D1. Survey and geophysical prospection at the monuments

D1.1 Southern henge, double pit alignment and Centre Hill barrow

by Arnold Aspinall, Alan Biggins, Jan Harding, Benjamin Johnson, Roger Martlew, Armin Schmidt, and Kristian Strutt

D1.1.1 Introduction

A topographic survey of the southern henge and its immediate surroundings was completed in the summer of 1997 as part of the VMNLP (Fig 3.5). It excluded the nearby Centre Hill barrow which was surveyed in July 2003 as part of the ALSF Project. Three geophysical surveys were also undertaken by the VMNLP in advance of excavation – across the southern extent of the double pit alignment in September 1994, at the henge’s western section of outer ditch in August 1996, and at its north-west inner ditch terminal in August 1997 (Fig 3.6). The first two were by Jan Harding and the latter by Armin Schmidt of the then Department of Archaeological Sciences, University of Bradford. This work was supplemented by two more extensive geophysical surveys: Arnold Aspinall and others from the Department of Archaeological Sciences at Bradford University, along with Roger Martlew of the School of Continuing Education at Leeds University, conducted a survey across two-thirds of the monument and adjacent double pit alignment in the summers of 1992 and 1993; and Alan Biggins of TimeScape Surveys Ltd examined the henge’s inner area, its northern entrance, a small part of the adjacent double pit alignment, and the Centre Hill barrow as part of the ALSF Project in the summer of 2003 (Fig 3.7). The results from these different geophysical surveys are integrated together here rather than reported separately. These topographic and geophysical surveys aimed to locate the southern henge, double pit alignment, and Centre Hill barrow in relation to the modern landscape and an arbitrary coordinate system, and to provide a detailed and accurate record of each monument, including information about the extent, nature, character, condition, and quality of their surviving archaeological features.

D1.1.2 Methodology
The two topographic surveys were carried out using a Geotronics Geodolite Total Station. The surveyed area was bounded to the north by the road between the villages of West Tanfield and Thornborough, and to the south by a line some 50m beyond the limit of the southern henge’s outer ditch (Fig 3.5). The northern half of the corridor was 300m across but wider elsewhere to include the double pit alignment. The data from the 1997 and 2003 surveys were processed with Landscape Survey Systems software versions 4.0 and 6.0 and Landscape Survey Systems software version 8.2 respectively. Across the southern henge and 0.9 hectares at and around the Centre Hill barrow, readings were taken on ‘intelligent’ point locations, dictated by factors such as breaks in the slope of features or depressions and rises in the topography. Away from the monuments, they were taken at regular points using the OS National Grid. The data are illustrated as a contour plot of the entire survey area (Fig D1.1), detailed contour and hachured plans of the southern henge (Figs D1.2 and D1.3 respectively), and a profile of the Centre Hill barrow (Fig D1.4).

Geophysical prospection employed a number of methodologies across different survey areas. The first was by Arnold Aspinall and Roger Martlew, and included: an earth resistance survey of the southern henge’s inner ditch, bank, and part of its outer ditch; a smaller magnetometer survey of part of its inner area; and a magnetometer survey of the northern end of the double pit alignment. These surveys used a Geoscan RM4 and Geoscan FM36 fluxgate gradiometer on a 20m grid with 1m parallel traverses and a reading interval of 1m. Both magnetometer and earth resistance survey were also employed by the VMNLP: a magnetometer survey, using a Geoscan FM36 fluxgate gradiometer, was conducted across five 20m grid squares where it was believed that the southern end of the double pit alignment terminated; an earth resistance survey, using a Geoscan RM4, was conducted across twenty-two 20m grid squares located over the henge’s western section of outer ditch; and both earth resistance and magnetometry, using a Geoscan RM415 and Geoscan FM36 fluxgate gradiometer, were conducted across a 20m by 50m grid at a section of the southern henge’s inner ditch. These VMNLP surveys used either 1m (double pit alignment and outer ditch of southern henge) or 0.5m
parallel traverses with a reading interval of 0.5m. The ALSF survey used a Geoscan FM36 fluxgate gradiometer to carry out magnetometry across 30m grids with 1m parallel traverses and 0.25m sample intervals. A total of 4.5ha was surveyed, including the 60m wide strip between the Stewardship Agreement boundaries for some 240m to the north of the southern henge, but the survey areas close to the latter were not contiguous because a derelict fence prevented access at that point (Fig D1.13). The VMNLP and ALSF geophysical data were processed and analysed with the Geoplot 3 processing software and plotted as grey scale clip plots, relief plots, and traced plots (Fig D1.10–D1.13). A separate anomaly plan was produced for the larger ALSF survey which highlighted possibly significant archaeological features (Fig D1.13).

D1.1.3 Topographic results

The southern henge is sited on a predominantly level area of ground at 44.25m OD which slopes down gently to the south and west beyond the circumference of the monument’s outer ditch (Fig D1.1). The earthwork has been extensively disturbed, especially on its eastern, southern, and western sides, making it the least well preserved of the three henges. Despite this, its inner ditch and bank are still clearly visible, as are the faint traces of the outer ditch to the north and north-west (Fig D1.2). It has an average overall diameter of 235m. The Centre Hill barrow is sited to the north on a slight gravel ridge which runs east–west and rises 1.25m above the surrounding landscape (Fig D1.4). The barrow itself survives as a much reduced, if still visible, earthwork 28.8m in diameter and 0.3m high. Its highest point lies at 45.8m OD. The northern and southern ends of the double pit alignment are at 45m OD and 43m OD respectively (Fig D1.1).

The contour plot of the henge was used to create a hachured plan (Fig D1.3). The inner henge ditch (Figs D1.5–1.6) is poorly preserved, especially on the eastern side where bank material had been deliberately spread across its top by a mechanical digger in the 1960s (N Campling, pers comm), presumably to create a more even area for ploughing. The ditch is approximately 0.6m deep to the south, and slightly shallower to the east, its width varying around its circumference from 13.7m to 22.9m. The ditch profile is a
shallow U-shape and appears best preserved on the south-west side of the monument. The bank is moderately well preserved on either side of the northern entrance, where it stands to a maximum height of 1.8m, has a width of 14.3–20.3m, and a top 4–5m wide (Fig D1.6). Elsewhere it has been badly damaged, especially on the east and south-east sides, where it now spreads over as much as 36.4m, standing to a height of only 0.3m. The bank’s profile is shallow-sided with a broad top (Figs D1.7–1.8), except to the south-east where damage has almost obliterated the feature. The plough has cut into the base of the south-west section of the bank, displacing the rounded pebbles, large stone, and gravelly soil from which it was originally constructed. Slight traces of the outer ditch survive to the north and north-west as a shallow hollow 0.2–0.25m deep and approximately 20m wide. No sign of the outer ditch is evident elsewhere around its circuit and there is no evidence for an associated bank.

There are two entrances through the henge’s inner earthworks. Plough damage has disturbed the bank terminal on the eastern side of the southern causeway, making any calculation of width difficult. The north entrance is 19.3m wide at the bank and 25.5m wide at the inner ditch, reflecting the shortened section of ditch on the monument’s eastern side. The two entrances may not be aligned on the same axis – as Thomas (1955, 434) suggested for the northern henge – but the poorly preserved southern entrance makes it impossible to conclude this with any certainty. The bank and ditch on the western side of its northern entrance have squared-off terminals, where the bank is greater in height and width than elsewhere around its circumference, suggesting that the terminals were originally enlarged. The berm between the inner ditch and bank is relatively flat and around 12m wide, except to the east where it has been greatly disturbed. The slightly rounded henge interior is approximately 85m in diameter.

