D2 Investigating flint scatters: geophysical prospection, total collection, and test-pitting
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D2.1 Methodology

Widespaced fieldwalking at Thornborough by the VMNLP enabled the landscape to be divided into arbitrary zones of comparative lithic density. Each field was classified as producing either a ‘low’ density scatter (0–5 flint per ha), a ‘medium’ density scatter (5–25 flints per ha), or a ‘high’ density scatter (more than 25 flints per ha). A representative of each was then chosen for follow-up fieldwork: fields 11, 12, and 18 were initially selected for geophysical prospection, total collection fieldwalking, and test-pitting. It was subsequently decided to explore a second ‘medium’ density scatter, using total collection and test-pitting alone, given this category’s wide range of densities. It was planned for lower on the terrace, nearer the river in field 2B, but access proved impossible. Consequently, it was undertaken across Field 16 instead. Total collection was also completed across the Three Hills Barrow Group, given that geophysical prospection and excavation would be completed here anyway as part of the study of its four round barrows. The scheduled monuments prohibited test-pitting. Investigations in each field focused where the scatters were their densest (Fig D2.1).

The largest lithic concentration from the study area was to the east of Chapel Hill, and here it was densest in field 11, the number of lithics per hectare well above both the mean and median for the study area (Table 5.1). Widespaced fieldwalking suggests its occupation from the Mesolithic to the Bronze Age, but it clearly became a major focal point for activity from the later Neolithic. Field 11 consists of a low ridge of till that rises 1.5m above the surrounding area, and it was the southern limit of this ridge, where the surface lithics were at their densest, that investigations focused. Fields 12 and 16, near to Chapel Hill and close to the northern edge of the lower river terrace respectively, were chosen for different reasons. Both are characterised by a lithic density well below field 11 but still higher than everywhere except for fields 2B, 22, and 21 (Table 5.1), all three of which were unavailable for further study. Field 12 lies on the southern fringes of the Chapel Hill concentration, but previous fieldwalking had revealed diagnostic lithics often with later Mesolithic or early Neolithic affinities.
It was hoped that further fieldwork across the topographically flat south-west quadrant of the previously walked area would either allow characterisation of the extent of the activity on Chapel Hill, or provide evidence for different, earlier activity. The western half of field 16, opposite the triple-ditched round barrow, would provide a contrast with the till. Here the field slopes very gently from north to south across an old palaeochannel which probably predates the construction of the barrow. The presence of a sizeable Mesolithic and earlier Neolithic lithic collection from the site of the later monument suggests the importance of the location to those who occupied the Thornborough landscape. By contrast, field 18, immediately to the east of the central henge on the plateau, was selected as a field whose lithic density per hectare is below the mean (Table 5.1), and crucially, as a place where worked flint and chert does not seem to have been deposited during the later Neolithic and Bronze Age. Its ground surface slopes very slightly downward from north to south at its southern end, but is flat to the north. Only four worked lithics had been discovered by widely spaced walking, and further investigation would establish whether this reflected a genuine lack of archaeological activity in the immediate vicinity of the monument complex.

Magnetometry was undertaken across a 90m by 90m grid in fields 11, 12, and 18 in July 2003. The prospection was completed by Alan Biggins of TimeScape Surveys Ltd using a Geoscan FM36 fluxgate gradiometer across 30m grids with 1m parallel traverses and 0.25m sample intervals. The resulting grey scale plots (Figs D2.2, D2.5, and D2.9) denote anomalies with a single sequence of numbers shared with other TimeScape surveys completed in 2003. This was followed by total surface collection across the same areas, although in both fields 11 and 12 it was subsequently decided to extend this to an area 90m by 180m. In field 16, where no geophysical prospection had been completed, total collection was similarly completed across a 90m by 90m grid, whilst at the Three Hills Barrow Group total collection was completed across the entire area subject to geophysical prospection, totalling 2.4ha. Each walker was assigned a 2m transect, providing 100% surface coverage, and the three-dimensional location of each find was recorded by a Geotronics Geodimeter Total Station, data processed using Landscape Survey Systems version 8.2 and Autodesk Land Development Desktop. These data were referenced using a common survey network to the OS National Grid. Nine 2m by 1m test-pits were then dug 10m apart in fields 11, 12, 16, and 18 across a 30m by 30m grid whose exact location was determined by
the results of both geophysical prospection and total lithic collection. In a number of instances these test-pits were enlarged and further pits dug, including two that were 5m by 5m in field 11. They were excavated by trowel, shovel, and mattock, with the exception of the two larger test-pits where a mechanical-digger was employed. The excavated content of every test-pit was sieved through a 5mm mesh. All finds were recorded by context. The total collection and test-pitting was undertaken in August 2003.

