D3. Lithics
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D3.1 Introduction

The assemblage consists of 2,575 pieces of worked flint and chert, of which 1,132 were from widespaced fieldwalking (Tables D3.1 and D3.5), 829 from excavation (Tables D3.2 and D3.6), and 350 from total collection or test-pitting (Tables D3.3 and D3.7). This total also includes 264 pieces from Nost 1 where widespaced fieldwalking and total collection had been combined (5.3.1; Tables D3.4–3.5). The distribution of this material varies greatly across the study area, but the single largest collection by far was from the excavation of the triple-ditched round barrow, which produced 590 pieces (including 93 from the sieving of bulk soil samples). Other notable collections are the 153 pieces from widespaced fieldwalking in Field 11, along with a further 142 from total collection and test-pitting here, and 139 pieces from total collection across the Three Hills Barrow Group. With the exception of the triple-ditched round barrow, the incidence of lithics from the other excavations is extremely low, especially at the double pit alignment, which produced only 68 pieces, and at the excavation of the central henge’s outer ditch, which produced none. Despite this, the assemblage is one of the largest from the region, comparing favourably with the 1,528 pieces from the adjacent Nosterfield Quarry (Dickson 2011), and the 563 pieces found by excavation at nearby Marton-le-Moor (Makey no date a). The quantity, however, is far lower than is encountered across the flint-rich chalklands of the Yorkshire Wolds (eg Abramson 1996; Manby 1974; 1975), despite the availability of low-grade material across Thornborough’s gravel terrace.

The value of the 829 excavated pieces is limited. They include only 32 retouched pieces. The majority are also from the least useful contexts. Despite the relatively large size of the collection from the triple-ditched round barrow, most were either from disturbed contexts (215 pieces or 36%) or unstratified (217 pieces or 37%), with some of the 158 pieces found in feature fills (27%) thought to be residual. Similarly, the majority of lithics from the excavations at the outer ditch (19 pieces or 95%) and inner ditch of the southern
henge (14 pieces or 82%), the gypsum pits (63 pieces or 93%) and the Three Hills barrow 
(58 pieces or 89%) were from disturbed or unstratified contexts, the exception being the 
double pit alignment, where all but 10 of the 68 pieces were from feature fills, albeit in a 
few cases their truncated tops. Many of these were also thought to be residual. The lithic 
collections therefore provide little insight into the general chronology or use of the 
monument, with the exception of the earlier Neolithic fraction of the material from the 
triple-ditched round barrow.

The VMNLP and ALSF projects employed different lithic specialists (Peter Makey and 
Frances Healy respectively), but their reports are combined into this single account of the 
assemblage. This account often distinguishes between the ‘excavated collection’ (from 
the triple-ditched round barrow, the gypsum pits, the oval enclosure, the outer and inner 
ditch of the southern henge, the double pit alignment, and the Three Hills round barrow), 
the ‘widespaced fieldwalking collection’ (Fields 1–53), which excludes lithics from Nost 
1, the ‘surface collection’, which combines the results of widened fieldwalking with 
the material from Nost 1, and the ‘ploughzone collection’, which includes everything 
from widened fieldwalking, total collection fieldwalking, and test-pitting. This chapter 
refers to figures in the printed report, which includes all lithics selected for illustration 
(Chapters 4–5).

**D3.2 Raw material procurement**

Unworked gravel flint was recovered from the study area, often in the form of small, 
heavily patinated and thermally fractured fragments, and more rarely as pebbles. Despite 
this, most of the artefacts are made of non-local flint, usually sourced on their colour 
because of the frequent absence of cortex. The assemblage was overwhelmingly derived 
from till or gravel sources (Tables D3.8–3.10) and nearly all diagnostic implement types 
are, unsurprisingly, manufactured on these materials (Table D3.11). The most numerous, 
by far, is till flint, usually representing around half of the excavated collections. Overall it 
constitutes 70% of the surface collection, but more across terrace areas. Despite a fair 
degree of variation it tends to be fine-grained, semi-translucent, and olive-grey (5Y 3/1-
6/1) or grey (5YR 3/1, 5/1, 6/2; 7.5YR 3/0, 4/0, 4/1, 6/0, 7/0; 10YR 4/1, 6/1, 7/2) in colour, frequently with a smooth, thin (about 2–3mm thick) buff or brown cortex. It can also be moderate to light brown (5Y 4/4-5/6; 7.5YR 4/2, 4/3, 5/2; 10YR 5/3, 7/3), very dusky red (2.5YR 5/2), dark reddish-brown (2.5YR 3/4 and 5YR 3/2-3/4), reddish-brown (2.5YR 4/4), pink (7.5YR 7/4), yellowish-brown (10YR 5/4), and brownish-yellow (10YR 6/6) in colour, fine- to medium-grained with occasional speckled mottling, of medium to poor transparency, and again, typically with a thin light brown or buff-coloured smooth cortex. Till flint is characteristic of glacial clay deposits, but most is more likely to have come from the coast some 80km to the east, since the local Devensian tills in the Vale of Mowbray are of northern or north-western origin (Aitkinhead et al 2002, fig 33) and hence contain little or no flint. The greys and browns which predominate in most of the Thornborough collections are the most frequent flint colours of the coastal tills, especially at Flamborough Head, and the more brightly coloured flints, some of high knapping quality, are relatively rare (Brooks 1989, 57; Henson 1985; Durden 1995, 410). Semi-spherical, smooth cortical pebbles of about 80–100mm diameter appear to be favoured for utilisation.