**D1.1.4 Geophysical results**

The geophysical survey results are depicted in Figures D1.9–1.13 in the order in which they were completed. Only selected use is made of their results here. The results of the ALSF magnetometer survey – which successfully identified the Centre Hill barrow, the
The ALSF survey area extended outside the henge’s northern entrance along the narrow strip of pasture bounded on either side by the fence line of the Stewardship Agreement (Fig D1.13). At the extreme north-west of the survey transect a small sub-circular positive anomaly was detected (52), but this is unlikely to have an archaeological origin. A narrow linear positive anomaly (53) clips the north-western edge of the survey area, and another wider (about 3–4m) linear anomaly (54) was aligned almost north–south, the feature possibly splitting towards the north-east. It appears to be cut by 53. The northern end of this broad anomaly is more complex, possibly consisting of more than one linear feature, a number of ‘pits’, and some small rectilinear features. The Centre Hill barrow is clearly visible as a ring-ditch (55). It measures some 26.7m in diameter, similar to the size of the earthwork mound, with a ditch width of 2.5m. The strength of the magnetic response was maximally +3.5 μTeslas. It is possibly broken by an entrance to the north. One internal feature appeared to be a sub-square positive anomaly, approximately 7.4m in size. A small circular positive anomaly was located centrally, with others to the north and north-east of the square, but it is uncertain whether they are part of the structure. Additional, apparently isolated anomalies were located around the inner periphery of the
ring-ditch. It is tempting to speculate that these may represent secondary burial locations. Two flanking smaller pits were located immediately to the east (56), with part of what may be a large circular positive anomaly to the south-west (57). The symmetry of these features in relation to the ring-ditch suggests a deliberate emplacement and it may have been associated with some very slight linear positive anomalies.

There was a broad curvilinear positive anomaly about 35m south of the ring-ditch (58). Aerial photographs show a palaeochannel in the same location. Nearby was the distinctive northern end of the double pit alignment (59), which, on the aerial photographs, resembles rows of parallel lines with a central gap. The geophysical results, by contrast, indicate these ‘rows’ were comprised of initially two and then three contiguous matching linear postholes. This feature was closely connected to the larger pits of the alignment proper, one of which is visible near the edge of the survey area. Others can be assumed to be beneath the recently erected double fence defining the western boundary of the Stewardship Agreement. There may be two possible blocking posts located at the end of the terminal, lying some 5m to the north. It is feasible that these posts are unconnected with the double pit alignment and form part of 58. A number of linear features were detected to the south-east of the double pit alignment. There was a group of positive and bipolar elements (60), possibly with a sub-circular shape, but it is unknown if they are archaeologically significant. A diffuse linear anomaly (61), consisting of both positive and negative elements together with scattered circular bipolar elements, is all that remains of a destroyed field boundary. Some ridges in the field surface were visible in this sector, most likely of geological origin. A slight linear positive anomaly (62) is located some 15m to the south and follows roughly the same alignment. There is some slight evidence for its ‘beaded’ configuration, tentatively suggesting it was an insubstantial palisade trench. A third more robust linear anomaly (63), again some 15m south, shares its alignment with 61 and 62. Towards its western end it has a fairly substantial response (maximally +4 nTeslas), but its interpretation is uncertain. A fourth linear feature (64) appears to terminate at a sub-circular or U-shaped positive anomaly. Although the link is tenuous there are certain similarities in both location and distance from the entrance of the henge (about 100m), to that feature
observed north of the central henge (D1.2.4). A sinuous linear anomaly (65) is located between 15m to 20m further south. Possible features between 64 and 65 toward the western edge of the survey had no clear morphological characteristics. One feature in common with all these linear features (61–5) is their roughly east–west alignment. Closer towards the henge an irregular, fairly narrow linear anomaly (66) was detected. There is slight evidence of two lines directed towards the henge entrance. Its western edge appears either to join or run parallel with the western outer ditch of the henge (67). The latter appears to be in a better state of preservation towards the east. South of the outer ditches there are indications of slight linear anomalies (68), but their provenance is unresolved.

There is clearly a significant degree of destruction at the southern henge. Four linear anomalies (69), aligned approximately north–south and spaced between 30 and 40m apart, continued across the monument. They were also detected by other surveys (Figs D1.9B and D1.12). The morphology of each of these linear features is slightly different, and from geophysical prospection alone it is impossible to explain them. They do appear, however, to be of later date than the henge, and excavations of the inner ditch terminal discovered the remains of a stone wall or some other form of boundary – which cut the upper fills of the henge ditch and was associated with medieval pottery (4.6.3) – on broadly the same alignment. A segmentary positive anomaly (70) was visible around the outside periphery of the inner ditch circumference, most likely a lynchet formed during the site’s cultivation. Destruction may also have helped reveal an original element of the henge. The Aspinall and Martlew survey detected a narrow linear band of low resistance within the high resistance of the bank. It is particularly clear on the eastern side, where it shows as a double curving line (Fig D1.9A). As mentioned, the bank here has been very badly damaged, so it appears this anomaly is best defined close to the original buried ground surface. Its consistency suggests it could be a marking-out ditch or possibly a foundation trench for a timber revetment similar to that identified by excavation at Priddy Circles 1, Somerset (Tratman 1967).

The inner ditch (71) was still intact and a number of positive anomalies may have been detected, particularly around its terminals. The latter appear to be squared-off. The most
interesting discovery of the 1997 earth resistance survey is the large squarish anomaly located along the northern edge of the north-west ditch terminal which appears to run across at least part of the entrance (Fig D1.12A). The importance of what may possibly be an archaeological feature is reiterated by a patch of low readings in the 1997 magnetometer survey (Fig D1.12B), and subsequent excavation here located the disturbed remains of a banked feature which was most probably an original feature. The ALSF survey failed to provide any additional information about this feature. Additional linear anomalies on the ALSF survey (72 and 73) may represent further episodes of destruction. Although on a different alignment to each other and 69, they give the appearance of resulting from later agricultural intervention.

A number of internal features are visible in the centre of the henge, but given the degree of destruction at this monument it is unclear whether they are archaeological or later damage. A central linear positive anomaly (74) was detected offset towards the south-west. This feature appeared to kink towards the north and was interrupted by a small circular feature (75) some 5m in diameter and possibly formed from a number of small postholes. This linear anomaly was also clearly visible in the earlier surveys of Aspinall and Martlew, showing very clearly as a flattened V-shape (Fig D1.9). Its origins are far from clear, but its off-centre location, with its northern end on the main henge axis, highlights the intriguing possibility that it was originally part of the monument. Its future investigation is of considerable importance. Four large positive anomalies, possibly pits, were located a few metres to the south. Just off centre, towards the east, was a pair of positive anomalies, one oval the other D-shaped (76), again possibly formed by small pits, the smaller of which may contain a pair of central pits. The origin or function of these anomalies is unknown. A further group of circular positive anomalies (77) may indicate the location of small pits between 1 and 2m in size. Two anomalies (78) were detected in the henge’s southern entrance. To the west was a rhomboidal structure some 10m in length, while 5m to the east was a sub-circular structure with a diameter of 8m. Finally, an intense linear positive anomaly (79), possibly a ditch, was detected, but further survey was prevented by the boundary fence, seen as the black and white linear bipolar anomaly.
The earth resistance survey by Aspinall and Martlew detected the outer ditch as low resistance anomalies on the northern and southern side of the henge (Fig D1.9A). The feature’s irregular and interrupted character is clearly apparent. The different soil moisture regimes during the separate survey events led to variations in the contrast of earth resistance values that resulted in an inconsistent appearance of the recorded anomalies. The VMNLP earth resistance survey completed in 1996 also successfully detected the henge’s outer ditch on its western side (Fig D1.11). A curvilinear band of low resistivity readings stretched from the north of the grid to the south and was approximately 12m in width (a). These readings are less pronounced towards the centre of the survey grid at the point where aerial photography suggests a break in the ditch. On either side of this possible entrance, the spread of these readings increases in width (b and c). These and other linear features (d–h), each running east–west and approximately 2–4m wide, are probably where the plough has disturbed and spread the ditch fill. Beyond b, there is some uncertainty about the course of the ditch. The negative anomaly clearly continues in a south-south-east direction, but aerial photography shows it actually deviating from the henge circumference and forming a straight almost palisade-like section. The existence of the latter is indicated by a pronounced positive anomaly (i) which corresponds exactly with the bulbous termination of this cropmark feature. Traces of the outer ditch then become invisible. Aerial photography has also failed to produce any evidence for this feature’s continuation around the south-west part of the monument. It must remain a possibility that this absence of evidence resulted from the effects of drainage produced by the sloping ground on this side of the monument.