Total collection and test-pitting resulted in the discovery of 350 pieces of worked flint and chert whose distribution in each field is depicted in Figs D2.3, D2.6, D2.8, and D2.10. This is significantly fewer than was expected given the numbers found during widespaced fieldwalking (Table D2.1) and the reasons for this, along with their high breakage rates, are explored in 5.3.2. The material itself is described below and in D3, with selected pieces illustrated in Figs D2.4 and D2.13.

**D2.2 Field 11**

**D2.2.1 Geophysical prospection**

A number of largely regular linear features were detected by magnetometer survey (Fig D2.2). Most are attributable to agricultural activity and signs of underground drainage could be seen throughout the field. A few circular bipolar anomalies (Fig D2.2, 49) were detected in the south-west corner of the survey area, and generally, features like this are attributable to ferrous agricultural materials. About 20m to the north of these anomalies a diffuse darker area indicates a waterlogged patch of ground. A number of curvilinear and linear positive anomalies (Fig D2.2, 50) are thought to indicate vehicle tracks, but a diffuse magnetically disturbed area (Fig D2.2, 51) is difficult to explain. It is sited on higher ground and appears to obscure the parallel linear features assumed to have a drainage function. It is therefore quite recent, but its origins are obscure.

**D2.2.2 Total collection**
A total of 97 worked lithics was found from an area of 1.6ha (Fig D2.3). There were 52 flakes and 11 blades, 9 scrapers, 5 of which – including a complete scale-flaked Beaker ‘thumbnail’ form on dark yellowish-brown till/gravel flint and a complete nosed scraper of dark reddish-brown till flint – are later Neolithic or early Bronze Age, and 4 cores, at least 2 of which, both on till flint, are of middle or later Neolithic Levallois form (eg Fig 2.4, 1). Also recovered were: a distal fragment of a probably early Mesolithic microlith of dark reddish-brown till flint; three serrated pieces on blade-like blanks of Mesolithic or Neolithic date, two of which, including a distal fragment of reddish-brown till/gravel flint, retain a high gloss along the serrated edge from cutting silica-rich material (eg Fig D2.4, 4); a brown till fragment of a Neolithic flint axe or a discoidal knife with a bifacially ground edge (Fig D2.4, 7); a bifacially flaked fragment of a brown till chisel or oblique arrowhead of middle to later Neolithic date (Fig D2.4, 3); a complete dusky red till flint denticulate of later Neolithic or early Bronze Age date (Fig D2.4, 8); and a complete scale-flaked early Bronze Age knife of dark yellowish-brown till/gravel flint (Fig D2.4, 5). The remaining 13 worked lithics were largely irregular waste, but there were 3 miscellaneous retouched pieces, and a core rejuvenation flake.

The lithics from total collection were spread in three broad bands, running approximately north-west to south-east (Fig D2.3). Their distribution very closely mirrors the results from widened spaced walking, and given that these bands are on approximately the same axis as the field’s eastern boundary, they are perhaps the result of tillage spreading what were originally at least three spatially defined clusters. It has been calculated that the horizontal movement of objects ranges from an initial displacement of around 1.5m to between 2.16m and 6.77m after 96 ploughing events, depending on slope gradient; and that horizontal displacement is cumulative and directional through time, with the distance an object moves increasing as the number of tillage events increases (Boismier 1997, 35, 163, 178–83). These actions significantly increase the area of an original scatter, although smaller pieces like trimming flakes, chips, and spalls tend to remain in situ (Edmonds et al 1999, 50). Given these factors, it seems probable that two of the lithic clusters were located near the top of the knoll, on its western side above the 43m OD contour. The spatial derivation of the most northerly and least dense of these three bands is more problematic, but its concentration between the 42m and 43m OD contours suggests a
marginal less elevated location than the other two scatters, overlooking a small basin, now filled by a pond, in the north-west corner of the field.