Till material that may subsequently have been buried, rolled, or in some other way incorporated into a fluviatile environment, such as a stream bed, was also present. This till/gravel material, representing a small part of the assemblage, often possesses a colour characteristic of till flint, but can also be grey (10YR 5/1, 7/1, 5YR 6/1), greyish-brown (10YR 5/1), moderate red-brown (10YR 4/6), dusky red (5YR 2/2), greenish-black (5GY 2/1) and black (7.5YR 2/0). Its cortex is characteristic of till flint but with a yellow or brownish-yellow colour. The material is proportionally well represented in the widespaced fieldwalking collections from fields 10–12 on Chapel Hill, field 32 at Mire Barf Farm, and field 38 next to the central henge (Table D3.8). The result of total collection and test-pitting in field 11 and at the Three Hills Barrow Group confirm these clusters of material, but the highest percentage of till/gravel material was from field 16 (Table D3.10), perhaps reflecting the material’s probable occurrence in the eroded banks of the watercourse once thought to have existed here. Its possible local availability, across the south-east corner of the gravel terrace, is also suggested by its relatively high
occurrence in the excavated collections from the triple-ditched round barrow and the nearby gypsum pits (Table D3.9).

Gravel flint was much rarer than till material (Tables D3.8–3.10), despite occurring naturally in the study area, and was not used for the manufacture of implements. It includes a wide range of coloured flints of varying grades, including a small amount of high-quality material. Frequent colours include moderate yellowish-brown (10YR 5/4), moderate reddish-brown (10R 4/6), dark yellowish-orange (10YR 6/6), light brown (5YR 6/4), and yellowish-grey (5Y 8/1). The material can either be translucent or opaque and contains more inclusions and a typically thicker (about 4–6mm) cortex than till flint. It is usually rare in the boulder clay deposits of north-east Yorkshire, but would be widely available given the extent of the alluvio-fluvial terraces from across the study area and elsewhere in the Yorkshire vales. Its availability could certainly account for its wide variation of colour, translucency, and texture, yet its rarity in the assemblage, both on and off the gravel terrace, hardly suggests the systematic use of the raw material. Perhaps it was only used when no other sources were to hand. Some of the gravel type material used at Thornborough appears to have been obtained from water-borne sources, typically river and stream deposits, where it would have been available as small (about 80–100mm) and spheroid pebbles, possessing a water-worn cortex.

The assemblage also includes very small quantities of chalk flint and one piece of high-quality beach flint (Tables D3.8–3.10). The former possesses a nodular chalky cortex, a bluish-white (5B 5/1) patina, and is typically light yellowish-grey (5Y 8/1), although some pieces are yellowish-brown (10YR 6/2) or very pale orange (10YR 8/2). Pieces are often chalcedonic, may contain many inclusions, and are loose-grained, granular in texture, and opaque. The one piece of high-quality beach flint, a flake from field 32, is tabular, dark greyish-brown (10YR 4/2) in colour, poorly translucent, and fine- to medium-grained, but with a thick (about 6–8mm) light grey diffuse cortex and frequent large coarse inclusions. Almost certainly some of this material comes from the veins in the upper chalk of the Yorkshire Wolds, which is normally of poor flaking quality (Brooks 1989, 57; Manby 1979, 71), and small clusters of chalk flint were discovered in
fields 2B, 38, 44, and 50 (Fig 5.8). In addition, the one piece of fine-quality beach flint was probably from the lower chalk, originally eroded from a cliff exposure, and a few dark grey to black pieces, with thick, unrolled cortex – including two core rejuvenation flakes from the excavated collection at Three Hills – are of flint which conceivably could have come from the chalk of East Anglia or farther south, although the heterogeneity of the flints in the till makes it difficult to be sure of this. A relatively high proportion of implements were manufactured on chalk flint: there were 3 scrapers from fields 50 and 53, a serrated edged blade from field 44, 2 miscellaneous retouched flakes from field 2B and 44, a single notched blade from fields 2B, and 2 microliths from the excavations at the triple-ditched round barrow. It is perhaps no coincidence that these exotic materials are relatively well represented at the triple-ditched round barrow, the Three Hills Barrow Group, and near to the henges in field 38.

