supplies.
Protect wildlife, wild plants and trees.
Go carefully on country roads.
Respect the life of the countryside.

f) Take particular care on country lanes. Keep to edge of the road facing oncoming traffic.
   Carry a torch and wear bright clothing after dark and do not walk alone after nightfall.
You are required to comply with all instructions contained in the UCL Fieldwork Approved
Code of Practice available from the fieldwork section at:--
http://www.ucl.ac.uk/archaeology/administration/common/fieldwork

**Food and Drink**

Those staying at Goodwood will be provided with materials to make their own packed lunch;
breakfast and a hot evening meal will be provided each day (see preliminary information sheet
circulated on Moodle on 10/9/16). You should make sure that you take an adequate supply of
drinking water up to the site each day. A flask for carrying hot drinks would also be beneficial.
Please note that NO ALCOHOL is allowed on site and none should be consumed off-site during
working hours. This is a health and safety regulation, and any infringement of this rule will
result in expulsion from the course. There will be opportunities for sociable drinking in the
evenings, please do this in moderation, return to Goodwood in good time and take care not to
disturb the residents or other students who may be resting. Please note that the Goodwood
stable block is a NON-SMOKING area. Anyone smoking during the survey course should do
so with consideration for others and make sure there is no risk of fire.
4/. Reading List and Bibliography


English Heritage, 2014. Pastscape Monument Number 249672. [Romano-British Trackway] 


Grinsell, L.V., 1941. Sussex barrows: supplement no. II. *Sussex Archaeological Collections* 82, 115-123.


Appendix 1  Setting up the Total Station

1. Place the tripod over the survey control point; try to get the centre of the tripod top approximately over the centre of the survey control point.

2. Set the tripod up so that it is roughly level; the height of the plate should be as high as the shortest operator’s shoulder. This setting enables everybody present to use the total station.

3. Place the total station on top of the tripod. Hold it very carefully and try to keep two hands on the machine at all times. There is a screw under the tribrach of the total station that attaches to the tripod. The 1200, 800 and 700 series total stations have a laser plummet. Once the machine is attached to the tripod turn the machine on. It should default to a levelling and laser plummet screen (this action will depend on internal settings). The laser plummet will appear as a red dot beneath the total station. Carefully move the tripod until the laser plummet is located over the control point. Turn the thumbscrews until the plummet is central over the survey point/nail. Heel the tripod in so that it is stable (it does not to be underground)

4. Centre the laser plummet again; turning the thumbscrews does this.

5. Now use the spirit level on the tribrach to level the tripod. Level the tripod by adjusting the legs. The thumbscrews should be used for fine adjustment only.

6. Once you have it level, the laser plummet will have moved away from the survey point. Use the thumbscrews to re-centre the plummet. The tripod will need levelling again (with the tripod legs) but should need to make smaller adjustments.

7. Eventually you will have the tripod level with the plummet nearly directly over the survey point. To make the final adjustment then loosen the screw that holds the tribrach to the tripod. You should only have to move the plate a small
distance to centre the plummet. Re-level with the thumbscrews (this action should only involve a small adjustment).

8. Finally level the machine using the electronic level. This will appear as a horizontal and vertical bar or as a pictorial representation of a bulls eye spirit level (depending upon the machine used).

9. Exit out of the levelling screen.

10. The height of the total station must now be measured. The height should be from the ground to a mark on the side of the total station that corresponds to the centre of the telescope. Keep the tape measure as straight as possible. The height should be recorded to the nearest millimetre. Record the height in your notebook.

12. The total station is now ready to work. We shall learn how to use the system programmes in the field.
Appendix 2. Chichester District Historic Environment Record (HER):

[Two of the monuments shown on the HER map are given below, to illustrate the layout of the Chichester District HER].

Chichester District HER: Monument Report

DISTRICT HER NUMBER:  CD1779
Name:  Trackway - EastDean Wood, East Dean
Monument Type:  TRACKWAY  Period from:  Unknown
Narrow Type:  Terraceway  Period to:  
Parish:  East Dean
Map Sheet:  SU91NW  NGRX:  491694  NGRY:  115579

Remarks:  A 'celtic road' 710yds long was noted in East Dean Woods, with lynchets to E. and W. of the road (see CD1781) {1}. In 1971 it was a stretch of forest track descending the South Downs towards Brockhurst Bottom, a dry combe to S{2}. It is shown as 'Green Road' by the OS{3}.

{1} SU91NW27 (OS record card)  Date:  1962
{2} SU91NW27 (OS record card)  Date:  1971
{3} OS 25inch map  Date:  1875-1961
Specific ref:  1961 ed.