The Aspinall and Martlew survey also detected the two rows of individual pits, running north-east to south-west, of the double pit alignment (Fig D1.9C). These features are less discernible across the southern extent of the survey where the ground surface dips down relatively sharply to the river terrace. Aerial photographs demonstrate their continuation here, so the feature’s weakened response most likely reflects either the change in the underlying drift geology or a greater depth of over-burden. The survey confirms the rows were between 9m and 10m apart and that the pits varied greatly in size with one section
of the monument comprising features as much as 3m across. Their results are certainly more impressive than the VMNLP magnetometer survey at the southern end of the double pit alignment in 1994 (Fig D1.10). The relatively deep terrace deposits known to exist here seem to have significantly lessened the archaeology’s magnetic response. Nonetheless, this survey did fulfil its aim by detecting the individual features of this monument prior to excavation (4.7). Eight dispersed sub-circular anomalies about 2–3m in diameter, all with high positive magnetic values, formed a double alignment running north-north-east to south-south-west (c–j). Their size and orientation suggests that each of these is best interpreted as the plough-disturbed remains of the pits which comprise this monument. Other areas of positive readings were evident to the west of the grid (a and l) and to the south of the monument (k). The latter continues its orientation and is most likely one of its pits, but the origin of the other positive anomalies is uncertain. A strong negative anomaly around 8m wide, but narrowing to the south, runs along the eastern side of the survey area (b). Again, it is of unknown origin.

D1.1.5 Implications and potential

The topographic survey demonstrates that the Centre Hill barrow has been greatly affected by ploughing. In 1864 the monument was recorded as ‘about sixty feet in diameter, and three feet six inches high’ (Lukis 1870b, 119), while in 1952 it had been slightly reduced to 3 feet (0.9m) in height, its mound deposit now spread over 90 feet (27.5m) (Thomas 1955, appendix II). The rate of destruction clearly accelerated in the post-war period and the monument is now spread over 28.8m with a height of no more than 0.3m. It is, nevertheless, one of the best preserved of the surviving barrows at Thornborough and geophysical prospection detected well-preserved buried features, including, most notably, a single encircling ditch and a number of possible internal pits. It is fortunate that the barrow is now situated within an area of permanent pasture created by the Stewardship Agreement, providing it with adequate protection for the foreseeable future. The site’s location on the axis between the southern and central henges suggests it was possibly of ‘special’ status, and the results of its 19th-century excavation produced
archaeological deposits which were locally unusual (2.3). It seems highly probable that much of interest still remains.

Less is known about the rate of destruction at the southern henge. Its extant earthworks and inner area appear less well preserved than its central and northern counterpart. Excavations have demonstrated that its interior was used extensively during the medieval period (4.6.3) and it is possible that some of this activity has been detected by geophysical prospection. In all likelihood, the site experienced accelerated destruction in the post-war period, highlighted by the recorded flattening of a considerable section of its eastern bank and ditch. In addition, many of its internal linear anomalies are suspected of being modern agricultural features, possibly linked to drainage. Fortunately, the site’s inclusion in the Stewardship Agreement offers a level of protection. Yet, despite earlier episodes of destruction it still possesses considerable potential for further investigation. Notable questions for further research include: the original state and differing level of preservation around its outer ditch, especially on its western side, where it changes its configuration, forming a feature very similar in appearance to a palisade trench; whether the features detected by geophysical prospection to the north of the henge’s northern entrance are indeed contemporary and associated with the monument or geological in origin; and whether any of the anomalies within the site’s earthwork, especially the flattened V-shaped feature at its centre, were of Neolithic date. The north-east terminus of the double pit alignment also appeared relatively well preserved and more complex than suggested by the aerial photography, possibly comprising double or treble matched flanking post-holes. Small-scale excavation would establish the character of this extremely unusual configuration and may provide invaluable evidence about the use of the double pit alignment, a spectacular but enigmatic monument.

D1.2 Central henge and cursus

by Alan Biggins, Jan Harding, Benjamin Johnson, Armin Schmidt, and Kristian Strutt

D1.2.1 Introduction
A topographical survey of the central henge and its immediate surroundings was completed in the spring and summer of 1998 as part of the VMNLP (Fig 3.5). Limited geophysical prospection, across part of the monument’s outer ditch and a section of the cursus, was also completed by Alan Biggins of TimeScape Surveys in June 1998 prior to excavation (Fig 3.6D). A more extensive survey was completed as part of the ALSF Project in July 2003, also by Alan Biggins of TimeScape Surveys, across the henge’s inner area, including part of the cursus, both of its entrances, and a narrow strip extending nearly 100m beyond the northern entrance (Fig 3.7). The results from these different geophysical surveys are integrated here rather than reported separately. These topographical and geophysical surveys aimed to locate the central henge and part of the cursus in relation to the modern landscape and an arbitrary coordinate system, and to provide a detailed and accurate record of both monuments, including information about the extent, nature, character, condition, and quality of their surviving archaeological features.

**D1.2.2 Methodology**

The topographical survey was carried out using a Geotronics Geodolite Total Station across the full extent of the central henge and part of its surrounding landscape. The surveyed area was 300m across, and extended from the road between the villages of West Tanfield and Thornborough, and northwards to the road between West Tanfield and the B6267 (Fig 3.5). Data were processed with Landscape Survey Systems software versions 4.0 and 6.0. Across the henge, readings were taken on ‘intelligent’ point locations, dictated by factors such as breaks in the slope of features or depressions and rises in the topography. Outside the monument they were taken at regular points using the OS National Grid. The data are illustrated as a contour plot of the entire survey area (Fig D1.14) and detailed contour and hachured plans of the central henge (Figs D1.15–1.16).

It was decided that the VMNLP survey of 1998, across a 30m by 60m area across the south-west section of the henge’s outer ditch, would use high-density magnetometry to determine better smaller features such as postholes or pits. A Geoscan FM36 fluxgate
gradiometer was employed across a 10m grid with 0.5m parallel traverses and a reading interval of 0.5m. In 2003 a Geoscan FM36 fluxgate gradiometer was used to carry out a very much larger magnetometer survey across an area of 3.98ha, using a 30m grid with 1m parallel traverses and 0.25m sample intervals. All the geophysical data were computed and analysed with either the Geoscan 2 or Geoplot 3 processing software, and plotted as grey scale clip plots, relief plots, and traced plots (Figs D.1.23–1.24). These were then used to produce an anomaly plan of possibly significant archaeological (Fig D1.23).

D1.2.3 Topographic results

The central henge is sited on level ground at 45.5m OD, bordered to the west by a fence and to the south by a road running between the villages of West Tanfield and Thornborough (Fig D1.16). An old L-shaped quarry lies immediately to the west of the fence line. The earthwork is much better preserved than the southern henge, its inner ditch and bank clearly visible around the entire circumference, with traces of the outer ditch surviving to the north-west (Fig D1.15). The monument has a diameter of approximately 185m measured from the exterior of its bank, but with its outer ditch is about 250m across. There is ample evidence for rabbit and sheep disturbance to the earthwork bank. To the north of the henge the survey area is bisected by a slight ridge which then slopes down, over a distance of 170m, to form a shallow basin 1.5m lower than the surrounding area (Fig D1.14). The landscape then rises sharply by 2.5m over the next 30m, only to descend again, this time by 3m over a distance of 90m, where it is partly obscured by the road. Nothing is known about the cause of these marked fluctuations in the ground surface, but they are unusual for the plateau, their occurrence on the axis between the central and northern henges suggesting they may have had some purposeful role for those moving between the sites.

The contour plot of the henge was used to create a hachured plan (Fig D1.16). The henge’s inner ditch is poorly preserved (Fig D1.17). On average it survives to a depth of 1m from the top of its cut, the deepest section being the terminal on the eastern side of
the southern entrance, where it has a depth of 1.05 m. It varies in width from between 20.3m and 27.7m, with an average of approximately 25m, and although ploughing has greatly disturbed the top of the feature its sides and slightly rounded terminals retain some of their original appearance. The earthwork bank is well preserved on its western side, where it stands to a height of 3m above the berm with a width of about 18m, and at the western terminal at the southern entrance, where the bank is as much as 4.5m high and 21.9m wide (Fig D1.18). Whether the latter was originally more impressive, or whether it simply survived better than elsewhere is a matter of speculation, although its rounded profile strongly suggests the former. The bank’s uneven top is 3–5m wide, except to the west of the southern entrance, where it is more rounded and 6–8m across. By contrast, to the north-east and east it only stands 0.85m high, and is much narrower, with a width of approximately 12m. Signs of quarrying and erosion are particularly evident across its southern and south-eastern portions (Figs D1.19–1.20). Redeposited loose rounded pebbles and gravelly soil can be found around recent scars caused by burrowing rabbits and grazing sheep. The bank’s overall profile is steep-sided with a flat top, although it alters drastically on the north-east side of the monument to a shallow slope. No evidence was found of the earlier excavation trenches dug by Nicholas Thomas.