Three different types of chert were also readily identifiable in the assemblage, although all were probably collected from the local gravels, having been carried by the Rivers Ure and Swale, or their tributaries, from Carboniferous deposits to the north and west: their most common feature was a rolled riverine cortex and unworked chert pebbles and fragments were recovered during fieldwork. It is predominantly black (N1 01; 2.5YR 2.5/0, 2/1; 5Y 2/1) or dark grey (N5 01; 5YR 4/1; 7.5YR 3/0), sometimes with a specked appearance (N7 01), is moderate- to fine-grained, and frequently possesses a moderate to clearly defined thin cortex. The second type is light grey-coloured, often appearing to have a greenish tint to the naked eye (5GY 6/1), open-grained, and with a poorly defined cortex. The third type is the closest to the flints. It varies between dark yellowish-orange (10YR 6/6), pinkish-grey (7.5YR 7/2), brown (7.5YR 5/2; 10YR 7/4), brownish-grey (10YR 6/2), yellowish-brown (10 YR 5/6), and greenish-yellow (5Y 8/4) in colour, possesses a very loose granularity, and a variable, but typically smooth, nodular cortex. Chert was used rarely and unevenly (Tables D3.8–3.10). It represents only c 6% of the surface collection, and was absent from nearly a third of the walked areas, being especially under-represented on Chapel Hill and the Upsland ridge. It is intriguing that chert was used at all, especially given the under-exploitation of local gravel flints. Experimental knapping by Peter Makey showed it to have poor flaking properties,
although rare cobbles may have been of reasonable quality, as shown at Three Hills by a large flake from an extensively worked chert core, with scars of at least six previous removals on its dorsal face, and a large non-cortical flake with dorsal scars from at least five previous removals from the triple-ditched round barrow. Chert was actually used for the manufacture of 13 blades and bladelets from fields 2B, 3, 5, 6, 8, 11, 14, 27, 28, and 30, an edge-retouched flake from field 30, 3 scrapers from fields 1, 16 and 36, a notched flake from field 10, and a microlith from field 50. In general, chert may have been used because it provided size. Where weights have been recorded, complete chert artefacts have a mean weight of just under 7g, compared to just over 4g for complete flint ones.

Chert is better represented in the excavated collections (Table D3.9) – constituting 18.6% of the total – particularly at the outer ditch of the southern henge (Fig 4.32, 3–5), where it appears to have resulted from one knapping event, and the double pit alignment, where as many as 18 pieces in pit 930 may similarly be the result of one knapping episode. The most economical interpretation for its relatively high incidence at most excavated sites is that it was encountered as the ditches of the monument were dug, and was knapped opportunistically, either then or at any time after it had been brought to the surface. This certainly accords with some of the chert fragments having the rounded, battered surfaces of gravel pebbles and cobbles, and also that irregular waste at the double pit alignment and the Three Hills round barrow, and cortical flakes at the triple-ditched round barrow, the Three Hills round barrow, and the outer ditch of the southern henge are more common among chert than among flint (Tables D3.6 and D3.20). Some of the largest artefacts are also of chert. By contrast, the far more abundant flint collection from the triple-ditched round barrow has a low frequency of cortical flakes which compares with that from widespaced fieldwalking, and indicates that most flint was brought to the site in an already partly decorticated state.