DISTRICT HER NUMBER:  CD1780
Name:  Roman building - Lamb Lea, East Dean
Monument Type:  BUILDING
Narrow Type:
Monument Type:  VILLA
Narrow Type:
Monument Type:  CORN DRYING OVEN
Narrow Type:
**Status:** Archaeologically Sensitive Area (ASA).  **Grade Ref:**  **Prev. Grade Ref:**

**Parish:** East Dean  
**Map Sheet:** SU91NW  
NGRX: 491623  
NGRY: 115397

**Remarks:** The scanty and mangled remains of an apparent villa of simple type were found c.1953 at Lamb Lea, East Dean. Under the westernmost room a furnace had been inserted, possibly for the drying of corn. It is 15ft long and the drying floor end is 8ft square {1}. A T-shaped drying furnace, it contained wheat, spelt wheat, barley, oats and rye. It had been dismantled and filled in, probably in C4, and was then covered with a solid floor on which were fragments of rotary and saddle querns. The excavation was by the West Sussex Excavation group {2}. No full account was published at the time but O.J. Gilkes attempted to reconstruct the story from Miss P A M Keef's notes. The main flue of the corn drying oven (Morris' Type T) was built of chalk and cob. The infill of the oven contained two complete pottery vessels, one of which, a grog-tempered dish, has C4 parallels. From the cross flue was a large portion of the lower stone of a greensand rotary quernstone. Above and to the N of the corn dryer was excavated an earthen 'make up' floor 13.41m long by 3.65m wide with a southward projection at its W end. The floor and associated features are interpreted as the remains of a timber-framed building. While the relationship between the oven and building is not clear, the building continued in occupation after the infilling of the oven {3}. Most of the finds are now lost but the two complete pottery vessels found in the corn dryer survive, one in the British Museum and the other in Brighton Museum {4} {5}. A single sherd found in the flue in association with the fragment of quernstone was deposited in Chichester District Museum {6}. A quantity of Roman material inc building debris, samian ware and quernstone fragments was found close to the site by R Pailthorpe in 1992 at SU 9159 1549 at Brockhurst Bottom, and deposited with the then CDAU (see also CD1836) {7}.

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{1} Article in Sussex N&Q 14  
**Date:** 1954-7  
**Author:**  
**Journal/Serial:** Sussex Notes and Queries  
**Volume/part:** 14  
**Specific ref:** p. 109

{2} Roman Britain in 1954
Date: 1955  Author: Anon

Journal/Serial: Journal of Roman Studies  Volume/part: 45

Specific ref: p. 143

[3] Miss Pam O'Keef’s excavations on a Roman Farmstead at Lambs Lea, West Sussex

Date: 1990  Author: O.J. Gilkes

Journal/Serial: Sussex Archaeological Collections  Volume/part: 128

Specific ref:


Date:  Author:

Journal/Serial:  Volume/part:

Specific ref: Acc. No. 250500


Date:  Author:

Journal/Serial:  Volume/part:

Specific ref: Acc. No. R 5083/2 &195


Date:  Author

Journal/Serial:  Volume/part: 14

Specific ref: Record A20564


Date: 22/4/92  Author: James Kenny

Journal/Serial:  Volume/part:

Specific ref:

Related events: Event ID E1041 Excavation - Lamb Lea, East Dean
Fig. 24. Scheduled sites to the south of the survey course area at Lamb Lea.
Appendix 3 Students attending the surveying course

**Group A**
- Lyndsey Banfield
- Johan du Preez
- Maria Gajewska

**Group B**
- Heather Norris
- Iva Massa
- Alex Espinosa

**Group C**
- Hannah McClean
- Bianca Bertini
- Janejila Gammans

**Group D**
- Tumi Markhan-Jones
- Maya Howard
- Lauren Bell

Special Guests  Fergus Hooper and Lina Merzougui

Appendix 4 Useful telephone numbers and contacts

- Mark Roberts Mobile. – 07803 500321
- Robert Kaleta Mobile. – 07883 154514
- Darren Norris: Goodwood Forestry. – 01730 812325
- Rob Thurlow: Forestry Commission. – 07771 667140
- Jeremy Hill: Goodwood Land Agent. – 01243 755043 – 07580 976413
- Penny Morris: Stable Dormitory. – 01243 755036 – 07713 502688
- Johno Newton: Gamekeeper Goodwood Estate. – 01243 535248 – 07977 441874
- Goodwood Education Office. – 01243 755157
- James Peill: Archivist Goodwood Estate. – 01243 818253
- St. Richard’s Hospital Chichester. – 01243 788122
- Doctor: Lavant Surgery. – 01243 527624
Appendix 5 Acknowledgements

The compilation of this handbook has been greatly facilitated by James Kenny at Chichester District Council HER department, and Charlotte Frewson and Sandra Bond at the Institute of Archaeology. I am most grateful to their Graces the Duke and Duchess of Richmond, and to Lord and Lady March for their support and encouragement. At the Forestry Commission I would like to thank Rob Thurlow, Simon James and Tim Yarnell for supporting and facilitating the project. The following have all been instrumental in helping to set up the course: Darren Norris the Head Forester; Jeremy Hill, Land Agent; Johno Newton, Gamekeeper; and James Peill, Penny and Alan Morris, and Sarah Stewart, of the Goodwood Estate.
Rear Cover. Looking southwards towards Institute students surveying at Reservoir Clump, Goodwood, in 2015. Chichester Harbour and the English Channel are in the background.