D2.2.3 Test-pitting

Fourteen test-pits were opened of which twelve were 2m by 1m and two 5m by 5m (Fig D2.3). Nine of the test-pits were excavated on the summit of the low ridge, with three at the base of the ridge (TP10–12), and two 5m by 5m (TP13 and 14), one on the slope to the south of the ridge and one on the slope to the east. On the summit the test-pits revealed a stratigraphy of topsoil, with a depth of 0.26–0.33m, but on average 0.28m deep, and underlying drift geology of till. The topsoil was a firm dark brown (7.5YR3/3) sandy clay, whilst the till a firm, dark brown (7.5YR 3/3) silty clay. TP10, 11 and 12 had on average 0.32m of topsoil, similar in composition to that elsewhere, but a natural of compact very dark brown (10YR 3/4) silty sand. It is possible this is the area of a relict stream bed. No features were discovered in the test-pits. It seems likely that lithics were simply discarded on the surface given the areas heavy mantle of till, but despite this, the original presence of dug features cannot be completely discounted.

Only 45 lithics were recovered (Fig D2.3), consisting of 25 flakes or flake fragments, 2 scraper fragments, including 1 from a very large flake, 3 blade fragments, 1 core fragment, 1 core rejuvenation flake fragment, a bifacially flaked piriform leaf-shaped arrowhead, missing only its tip, of yellowish-red till/gravel flint, and 12 pieces of irregular waste. Test-pit numbers were unrecorded for five lithics, which cannot therefore be shown on Fig D2.3. The distribution of this small collection largely reiterates the distribution of surface material, although the discovery of 7 pieces from TP 1, the largest number found in any of the test-pits, could suggest that the most southerly of the three bands represents the dispersal of two scatters rather than one. Other test-pits on the ridge-top produced between 1 and 7 worked pieces. Quantities lessened downslope, with only 6 lithics in the two 5m² test-pits, all but one from TP 14, and only two pieces in TP10, 11, and 12, downslope in the south-east corner of the field. The distribution of both surface and sub-surface material suggests that the upper slope on the eastern side of the rise was deliberately avoided.
Discussion

The material from both the test-pits and total collection reinforces many of the conclusions drawn from the widespaced collection. In contrast to the other fields selected for further investigation there is little evidence for a Mesolithic or earlier Neolithic component and even three serrated pieces on blade-like blanks are of a form which consistently occurs in association with Peterborough Ware and Grooved Ware (Manby 1975; 1974). The overwhelming majority of the collection can be seen as a homogeneous later Neolithic industry, but it appears the area was never used for long-term settlement, there being a very small number of finished tools, and fewer cores than might be expected. Rather, it seems to have been used for more specialised activity. A distinctive technology is certainly represented by the 2 Levallois cores, one unstruck and the other worked to exhaustion, 2 Levallois flakes (eg Fig D2.4, 2), and faceting on other flake butts. This was the technique used in the middle and later Neolithic to produce blanks for transverse arrowheads and possibly even discoidal knives (Durden 1994, 158, 304; Healy 1984, 12; Makey 1996, 61–2), one fragmentary example of which is present in the scatter, and signally represented at the till flint sources on Flamborough Head (Durden 1995), as well as being more widely employed (Manby 1974, 83). The importation of a different, perhaps carefully selected, raw material seems to have been bound up with this new technology, with over half the pieces being of reddish-brown and red flint – in contrast to less than an eighth of the pieces from the other scatters – with chert virtually absent (Table D3.10). The bifacially flaked fragment with a ground cutting edge could come from a discoidal knife – a form also made on Flamborough Head – or from an edge-ground axehead. At least some of this material was worked on the site, on the evidence of two probable retouch chips and one probable core platform chip, the latter a by-product of Levallois flaking. But higher frequencies of non-cortical flakes (Tables D3.23–3.24) indicate that much more of the material was brought here in a decorticated state. With the exception of a ‘thumbnail’ scraper, most tools were made on some of the largest available flakes, and one red flint scraper fragment would have been made on a flake far larger than any in the collection, suggesting it was imported as a finished implement.