The procurement of raw material clearly changed between the Mesolithic and Bronze Age (Fig 5.11). Grey and olive-grey flint is pre-eminent throughout the entire period, amounting to over 60% of the more than 2000 pieces of flint and chert for which colour has been recorded. Grey flints are commonest in the predominantly Mesolithic and early
Neolithic collection excavated at the triple-ditched round barrow, making 78% of the total. Greater frequency in these earlier periods is also indicated by the incidence of grey flint among fieldwalked material (both widespaced and total collection) from fields where blade production and use are fairly well represented, for there is a trend during the Neolithic and early Bronze Age for collections to include an increasing proportion of olive-grey till flint. This could indicate the increasing significance of certain coastal sources in eastern Yorkshire, especially since it is matched by lessening amounts of black chert and local brown gravel flint. There is also a progressive increase in the relative proportions of brownish-yellow, orange and reddish-coloured material during the later Neolithic and early Bronze Age (Fig 5.11), and at a more detailed level, this represents not only an increase in the proportions of coloured flint but also an accompanying increase in colour variation in the later assemblages. Colours now used, but rare or non-existent in earlier periods, were yellowish-red, yellow-brown, reddish-brown or orange, dusky red, and brownish-yellow. Their increasing quantities are especially evident at Chapel Hill, where they represent over two-thirds of the collected lithics. Such variation certainly matches the suggestion that later Neolithic assemblages became specialised and possessed emblematic roles (Bradley 1984, 48–67; Bradley 1990, 68–71; Pierpoint 1980; Thorpe and Richards 1984, 70–9), and if so, Chapel Hill itself could have been perceived and used in different ways from elsewhere. By contrast, the cluster of flints in field 21, lying adjacent to the excavated pits in the Nosterfield Quarry, and including material with a later Neolithic and early Bronze Age affinity, contained not one worked piece of brownish-yellow, orange, or reddish flint. There may be important differences between here and Chapel Hill.

**D3.3 Assemblage traits**

The majority of the ploughzone collection can be described as in a poor or moderate condition with a significantly high incidence of breakage (44%). The distribution of broken pieces is reasonably consistent across the study area, although the collections from fields 1, 4, 5, 10, 27–29, 37, 38, 44, 45, 50, and 52 had been subjected to greater attrition than elsewhere. Interestingly, there is a consistently higher rate of breakage
amongst those fields walked in 2003 than those walked earlier, at least partly reflecting an accelerated rate of attrition caused by recent ploughing.

This material therefore appears to have spent some time in the ploughsoil – only 367 pieces (21%) were described as fresh – and post-depositional agencies, especially ploughing, are probably responsible for a great deal of the attrition. The surfaces of some pieces display small orange rust spots or iron straining, usually indicating where they have been struck by a metal blade during tillage. A high proportion of the ploughzone collection has a general surface gloss, is often broken by recent damage which exposes fresher matt surfaces, and has patination which often extends over old breaks and edge damage, as well as being removed by more recent ones. Minimally and marginally retouched forms, such as serrated pieces, are likely to be under-recognised given the material’s general condition. A total of 406 pieces (24%) are patinated, of which the majority have traces of either moderate or heavy patina. It is typically off-white, grey or mottled blue in colour. Patinated pieces account for more than half of the collections from fields 2, 7, 18, 27, 44, 45, and 46. Patination is least frequent in the collections from fields 10, 11, 12, and 36, where it accounts for only 10–14%, probably because the extensive scatter found here lies on till, in contrast to the more calcareous gravel and limestone escarpment locations of most other collections.

The overall condition of the excavated collection varies greatly. The small amounts of material from both the southern henge’s outer ditch and the double pit alignment have the lowest incidence of breakage at 27.6% and 28.6% respectively, no doubt reflecting the incidence of pieces in undisturbed feature fills. At the former, the six flakes from 409 and 411 were struck on site and are in a remarkably fresh condition, with three from the last of these contexts almost re-fitting. These show little sign of plough-damage, but a residual shouldered blade in the basal fill of the ditch had heavy post-depositional damage along all its edges and dense light grey patination. The majority of the other excavated lithics from these two sites can be described as being in a moderate state and only two, including a possibly Mesolithic bladelet, are patinated. At the double pit alignment, nearly 31% (21 pieces) of the material is in a markedly fresh state and does
not appear to have been subjected to a great deal of solifluction or post-depositional attrition. Only 7 pieces (10.3%) possessed a light grey to dense creamy white patina, a trait which appears to be age-related, with 3 of the pieces being of later Mesolithic to middle Neolithic character. Of the 18 with plough damage, all but 1 were from either the ploughsoil or the truncated tops of features. There is no clear differentiation of the pit fills with regard to the state of the lithics, although the material from pits 927 and 93 appears to be in a slightly fresher state than elsewhere. It is highly probable that clearly residual material has been incorporated into the fill of pits 921, 925, and 932. The incidence of breakage is evenly distributed with incomplete pieces from pits 925, 928, 930, 931, 932, 933, 936, 942, 956, 971, 972, and 973. A higher incidence of breakage (eight pieces or 47.1%) is apparent with the tiny collection from the southern henge’s inner ditch, although here again the material was in either a fresh or moderate state and was largely without patination, even those pieces in the topsoil, suggesting its inner area had not been ploughed for many years. The only exceptions are two intrusive pieces from 602, of probably an earlier or middle Neolithic date, one of which has dense white patination.