The two henge entrances appear aligned on the same axis. The best preserved of these is to the south, with a width across the bank and ditch of 19m and 17m respectively (Fig D1.21). The northern entrance is about 17m wide. The bank terminals flanking both entrances appear squared-off and this earthwork is steeply faced on either side of the southern entrance. As mentioned, the bank on the western side of the southern entrance is both higher and wider than elsewhere around its circumference. What is likely to have originally been a flat berm between the inner ditch and steeply sloping bank now survives as a gentle slope running between the two earthworks (Fig D1.15). The henge interior is slightly dome-shaped and 83–92m across.

The outer ditch has been largely levelled by the plough except for where it survives as a wide depression running around the north-west of the monument (Fig D1.22). It is
curious that this part of the feature should escape the worst effects of ploughing, as
indeed does a corresponding section at the southern henge. Given its vicinity to the
adjoining quarry, there must be at least a chance that it was a product of this activity,
especially since its survival was not recorded in the 1952 survey, despite the outer ditch
being recorded elsewhere at the site (Thomas 1955, fig 2). The fence boundary truncates
this feature, but a slight gradient is clearly evident on its south-west side. There is no
evidence that it was associated with a bank. No sign of the outer ditch is now evident
elsewhere around its circuit.

**D1.2.4 Geophysical results**

The results of the ALSF magnetometer survey in 2003 (Fig D1.23), which successfully
identified well-preserved features of archaeological significance both inside and outside
the central henge, including a short length of the cursus, are described below with
detected features denoted in the text and on the anomaly plan by a single sequence of
numbers (shared by all the TimeScape surveys completed in 2003). It found what may be
important new features, especially around or on an axis with the monument’s entrances,
although, as with the southern henge, there can be no certainty about their origin or
function. This survey did not extend across the outer ditch, except in the vicinity of the
entrances, but this feature was detected by the earlier VMNLP survey, across the south-
west section of the monument, and its results are also fully described with individual
anomalies ascribed single numbers (Fig D1.24). Both these surveys produced a large
number of small, circular positive anomalies, less than 1m across. This is common in
fields which have been subjected to arable farming for many years, and generally
indicates the presence of ferrous agricultural debris.

The ALSF survey extended 130m outside the henges’ northern entrance along a strip of
pasture about 64m wide (Fig D1.23), bounded on either side by the fence line established
as part of the Stewardship Agreement. Some linear anomalies were detected which
crossed the northern part of the survey area transversely. These may relate to former field
boundaries not shown on available maps or to geological features. A slight linear positive
anomaly (18) was detected in the north-west corner of the survey area. Whether this continues, or is part of a linear anomaly (18B) which crosses the area east–west, is uncertain. A separate more intense positive linear anomaly (19) runs beyond the edge of the survey. This may indicate the location of a relatively substantial ditch some 2m wide. What appears to be a ditch of similar width extends across the survey area for a distance of some 60m and is aligned north-north-east to south-west-west (20). This is a probable field boundary shown on the 1796 Enclosure Map. To the north it appears ‘beaded’, most likely as a result of agricultural disturbance; and to its south there is a slight sub-circular anomaly approximately 8m in diameter possibly containing central pits. Just to the south is what may be a curvilinear feature. A broad, wedge-shaped anomaly (21) may be the total response of several disparate parts. In essence it contains two linear anomalies, which may comprise simple ditches or may in part contain some pits. Another complication is the slight negative linear response which runs concomitantly along the northern edge; such features generally indicate a geological element or a ridge of possible anthropogenic origin. An additional narrow positive anomaly (22) crosses the survey area, and again, this corresponds with a field boundary shown on the 1796 Enclosure Map.

One of the most significant features detected by this survey was a complex of at least six, or possibly seven, bands of positive anomalies (23). These bands are aligned transversely at an angle of 90° to a line drawn between the central and northern henges. Although these features appear as solid positive anomalies some 7m east–west and 1.5m in width, occurring in bands 1.5m apart, the reality may be more complex. It is likely that each individual band consist of fairly closely spaced postholes with a narrow central gap or causeway. The magnitude of the response would tend to indicate fairly substantial post-pipes, each with a diameter of about 1m. A further interesting complication is that two relatively strong bipolar responses were detected at the northern edge of the feature, with a third bipolar anomaly 4m towards the north. These may just indicate the fortuitous deposition of ferrous or substantial later ceramic agricultural debris, but their location is evocative and cannot be ignored. The possible seventh band is immediately south of these bipolar anomalies, although it may be connected to a positive linear anomaly approaching
from the east. A second linear feature of equal magnitude was seen to parallel this anomaly some 10m towards the south. There is good evidence for a circular feature (24) to the south of, and contiguous with, these bands. The circle, which is about 16m in diameter, appears to consist of pits or post-pipes 1m apart. The anomaly is better defined towards the west and south. A pair of linear positive anomalies (25) intersects it at its northern extremity, but there is no way of knowing whether these are geological or of archaeological origin. There are some internal anomalies within 24, which could conceivably be central pits aligned along the axis of the henges. It is possible that 23 and 24, whatever they may be, were connected to a linear positive anomaly (26) which extends towards the northern henge entrance. It has an uncertain relationship with 26B and 26C within the central henge. If associated with the former it may continue through the henge’s southern entrance with an overall length of 275m. The fact it appears more substantial within the henge may reflect preferential preservation if it is indeed an archaeological feature.

The outer ditch of the henge (27) appears to be relatively well preserved with both its squared-off terminals showing some evidence of internal circular positive anomalies. The edge of the western terminal appears more diffuse than its eastern terminal. It is 6–7m wide at its ends. Within the outer ditch some additional linear anomalies were detected. A relatively narrow feature (28) crossed the survey area some 15m north of the entrance through the bank, but appeared to be interrupted opposite it. The eastern arm of the anomaly either crosses or joins the main outer henge ditch, but its extent to the west is uncertain. There is a possibility that this was some form of screening palisade trench. A further feature associated with the henge’s northern entrance is what appears to be a curvilinear ditch (29) which arcs around the eastern terminal of 28 and crosses into the interior of the henge close to the north-east entrance embankment. A strongly responsive linear feature (30) crossed the entrance to the henge between the northern extant earthworks. The nature of the response with strong positive and bipolar elements suggests it may have been some form of boundary enclosing the external perimeter of the henge earthwork. It is of particular interest given the results from the partial excavation of the
northern entrance of the southern henge (4.6.3). A similar feature was not detected by geophysical prospection at the southern entrance of either the central or southern henges.

The interior of the henge is relatively uncomplicated. A distinctive negative curvilinear anomaly (31) probably indicates the lynchet of a former internal fence which was in situ when the central area of the henge was ploughed and arable crops sown. However, the presence of more than one sub-circular anomaly raises the possibility, however unlikely, of some stone demarcation line – perhaps kerbing – marking and supporting the base of the earthwork. The extended linear anomaly (26B) continues through the central part of the henge, apparently dissecting a strong positive anomaly (38), or probable pit, near the southern entrance. Both are evident on aerial photographs, albeit the former only on those taken by English Heritage from the late 1990s. This linear feature corresponds with a line of shorter grass, presumably caused by the grazing sheep that have been observed entering and leaving the henge along this very line. Its exit route through the northern henge entrance appears asymmetrical, favouring the western side of the gap between the internal ditches. At first sight it can be reasonably assumed that this feature continues to the north to join the intriguing complex of anomalies on the henge axis (23, 24 and 26), but the feature does appear to be offset slightly towards the west so that extrapolation further north may not join it with 26. Just north of the break between the inner ditches a slight linear anomaly was detected with slight lateral auxiliary anomalies set at right angles (26C). These appear to continue across the entrance. The similarity of 26C to 23 is suggestive. A number of slight rectilinear features were detected centrally (34) which may indicate the location of some building foundations, but it is unknown if these were part of the munitions store located within the monument during the Second World War (2.4). A number of diffuse relatively intense positive anomalies were detected to the east (35) and to the west (36) of the henge interior. These have no distinguishing morphological characteristics and could also be later disturbance.