D2.3 Field 12
D2.3.1 Geophysical prospection

Geophysical prospection located little in the way of magnetic anomalies. The grey scale and anomaly plots indicate modern ploughing striations. Medieval ridge and furrow, which takes a concerted effort to erase, was not suggested within the survey area. There were a number of randomly scattered circular positive anomalies (Fig D2.5, 80), most likely responses to iron-rich stone, and a triangular positive response (Fig D2.5, 81), or what is possibly the result of waterlogging. A curvilinear positive anomaly (Fig D2.5, 82) may indicate a small palaeochannel or natural drainage route, and a small double positive linear anomaly (Fig D2.5, 83) could be the result of natural or agricultural activities.

D2.3.2 Total collection

Only 6 pieces were recovered, all from the northern and eastern edges of the 1.6ha walked (Fig D2.6). There were 3 flakes, 1 core, and 2 scrapers, one of Neolithic or Bronze Age date. As with field 11, lithic numbers compare very poorly with the results of widened spaced walking, when a total of 47 worked pieces were recovered.

D2.3.3 Test-pitting

Ten test pits were opened, nine of which were 2m by 1m, the remaining one (TP10) 2m by 2m (Fig D2.6). Three were subsequently enlarged in order to expose more of what were considered at the time to be possible features – TP9 to 3m by 1m, TP2 to 3m by 2m, and TP6 to 2m by 2m. Each test-pit contained a topsoil of firm yellow-brown (10YR 5/6) clayey sand, some 0.3m deep, sitting on an underlying drift geology of till, a very firm light yellowish-brown (10YR 6/4) clayey sand. As in field 11, there was no subsoil. The content of the test-pits was significantly less clayey than that encountered in the field 11 test-pits. TP6 revealed an archaeological feature, a linear ditch running north-west to south-east along its 2m length (Fig D2.7). It was 1–1.8m wide, 0.3–0.4 deep, and filled with a homogeneous deposit of firm dark yellowish-brown (10YR 4/4) clayish-sand with occasional pebbles. No finds were recovered from the feature. Perpendicular to the field boundary to the north, it is most
likely to be the remnant of a destroyed field boundary, although it does not appear on any tithe maps.

Ten lithics were found, across an area where total collection had failed to produce a single find (Fig D2.6). Four of the test-pits were empty. The largest number of finds, of only 3 worked pieces, was from TP7; the others produced 1 or 2 lithics. This small collection consisted of 7 flakes, 2 irregular waste pieces, and a fragment of retouched material. None was diagnostic.

D2.3.4 Discussion

The results of widespaced walking had suggested the use of the field’s north-west corner from the Mesolithic through to the earlier Bronze Age: it had produced a fine double-sided and long end scraper of later Mesolithic or earlier Neolithic date, a nosed scraper which may be of later Mesolithic or later Neolithic date, and a Beaker barbed-and-tanged arrowhead. The absence of diagnostic finds from the follow-up investigations means little was added to what was already known about field 12. However, the relatively high incidence of feather terminations (Table D3.17), along with the careful preparation of striking platforms as shown by punctiform and linear butts (Table D3.14), may suggest the relatively high incidence of material from the Mesolithic and earlier Neolithic.

D2.4 Field 16

D2.4.1 Total collection

Twenty-two lithics were recovered from an area of 0.8ha (Fig D2.8). Most are in the northern half of the area walked nearer the triple-ditched round barrow, and their distribution corresponds very closely with the results of widespaced walking. There are 14 flakes, 5 blades, 2 scrapers, one a probable greyish-brown till flint ‘thumbnail’ of Mesolithic or early Bronze Age date, and a single piece of irregular waste.

D2.4.2 Test-pitting
No geophysical prospection was undertaken in field 16, but an aerial photograph clearly shows a broad palaeochannel running north-west to south-east through the survey area. Nine 2m by 1m test-pits were opened (Fig D2.8), each with a topsoil of loose brown (7.5YR 4/2) silty sand on average 0.3m deep, and an underlying drift geology of loose yellow-brown (10YR 5/6) sandy gravel. In TP4, 7, 8, and 9 a loose brown (7.5YR4/6) silty sand deposit between 0.11 and 0.23m thick, with a large number of cobbles, sat on the natural. It was devoid of archaeological finds. This subsoil is interpreted as the ploughed-out remains of the palaeochannel, curving round to the south-east. Its presence in some but not other test-pits suggest the feature was unlikely ever to have been much over 10m wide.