The inner ditch of the henge had enlarged and generally squared-off terminals (32). The width at the terminals was about 14m, with the median width of the central sectors 12m. Parts of its centre and edges produced strong positive anomalies, especially around its
north-eastern sector (32B), where the flanking features could even be trenches for a palisade fence, and its central response elicited by the deeper V of the earthwork. There is also some evidence of additional activity around its circumference (33), some of which is likely to result from post-depositional disturbance to the monument. The strength of these responses, although superficially appearing quite intense, is relatively modest (about 4–5 \( \eta \) Teslas). Additional disturbance (32C) across the western ditch was detected, with some slightly negative elements (possible masonry) together with a linear positive anomaly, but again this was slight with no distinctive morphology. A pair of slight linear parallel negative anomalies (37) was detected near the inner edge of the eastern ditch, although they may only indicate deeper than normal ploughing striations or former deeply indented wheel tracks. A strong positive anomaly in the corner of the south-west ditch terminal could relate in some way to the 1952 excavation of the feature (Thomas 1955, fig 2). Thomas’s two narrow trenches were dug within 10m of this anomaly, but they fail to show on the survey.

The northern ditch of the cursus was detected (39). At first sight it appears cut by the inner ditches of the henge. However, its central section, which crosses between the northern edges of the henge’s inner ditches, then disappears short of the eastern terminal. The gap is also evident on aerial photographs, but it is impossible to say whether this was an original feature or the result of truncation. Interestingly, this central section of the northern cursus ditch is pit-like in appearance, as it is when it reappears to the east of the henge ditch. Its form is less clear in its western sector. In both instances the ditch appears to taper as it approaches the inner henge ditch, but that may be as a result of differential survival or erosion near to the henge ditches. Elements of a curving and interrupted anomaly (40) connect the northern cursus ditch (39) with the southern cursus ditch (41). It clearly continues under the distinctive south-western bank terminal of the henge. The southern cursus ditch appears to be well-preserved and, as with its northern counterpart, was possibly formed in part of post-pits rather than a continuous ditch. A number of linear anomalies (42) cross between the extant bank terminals. This particular response may suggest an external boundary lynchet of later date. As the southern cursus ditch (41) approaches the eastern external henge ditch (43), it too appears to fade slightly,
suggesting the cursus had indeed been eroded by the later construction. The outer henge ditch (43) gives a similar response to the inner ditch in that there are flanking positive linear anomalies. An internal positive anomaly was observed, but this appeared to run parallel with a negative anomaly of possible masonry or stones. Definite, but curvilinear anomalies (44), of unknown aetiology, were detected adjacent the southern henge entrance. This magnetically responsive feature seemed to be comprised of pits rather than a simple trench or ditch. It is uncertain if the slight linear positive anomalies heading west from 44 were the abridged remains of the western external ditch. A linear positive anomaly, at the extreme southern edge of the survey, was caused by the wire boundary fence along the public road.

The 1998 survey to the south-west of the earthwork detected a number of anomalies of archaeological significance (Fig D1.24). The major feature was the positive anomaly of the outer henge ditch, running approximately east–west across the survey area (1). Towards its eastern end the structural nature of the ditch appears to change, and could even be broken, although aerial photographs clearly show the feature as continuous and unchanging. Another positive anomaly (2), again probably a ditch, approaches at an angle of about 45°, but it is unclear if it crosses the henge feature. Its alignment matches that of the cursus, but the feature is some 17m to the north-west of where the southern ditch should be located, occurring instead at the approximate centre of the monument. It seems that the survey failed to detect the southern cursus ditch. Running parallel was a poorly defined positive anomaly (3), possibly a series of interconnected postholes, and similar features – which are not numbered given their ill-defined nature and apparent complexity – may be evident elsewhere, in some instances aligned into wavy lines, in others forming rectilinear, rhomboidal or kidney-shaped arrangements. Subsequent excavation did indeed discover a large number of features which bore some relationship to the geophysical results (4.5). There were also a number of negative anomalies (4 and 5), and whilst it is no more than speculation, the discovery of an undated cist burial by quarrying further to the west, within the flanking ditches of the cursus (Vatcher 1960, 181–2), means these cannot be completely discounted as Neolithic or Bronze Age burial structures. Two bi-polar anomalies (6 and 7) are most likely caused by modern ferrous
material. These results, when considered together, suggest the presence of a large number of previously undetected features which attest to the original complexity of the cursus and central henge.

**D1.2.5 Implications and potential**

Both the topographical and geophysical surveys of the central henge, and its surrounding landscape, provide invaluable evidence. The former establishes a detailed record of a monument which has changed since the survey of 1952 (Thomas 1955, fig 2). Continued ploughing appears to have levelled the short stretches of outer ditch, noted by the earlier survey to the south-east and south-west of the monument, and the recorded cultivation of its interior may account for the truncation of the inner ditch, recorded in 1952 as 7 feet (2.13m) deep, but now just half this depth. Despite the impact of recent cultivation, it is still a remarkably well-preserved site, especially around its southern entrance, where the size and form of the bank terminals provide a rare glimpse into the earthwork’s original monumentality. The cessation of ploughing across its interior significantly enhances the likelihood of long-term survival, but the recent erosion scars in the bank, caused by rabbit burrowing and aggravated by sheep scrapes, highlights the need to manage the site more effectively. The geophysical survey also hints at the monument’s complexity. Like the southern henge there is little evidence for features from its interior, but every chance that its northern entrance is associated with a range of contemporary structures, including palisades and a bank. These should be a priority for further fieldwork, as should the investigation of the linear anomaly which runs through the site. This is most likely a drain of modern origin, but a Neolithic date cannot be ruled out, especially given its link to the range of features found outside the monument’s northern entrance. The character of the northern cursus ditch, especially its ‘causeway’ in the southern henge entrance, and its relationship with other linear anomalies, is intriguing and worthy of additional investigations. The full potential of the Thornborough cursus is further highlighted when it is considered that here there is, quite uniquely in the British Isles, a section of the monument’s interior is preserved under the henge bank. That geophysical survey and subsequent excavation (4.5) detected a large number of previously unknown features
across a small section between the outer ditch and inner bank offers an exciting opportunity for further research. There is every reason to believe this part of the site was extremely ‘busy’, and irrespective of whether such features were originally associated with the cursus or henge, they would radically alter our impression of how the monuments appeared and the roles they may have played.

Other new discoveries include the arrangement of features to the north of the henge. These are not evident on any of the available aerial photographs, yet their location astride the henge axis, and unusual form, matching the northern terminal of the double pit alignment – even to the extent that both have seven separate bands – highlights their potential importance. Again, they are a feature unique to the Thornborough complex, with no parallels known to the authors. Their original appearance and role is difficult to ascertain, as is their relationship with the other linear features recorded within the narrow survey corridor, but it is not stretching the imagination to see these as short stretches of fence or palisade which played an important role in the ceremonies and activities undertaken just outside the monument. This complex of features, and the unusual shallow basin and slight ridges in the ground surface, make the investigation of this previously unexplored part of the Thornborough landscape an exciting prospect. It is also possible that the natural depression contains environmental evidence and archaeological remains, sealed by later colluvium, which are contemporary with the monument complex. If so, its investigation could be invaluable.

D1.3 Northern henge

by Ed Dennison

D1.3.1 Introduction

A topographic survey of the northern henge was completed in the autumn of 1994 by Ed Dennison Archaeological Services on behalf of English Heritage and the landowner as part of the development of a management plan for the monument and its covering woodland (Dennison 1998). It aimed to provide a detailed record of the monument,
including information about the extent, nature, character, condition, and quality of surviving archaeological features. It should be noted that the descriptive text below is taken from the 1998 survey report, and conditions on site may well have altered since then.

D1.3.2 Methodology

The surveyed area, defined as being the extent of the surviving earthwork, was approximately 220m across. The survey was carried out using EDM Nikon Total Station equipment. A total of 25 temporary survey stations were established over the survey area and the data were integrated into the Ordnance Survey national grid. The survey recorded the position of all earthworks, paths and tracks, erosion scars and hollows, stone and rubble scatters, and any other features considered to be of archaeological or historic interest. It also recorded the position of all rubbish, other debris, and all the larger trees and major vegetation zones. The data were processed using Civilcad software and the resulting information plotted at 1:500 scale. A section with a vertical scale of 1:250 was also created. The resulting interpretative hachure plan is reproduced here (Fig D1.25).

D1.3.3 Topographic results

The northern henge is sited on level ground at approximately 43m OD. It is bordered to the west by a fenced boundary and Green Lane, which runs northwards to the village of Nosterfield, and to the south, east, and north by fenced boundaries and open fields. The remains of the henge consist of an inner ditch and bank, enclosing an area 187.5m across, and traces of an outer ditch, partially encircling an area about 220m across (Fig D1.25). The majority of the monument is well preserved below dense and long-established woodland, although most of the outer ditch, and parts of its inner bank to the north-west, west, and south-west, have been destroyed or disturbed by agriculture, quarrying and road construction. Some dumping has also taken place, especially around the outer east side of the bank, and along the bottom of the inner ditch. Debris includes objects as large
as an old truck chassis and a rotting wooden cart. There is also evidence for disturbance by vehicles, tree felling and wind blow, moles, rabbits, and badgers.