The test-pits produced 17 worked lithics, the largest number from TP4, with 6, the others producing 1–3 pieces (Fig D2.8). The collection consists of 5 flakes, 6 blades, 3 cores (of which 2 are complete opposed platform pieces of Mesolithic date, one of dark grey till flint whose final removals were of minute bladelets, the other brown till/gravlel flint), the distal fragment of a possible serrated blade of Mesolithic or Neolithic date, a core rejuvenation flake, and a piece of irregular waste.

D2.4.3 Discussion

The lithics collected through widespaced walking, total collection, and test-pitting contain a relatively high proportion of Mesolithic and earlier Neolithic material. The excavation of the triple-ditched round barrow suggests intensive, but probably sporadic and short-term, Mesolithic and earlier Neolithic occupation in this area, resulting in the deposition of a relatively high proportion of corticated material. The three cores discovered during test-pitting, along with the fact that nearly half of the lithics were secondary flakes (Tables D3.17 and D3.23), suggests that the area saw the exploitation of the ready supply of flint eroded by the nearby watercourse, now just a palaeochannel. This would certainly explain the relatively high percentage of till/gravlel flint discovered by total collection and test-pitting (Table D3.10).

D2.5 Field 18

D2.5.1 Geophysical prospection
Magnetometry indicated a number of linear features which are mostly, if not completely, the result of agricultural activity, and the direction of ploughing is clearly determined by slight but pervasive striations, although towards the southern field boundary the direction of cutting changes (Fig D2.9). The relatively prominent linear positive anomaly (Fig D2.9, 45) may merely indicate a wheel rut and subsequent soil compression; a number of such features were detected over the survey area. There was a slight sub-rectilinear positive anomaly (Fig D2.9, 46) and some prominent linear anomalies aligned approximately east–west (Fig D2.9, 47), the latter possibly remnant medieval ridge and furrow. Differential preservation usually indicates more than one phase of activity. A broad diffuse positive anomaly (Fig D2.9, 48) runs north-west to south-east in the same direction as ploughing. Its function and origin are uncertain, but it is likely to be the result of agricultural or natural factors.

D2.5.2 Total collection

Seven worked lithics were recovered from an area of 0.8 hectares (Fig D2.10). All but one piece was found in the north-east and south-east corners of the area walked. There were 4 flakes, 1 blade, a scraper fragment, and significantly, a possible fragment of white Wolds flint from a ground flint axe.

D2.5.3 Test-pitting

Nine 2m by 1m test-pits were opened (Fig D2.10). Each contained a topsoil of firm dark brown (7.5YR 3/3) sandy silty clay averaging 0.3m thick. The southern and central line of test-pits had between 0.47–0.49m and 0.22–0.28m respectively of a loose dark brown (7.5YR 3/3) sandy silt subsoil, but it was completely missing in the three northern units of excavation. The reason behind this variation in stratigraphy is unclear, but the remnants of what is probably a medieval field boundary was found in TP7 (Fig D2.11). Sited on the edge of a gentle slope, it comprised a deposit of fine mid-yellowish-brown silty sand with a quantity of medium to large cobbles. It perhaps suggests deliberate dumping. Along with the discovery of what could be ridge and furrow by geophysical prospection, it may suggest that variation in subsoil depth was medieval in origin, and possibly the result of different agricultural practices, such as
those practised in infield and outfield systems. All test-pits revealed a natural of very firm yellowish-brown (10YR5/6) clayey gravel.

Eight worked lithics were discovered from the southern row of test-pits, including three pieces whose test-pit number went unrecorded. (Fig D2.10). There were 4 flakes, a core rejuvenation flake, 1 blade, the fragment of a probable Mesolithic truncated blade of grey till flint with abrupt retouch on its distal end and right hand side, and a piece of irregular waste.

D2.5.4 Discussion

The investigation of field 18 appears to offer a rare insight into a type of archaeological evidence – the medieval field system – which may once have been common. It also reminds us that we must understand this activity before we can develop a detailed appreciation of lithic distribution and the likelihood of contemporary features preserved beneath the ploughsoil. It is far from clear if the evidence for medieval agricultural activity masks, or has destroyed, evidence of prehistoric activity. If this later activity does indeed cover and protect the latter, then worked lithics would not be mobilised into the ploughzone by modern agricultural processes, at least partly explaining the very low recovery rate of objects from this area. It is also possible that this medieval activity overlies archaeological features associated with the cursus, sited only 40m to the south.

D2.6 Three Hills Round Barrow Group

D2.6.1 Geophysical prospection

Geophysical prospection at the Three Hills Round Barrow Group is described elsewhere (D1.4).

D2.6.2 Total collection

A total of 139 worked lithics were found by total collection (Fig D2.12 for distribution). They are found along the ridge, with a notable cluster around the
centremost barrow. The collection consisted of 70 flakes, a core rejuvenation flake from a blade core, 8 pieces of irregular waste, 32 blades (including 5 Mesolithic bladelets), and 11 flint cores (including 2 complete opposed blade cores of Mesolithic date, along with 2 other blade cores, 2 multiplatform flake cores, and 2 discoidal flake cores). There were also 17 retouched pieces, comprising: the distal fragment of a microlith on grey till flint; 2 complete flake knives, and the fragments of another three, manufactured on different coloured till flint (eg Fig D2.13, 1–3); 3 unclassifiable scrapers (Fig D2.13, 4) and a ‘thumbnail’ scraper of Beaker date on brown till flint; 3 complete ‘fabricators’, of which one was regular and well made on a grey till/gravel blank (Fig D2.13, 5), but the other two, of a dark grey chalk flint and a grey till/gravel flint, were distinctly rough; and 4 miscellaneous retouched flakes.

The microlith, bladelets, and opposed platform blade cores attest to a Mesolithic component in the material. ‘Fabricators’ had a long currency, towards the end of which they were among the few finished flint artefact types to recur in flint industries of the full Bronze Age (Ford et al. 1984); they also occur in early Bronze Age burials (Clarke 1970, 448, where they are called ‘strike-a-lights’; Longworth 1984, 68). Given their absence from the rest of the assemblage, they may relate to activity connected with the barrows, whether or not they derived from burials. The same holds for four of the five flake knives. One is a regularly formed fragment with all-over bifacial retouch (Fig D2.13, 1). The remaining four are all different, but elide into a wide class of straight-edged retouched flakes, some pointed (Fig D2.13, 2) and some scale-flaked, which, at their most elaborate, resemble plano-convex knives (Fig D2.13, 3) and, like them, occur in early Bronze Age contexts, as in barrows at Rudston and Hutton Buscel in Yorkshire or Ovingham in Northumberland (Kinnes and Longworth 1985, cat nos 67, 153, 214). The exception is the distal fragment of a possible backed knife of Mesolithic or early Neolithic date. Earlier Bronze Age knapping at the Three Hills Barrows may account for the relatively high proportions of plain (ie unprepared) flake butts (Table D3.14) and of hinge and step fractures (Table D3.17) in this collection.

D2.6.3 Discussion
The association between higher and drier ridges and Mesolithic occupation is evident at Three Hills. In other respects, what was found here was unusual, reflecting its subsequent use during earlier Bronze Age funerary practice and building. The absence of intervening later Neolithic activity is typical of the wider plateau.

**D2.7 Conclusion**

It is believed that geophysical prospection, total artefact collection and targeted test-pitting have produced an invaluable palimpsest of data. Whilst the primary aim of producing buried evidence for settlement or domestic activity, such as pits and hearths, was not achieved, the resulting information nonetheless offers insights into the possible organisation of the landscape during the Mesolithic, Neolithic, and Bronze Age, and how the later reuse of the landscape may have affected the recovery and interpretation of the available prehistoric material. The fieldwork could be usefully developed in two ways. Firstly, it may be informative to assess and categorise some of those areas already targeted, particularly the ‘high’ density scatter, where follow-up geophysical prospection may detect traces of surviving archaeology away from the ridge-top, and highlight areas of high potential for excavation. Secondly, the strategy and techniques described here can be applied to other locations across the landscape. Of particular attraction may be the high density scatters identified by widespaced fieldwalking at Mire Barf Farm (field 32) and to the east of West Tanfield (field 2B). These new data would be exceptionally useful in the explanation, interpretation, conservation, and management of the landscape.