The henge’s inner ditch is remarkably well preserved (Fig 3.11), although there are old tree holes in its sides and more recent erosion scars caused by wind-blown trees. The north-east segment of the ditch is some 20m wide and 2.6m deep, while the south-west segment is slightly less impressive at 18m wide and 2.2m deep, the result in all likelihood of increased slumping and vegetation deposition rather than a real difference in construction. Thomas (1955, 434) commented on the henge’s ‘noticeably irregular plan’, with the inner ditch being ‘oval rather than circular and the curve is formed by a series of slightly angular segments’. The detailed survey showed that the ditch is in fact a true ‘circle’, but one dug in a number of straight sections which were subsequently linked. As far as can be determined, the ditch terminals flanking the northern entrance are rounded while those either side of the southern entrance more squared-off. The bank’s outer scarp on the eastern side of the monument is largely undisturbed (Fig 3.12), except for a 55m length adjacent to the north-west entrance which appears to have been quarried away. Overall, it is typically 20.5m wide and 3.2m high and has a flat top of between 1m and 2m wide. Fallen trees and small areas of bare ground clearly show the bank is made of rounded pebbles. It was noticeable that the field to the north of the henge is lower than the surface on which the bank sits, and that ploughing had started to encroach on the bottom of the bank. The bank on the west side of the henge is considerably more disturbed, although some of the outer face remains up to 1m high. Here the earthwork resembles a number of small linear quarries, suggesting that material has been removed from the inner parts of the bank, possibly during the 19th century when the adjacent Green Lane was laid out. Two breaks in the inner side of the bank are also the product of disturbance.

The two henge entrances are formed by simple opposed gaps in the inner ditch and bank. At the better preserved south-east entrance, the ditch gap is 9m wide but the bank gap is wider at 15m. The corresponding gaps at the north-west entrance are 14m wide, although the bank has been disturbed by quarrying. In contrast to the description by Thomas (1955,
the entrances are aligned on a single axis and it would be possible, vegetation permitting, to look through the monument. They are aligned 40° west of grid north. No evidence was found of the ‘rough road’ which Thomas (ibid, 434) noted passing through the south-east entrance. The berm between the inner ditch and bank is virtually level and is on average 13m wide. The interior of the henge is also flat, apart from numerous tree holes and minor erosion hollows; it is 90.5m in diameter.

The outer ditch survived in part as an earthwork. It can be detected running about 12m beyond and parallel to the east section of the inner bank. In the north-east quadrant, as it runs through a ploughed field, it is between 0.6m and 0.8m deep and up to 25m wide. The outer ditch is possibly more accurately depicted in the south-east quadrant where it crosses an area of pasture (Fig 3.17). Here it is 21m wide and up to 1.2m deep, with a definite 15m wide gap corresponding to the adjacent entrance. There is also a further gap to the west but this appears to be the result of infilling and is perhaps related to the erection of telegraph poles. No sign of the outer ditch can be seen to the north, although buried archaeological deposits are likely to survive. The projected line of the ditch in the south-west quadrant would take it to the west of Green Lane, but this area has been quarried, and no trace now remains.

**D1.3.4 Implications and potential**

Despite being blanketed in trees, the topographic survey confirms that the northern henge survives in an excellent state of preservation. The survival of its inner ditch is remarkable and provides an insight into the feature’s original appearance. Its current depth is comparable to the results of the earlier survey by Nicholas Thomas, and his two test-pits, dug into the ditch bottom, were found to contain ‘an accumulation of almost 2 feet of clean yellow sand exactly resembling that in the ditch-bottom in the central circle’, making the original earthwork over 3m deep (Thomas 1955, 434). This means that potentially only one-fifth of the feature has actually been infilled since its construction, making it perhaps the best preserved of all known British henge ditches. Its remarkable level of survival is confirmed by the alignment of its inside edge, suggesting it had been
gang-dug from the inside as short sections subsequently joined together. The best-preserved section of bank is over 3m high, and while this does not exceed the height of the central henge’s south-west terminal, it is nonetheless equivalent to the average height of this monument’s western bank section, suggesting it may have been the norm for the Thornborough henges. Similarly important is the rare survival of the outer ditch at the northern henge, especially around its south-eastern sector. Its size, and the available aerial photography for all three henges, suggest that this feature may have always been smaller and less impressive than its inner ditch, although Thomas (1955, 433–4) concludes, from the amount of spoil needed to create the bank of the central henge being roughly twice that obtained from the inner ditch alone, ‘that the outer ditch must have resembled the inner one closely in size and shape, as does the outer ditch of the Big Rings at Dorchester-on-Thames’.

**D1.4 Three Hills Barrow Group**

*by Alan Biggins, Jan Harding, and Benjamin Johnson*

**D1.4.1 Introduction**

A topographic survey of the Three Hills Barrow Group and its immediate surroundings was completed in the summer of 2003 as part of the ALSF Project. The same area was also subject in July 2003 to an extensive geophysical survey by Alan Biggins of TimeScape Surveys (Fig 3.7). The aim was the creation of a detailed, accurate and up-to-date assessment of the surviving barrows prior to the evaluative excavation of the least well preserved of the monuments (see 4.8).

**D1.4.2 Methodology**

The topographic survey was carried out using a Geotronics Geodolite Total Station across an area of 3.2ha. The data were processed with Landscape Survey Systems software version 8.2 using a survey grid which was referenced to the OS National Grid. Readings were taken on ‘intelligent’ point locations, dictated by factors such as breaks in the slope
of features or depressions and rises in topography. The data are reproduced here as a contour plot and a barrow profile of the best-surviving earthwork (Fig D1.26).

Geophysical prospection used a Geoscan FM36 fluxgate gradiometer to carry out a magnetometer survey across 30m grids with 1m parallel traverses and 0.25m sample intervals. A total of 2.4ha was surveyed. A very limited earth resistance survey was also completed across a 60m by 60m area using a Geoscan RM4 to determine the efficacy of the methodology in relation to the magnetic survey. All the data were computed and analysed with the Geoplot 3 processing software, and plotted as grey scale clip plots, relief plots, and traced plots (Figs D1.27–1.28). A separate anomaly plan was produced, highlighting possibly significant archaeological features with numbers (Figs D1.27–1.28).

**D1.4.3 Topographic results**

The barrows at Three Hills are located on a low gravel ridge to the south-east of the northern henge. The ridge has been cut on three sides by palaeochannel activity, leaving a triangular-shaped mound 268m along its south-west to north-east axis and 132m wide at its south-west end. It tapers to the north-east. The ridge is a maximum of 1.5m higher than the surrounding plateau, rising from 42.5m OD to 44m OD, with gentle slopes all around, apart from along the south-west side where they are somewhat steeper. Two of the barrows, sited in a line on the ridge top, were located by both the topographic and geophysical surveys, with another two just by geophysical prospection (D.1.29). As Table D1.1 indicates, all the Three Hills barrows have been badly affected by ploughing.

In 1774 Thomas Pennant visited ‘four tumuli, small, round, and exactly in a line with each other’ (1804, 51 my emphasis). By contrast, subsequent writers refer to three barrows. Lukis records only three, despite being an accurate and prolific surveyor (see Atkinson 1976; Roughley et al 2002) who undertook many surveys across Britain, particularly in Wiltshire, Hampshire, and Oxfordshire, and as far afield as the Carnac Alignments in Brittany (Atkinson 1976). His plan of Thornborough is certainly accurate
(Lukis 1870b, 127), although its similarity to the 1860 OS map suggests the latter was the source of much of the data: five of the six recorded barrows, the three henge monuments, and the field boundaries, correlate extremely well with data collated in 2003, although curiously, he does not include the triple-ditched round barrow and that immediately to the south of the cursus, despite them being present on the 1860 OS map. What is clear, however, is that a barrow visible from aerial photography and the ALSF topographic and geophysical survey of 2003, at the southernmost end of the ridge, is not plotted by Lukis, whilst he also locates a barrow to the north of the northernmost site visible on aerial photographs and the 2003 surveys. Grinsell also only mentions three barrows (Thomas 1955, appendix II, 442), although his locations, based upon OS grid references, are poor and can be ignored (Fig D1.29).

Errors in previous surveys may account for the discrepancy in the location of the barrows. It seems a field boundary, placed sometime between 1799 and 1842, separated the southernmost known barrow from the rest (Fig D1.29). This boundary enclosed an area to the east clearly marked on the 1860 OS map as ‘Three Hill Field’, suggesting that there must have been three barrows in this field, with the barrow to the south-west of ‘Three Hill Field’ subsequently going unrecorded. It can be reasonably assumed that differing agricultural practices occurring on either side of this boundary had flattened the southernmost barrow prior to Lukis investigations, whilst leaving those in ‘Three Hill Field’ (Lukis 1870b, 119; 1860 OS map) damaged but extant. Lukis and Grinsell did indeed suggest that their southernmost barrow is the ‘largest of the three’ (Lukis 1870b, 120; Thomas 1955, appendix II, 442), and as the survey results clearly depicted in Table D1.1 illustrate, this is actually the central barrow. There is, therefore, a ‘new’ addition to the cemetery, and given this, it is necessary to rename these monuments; for ease of reference we employ a numerical sequence from 1 to 4, each with the prefix ‘Three Hills Barrow Group’, abbreviated to ‘THBG’ (Table D1.1). The new site is THBG4.

D1.4.4 Geophysical results
The survey was conducted in an arable field which had previously been harvested leaving the stubble. The north-west to south-east alignment of the sowing, following the route of the eastern field boundary (a raised track), can be clearly seen on the geophysical results as faint linear striations (Fig D1.27). The survey indicated the apparently poorly preserved remains of at least three major features, or what in all likelihood are the barrows. There was no trace of the Lukis excavations, although some internal features, possibly of archaeological origin, were found within them. Two suspected palaeochannels gave a prominent magnetic response (8), comprising linear bands of positive and negative anomalies. These palaeochannels appear to join towards the southern edge of the survey area. The eastern channel is cut by a circular magnetically disturbed area, some 25m in diameter (9). At the time of survey a haystack (shown as ‘D’ on Fig D1.27) was located towards the north-east of this conglomerate of features.

What is presumably the most northerly surviving of the Three Hills barrows, THBG2, shows some degree of preservation of its southern ditch and internal features (1). From the available evidence a diameter of about 22m is assumed for the barrow ditch. The internal features include a number of positive anomalies, possibly pits, together with some slight evidence for a small (about 3m) negative rectilinear anomaly, the remains perhaps of a stone structure. There is also some evidence for the presence of a sub-circular pit alignment within the ring-ditch. Additional positive anomalies or pits were detected elsewhere, particularly in the barrow’s north-west sector, possibly co-located with a bipolar anomaly. A linear anomaly at its northern edge may indicate the presence of a ditch (2), but how this relates to the barrow is uncertain. It may be connected to a broader and more diffuse linear positive anomaly (3) which extends beyond the northern extent of the survey. Directly west of the suspected location of the barrow were two rectilinear anomalies (4). They appear to be of post-pit construction with small internal features. A number of slight linear positive anomalies are in proximity to these features. About 30m directly to the south of the northern barrow was a group of anomalies (5), consisting of what may be a small sub-circle of post-pits, some 10m across, and possibly other dug features, particularly towards the south-east, forming no recognisable pattern.
The central barrow, THBG3, is perhaps the best preserved of the three sites. An almost complete ring-ditch (6) was detected, with a diameter of 22m. A square anomaly, some 6m in size, was attached to its north-east edge, and ‘pits’, corresponding to the edge of the ring-ditch, may have delineated its southern side. A number of positive and bipolar anomalies were detected within its central area, but the extent to which they indicate the location of archaeologically significant features is uncertain, with the latter more likely to indicate the location of agricultural ferrous debris. Other circular positive anomalies, or possible pits, were detected outside of the ring-ditch. A number of linear positive anomalies (7) were located to the west of the barrow. Although these are aligned along the axis of ploughing they appear to be locally prominent. They may indicate nothing more than compressed soil, which could be caused by agricultural vehicles, rather than, for example, field ditches.

North-east of and close to the predicted location of the third barrow (THBG4) a possible pair of curvilinear positive anomalies was detected (10). They gave a response which would indicate small (1m or less) postholes forming slightly curvilinear alignments with an overall length of about 30m. Some 10m to the south-west was a small indistinct circular positive anomaly (11). This possible feature was approximately 12m in diameter with two central positive anomalies. A similar, but smaller, anomaly was detected some 30m towards the west (12). Neither of these possible features is thought to be the most southerly of the barrows as indicated on aerial photographs. Rather, the barrow was more likely represented by a nearby group of mainly positive and bipolar anomalies (13). There was no clear evidence for a ring-ditch although some intermittent vestiges may remain. One very prominent feature here was a rectangular positive anomaly some 6m in length, possibly flanked by pits. Internally, the relatively strongly positive response may indicate the location of a cist or some similar stone structure. A line of predominantly bipolar anomalies (14) was seen to extend from 13 towards the south-east. The significance of these responses is uncertain.

The earth resistance survey was conducted to ascertain the efficacy of the methodology on what is essentially a well-drained soil horizon. The grey scale and anomaly plan (Fig
D1.28) indicate that in the main the methodology appears to recognise geological features (15), probably relating to palaeochannels, better than the smaller more discrete features detected by magnetic survey. The faint ploughing striations were detected across the survey area, although a linear low resistance anomaly (possible ditch) was thought to have been detected crossing the area just to the north of the central barrow (16). The significance of this feature is uncertain. Very faint and diffuse low resistance anomalies suggest the ring-ditch and some central pits of THBG3 (17). Consequently, it was decided that magnetic survey would probably provide optimal results at other sites within the general area. This may not always be a valid assumption, however, as relative responses can vary quite markedly within a relatively small geographical area.

D1.4.5 Implications and potential

The topographic and geophysical data clearly demonstrate that the barrows are in an advanced state of destruction. As Table D1.1 indicates, much of the recorded damage has been caused by agricultural practices over the last 50 years. THBG1 and THBG2 are now completely levelled, despite still existing as earthworks in 1952, while THBG3, described in 1864 as the largest of the sites and ‘a prominent object on the right hand of the lane leading from West Tanfield to meet the Kirklington and Masham road’ (Lukis 1870b, 120), is now half of its earlier height of ‘about three foot’. Despite this, it remains more extant than the others, with THBG4, the ‘new’ site, surviving to a height of just 0.15 m. It is desirable that Three Hills is immediately taken out of cultivation.

D1.5 Triple-ditched round barrow

by Alan Biggins, Jan Harding, and Benjamin Johnson

D1.5.1 Introduction

A topographical survey of the triple-ditched round barrow and its immediate surroundings was completed in the spring and summer of 2003 as part of the ALSF Project. The area was also subject in July 2003 to an extensive geophysical survey by
Alan Biggins of TimeScape Surveys (Fig 3.7). The aim was the creation of a detailed, accurate, and up-to-date assessment of the surviving barrow prior to the evaluative excavation of the monument (see 4.2).

D1.5.2 Methodology

The topographic survey was carried out using a Geotronics Geodolite Total Station and the data processed with Landscape Survey Systems software version 8.2. Because the monument appeared more ephemeral than the plough ridges, readings were taken every metre across a profile 94m long along the line of the adjacent track which runs across the edge of the barrow. The data are reproduced here as a barrow profile (Fig D1.30).

Geophysical prospection used a Geoscan FM36 fluxgate gradiometer for a magnetometer survey across 30m grids with 1m parallel traverses and 0.25m sample intervals. A total of 0.9ha was surveyed. The data, computed and analysed with the Geoplot 3 processing software, were plotted as grey scale clip plots, relief plots, and traced plots (Fig D1.31). A separate anomaly plan was produced which highlighted possibly significant archaeological features with a number sequence shared by all the ALSF geophysical surveys completed in 2003 (Fig D1.31).

D1.5.3 Topographic results

The monument was situated on a very slight gravel ledge that rises no more than 0.5m above the surrounding terrace from 42m OD to 42.5m OD. It has been very badly damaged by ploughing and no longer survives as an earthwork. It was noticeable that large amounts of cobble were spread across the field, especially in the monument’s vicinity.

D1.5.4 Geophysical results
The field had been ploughed and disc harrowed prior to survey along a north-west to south-east alignment parallel to the longer field axis. Its southern headland was ploughed parallel to the southern boundary of a track and contained a number of deeper furrows. Linear depositions of stone were observed at intervals which had apparently been mechanically created when a potato crop was harvested. These generated very strong responses which hindered the determination of features in the survey area. Despite this, the results produced excellent evidence for the monument’s encircling ditches and possible inner features (Fig D1.31).

A number of linear, curvilinear, and circular positive anomalies were found in the north-west quadrant and north-east corner of the survey area (84 and 85 respectively). The evidence is not strong enough, given the disturbed background and the relatively weak response, to determine their morphology, but an archaeological origin cannot be discounted. Equally indefinite linear and curvilinear anomalies (86) were detected 20m south of 85. Whether these are related in any way to those detected north of the triple-ditched round barrow (87) was not established. A curvilinear anomaly (88), some 45m in length, may join or cut a linear of 87. A more robust set of anomalies (89) was detected west of the monument. These ran along the edge of the field, where the direction of ploughing changed to an east–west direction. They may indicate deep wheel ruts. The lone relatively large circular positive anomaly towards the west should, however, be noted.

A double ring-ditch, with an overall diameter of 25.7m, was detected along with internal features (90). Its degree of preservation appears variable, being better conserved in the north and east. The perceived response indicates a ‘beaded’ effect, which might suggest an irregular outer ditch. One or possibly two pits may have been detected offset internally from the main circumference of the ditch. The southern edge of the outer ditch is covered by the raised track (94), probably providing a degree of protection for the feature. The inner ditch is similar in form to the outer, but with a possible interruption in the south-east. There is good evidence for either its segmentary appearance or for its recutting. Within the central area of the site a third circular ‘ditch’ was detected. To the north of this
feature there appear to be two pairs of double pits, set upon different alignments. Directly south of these anomalies, and towards the central area of the barrow, were located a line of three pits, set some 1.5m apart. A rectilinear structure was detected at the site’s centre, some 5m by 2.8m in size, with its longer axis aligned east–west. One possibility is that this may be the major or primary funerary feature within the monument. The structure appears to consist of six major postholes or pits, one at each corner with two placed equidistant between them on the longer axis. It would seem that these may have been within a rectangular trench. A single pit was located centrally, slightly offset towards the east. Another single circular positive anomaly, some 1.5m in diameter, was located 2m to the west of the rectangular complex. The results suggest a monument of great complexity and probably of several phases. It may even include secondary or satellite inhumations or deposits.

Towards the eastern edge of the outer ditch a possible gap was detected (91). This led to an area between the inner and outer ditches with the strongly negative elements (maximum of –14 μTeslas) of a sub-rectangular feature some 2.4m long and 2m wide. At its northern end were a contiguous circular negative anomaly, a further rectangular negative anomaly and circular positive anomaly, and three small circular negative anomalies some 1.5m outside the feature. Across the other side of the monument a similar arrangement of anomalies was detected (92). The origin of these responses is difficult to assess. Their nature may indicate the location of stone structures. A double line of linear anomalies was located 25m east of the site (93). The feature appeared to fade towards the west and its eastern extent was inhibited by the raised hardcore farm track (94). This latter gave a strongly bipolar response, which indicates not only the route of the track but also a possible pipe.

**D1.5.5 Implications and potential**

The intensity of destruction was suggested in 1997 when fieldwalking discovered Grimston Ware pottery sherds (D4.1.2) in the soil mark of the monument’s inner ditch. The topographic survey confirms that the barrow is now completely denuded despite it
surviving in 1952 to a diameter of 100 feet (30.5m) and to an impressive height of 4 feet (1.2m) (Thomas 1955, appendix II). The geophysical results indicate the survival of substantial buried archaeology, including two concentric ditches, one of which may have been recut, many internal features, and linear features external to the barrow. Fortunately, this monument has now been taken out of cultivation. The complexity of the site – confirmed by its subsequent excavation (4.2) – suggests it could potentially be the most archaeologically important of the Thornborough barrows.

D1.6 Oval enclosure

by Jan Harding and Kristian Strutt

D1.6.1 Introduction

A geophysical survey was completed at the oval enclosure (Fig 3.6C) in August 1995 as part of the VMNLP. The aim was the creation of a detailed, accurate, and up-to-date assessment of the monument prior to its evaluative excavation (4.4). The ploughed field in which it was located had been used periodically for pasture over the last four decades, including the years immediately prior to the survey (Doreen Benson, pers comm).

D1.6.2 Methodology

Both an earth resistance survey and magnetometer survey were completed. The survey grid was positioned using the single aerial photograph of the monument (CUCAP BTY30). A Geoscan RM4 was employed for the earth resistance survey of an area 40m by 40m. Magnetometry, using a Geoscan FM36 fluxgate gradiometer, was undertaken across the two northern squares. With both, readings were taken on 20m grid squares with 1m parallel traverses and 1m sample interval. The data, computed and analysed with the Geoplot 3 processing software, were plotted as grey scale clip plots, relief plots, and traced plots, with any anomalies of possible archaeological significance highlighted with a letter (Fig D1.32). Unfortunately, the grid was badly positioned and missed the south-
east portion of the enclosure, whilst the magnetometer survey was mistakenly completed across just the two northern squares, away from the enclosure (Fig 3.6C).

D1.6.3 Geophysical results

Earth resistance and magnetometry produced a broad variation in readings across the survey grid (Fig D1.32). Earth resistance survey detected a largely intense oval-shaped area of low resistance approximately 20m north–south by 20m east–west (A). The field was especially stony and gravelly here. A secondary area of low resistance was also noted to the east (B), with slightly higher readings to the north (C). The area of higher resistance north-west to south-east through the southern half of the grid corresponds with a water pipe running from the road to a cattle trough. This pattern was generally matched by the magnetometer survey. Results of the magnetometer survey indicated high positive readings in the east of the survey area (A), changing to high negative values further west (B), separated by a linear band of negative readings created by the water pipe. Differing resistivity and magnetic values indicate gradual changes across the survey grid. The roughly oval area of low resistance to the south-west of the survey area broadly corresponds with the northern half of the oval enclosure, but given its poorly defined and diffuse nature it is more likely to represent differences in the drainage of the fluvio-glacial deposits at the site.

D1.6.4 Implications and potential

These results proved inconclusive despite the clarity of the cropmark. The monument’s principal elements were confirmed by subsequent excavation (4.4).

D1.7 Possible cursus

by Jan Harding and Kristian Strutt

D1.7.1 Introduction
A geophysical survey was completed at the site of a possible cursus (Fig 3.6B) in August 1995 as part of the VMNLP. Its aim was to ascertain if the faint cropmark of a flanking ditch – possibly part of a cursus – corresponded to buried archaeology.

D1.7.2 Methodology

A RM4 was used to carry out the earth resistance survey of an area 40m by 80m. The survey grid was positioned using aerial photographs of the cropmark (Ordnance Survey 73 199; CUCAP BTY42–3; DNR541) of the site. Readings were taken across 20m grid squares with 1m parallel traverses and a 0.5m sample interval. The data, computed and analysed with the Geoplot 3 processing software, were plotted as grey scale clip plots, relief plots, and traced plots, with anomalies of possible archaeological significance highlighted with a letter (Fig D1.33).

D1.7.3 Geophysical results

Results of earth resistance survey to the east of the northern henge produced a series of anomalies (Fig D1.33). The strongest readings were of a linear feature running diagonally across the survey grid (A), with a width of between 2 and 5m, probably marking the line of a modern land drain to the east of the northern henge. Weaker readings to the east and west of this feature may indicate an earlier curvilinear anomaly. This feature runs in a curve from the western half of the grid across to the centre of the survey area (B), forming a band some 4–5m wide. A series of higher resistance readings obscures any definite edge to the curvilinear anomaly to the east of A (C), these then continuing to curve in a band 10m wide. This is most likely of geological origin. A large sub-circular anomaly comprising high resistivity readings was observed on the eastern edge of the survey grid (D), some 12m in diameter. This could be a large ring-ditch, but aerial photography has produced no evidence for its existence.

D1.7.4 Implications and potential
The survey results produced no evidence for the flanking ditch of a possible cursus monument. It also failed to detect the outer ditch of the northern henge. Additional geophysical prospection and evaluative excavation would be necessary to ascertain whether a cursus did indeed exist at this location. Its definite discovery would be of considerable importance for understanding and managing the complex.