This material contrasts markedly with the excavated collections from the Three Hills round barrow, the triple-ditched round barrow, and the gypsum pits. Their condition can be described as poor, with almost ubiquitous plough damage and an incidence of breakage very much higher than that usually encountered in the ploughzone collection. There are 49 (75.4%), 350 (70.5%) and 48 (70.6%) incomplete pieces at the Three Hills round barrow, the triple-ditched round barrow, and the gypsum pit respectively. Their general condition certainly attests to the impact of the plough. Proximal and distal fragments occurred in roughly equal numbers, at 88 pieces (45.8%) and 90 pieces (46.4 %) respectively, and 16 (8.2%) were broken laterally. Unfortunately, the frequency of breakage, post-depositional damage, and patination fails to distinguish between residual material and what may be contemporary with the monument. The flint artefacts from the ditch fills of the triple-ditched round barrow are certainly in variable condition and are difficult to distinguish from those from superficial contexts in terms of the frequency of breakage, post-depositional damage, patination, and other surface modifications. A substantial, redeposited Mesolithic component in the collection could account for the
higher incidence of patination (217 pieces or 43.6%) here than at the Three Hills round barrow (8 pieces or 12.3%) or the nearby gypsum pits (20 pieces or 29.4%).

The condition of both the ploughzone collection and the excavation collection offers few insights into the material’s preparation and use. Only a small number of pieces had been burnt to varying degrees. Evidence of burning was present on just 103 pieces (6%) from the ploughsoil, and on many of these the trait can be related to modern agricultural practices, with some pieces betraying traces of stubble burning. The impact of more recent processes would certainly account for the higher incidence of burning here than in the Nosterfield collection (Dickson 2011, 293), the majority of which was from undisturbed contexts. It is possible that a minor component of the Thornborough material had been heat pre-treated, but if so there is no significant pattern to its distribution. There were no burnt pieces in the excavated collections from the southern henge, just 26 (5.2%) from the triple-ditched round barrow, 7 (10.8%) from the Three Hills round barrow, 6 (8.8%) from the gypsum pits, and 2 (2.9%) from the double pit alignment. With the exception of some of those from the triple-ditched round barrow – 8 of which were found in undisturbed feature fills – these burnt pieces were all from the ploughsoil or the old subsoil, suggesting that stubble burning was the most likely single cause.

A total of 239 pieces from the ploughzone collection (13.7%) exhibit macroscopic traces of edge use, all but three from fields walked by the VMNLP. Many of these are, not unexpectedly, found on retouched implements. Of the unretouched component of the lithic assemblage, macroscopic traces of use-wear are present on 65 flakes, 23 blades, 5 chunks, 6 core rejuvenation flakes, and 6 cores. Curiously, the overall numerical distribution of pieces exhibiting use-wear does not increase in the larger collections and no clear spatial focus can be discerned except for a few rather insignificant clusters. In the majority of instances the degree of macroscopic utilisation may be termed light to moderate. Among the excavated material, the largest collection, from the triple-ditched round barrow, included 1 flake, 2 blades, and a serrated piece with either blunted edges, slight traces of edge gloss or regular-looking edge damage. Evidence of utilisation was
also apparent on another 5 flakes, 2 blades, a scraper, and a miscellaneous retouched flake from the double pit alignment, and a flake and scraper from the outer ditch of the southern henge. The two conjoined fragments of a leaf-shaped arrowhead from the double pit alignment revealed no traces of residue or any other use-wear.

All of the VMNLP lithics received preliminary micro-wear analysis by Peter Makey, but the high incidence of edge modification and attrition made its identification problematic. Whilst the scrapers tend to exhibit moderate traces of macroscopic edge use, frequently on the transverse distal end of the flake support, there are instances when the micro-wear analysis does not appear to be consistent with this. The retouched items in field 10 are a notable example, for they show no traces of utilisation. In fields 11 and 12, by contrast, there is a marked increase in the degree of macroscopic edge use and in this instance the scrapers would appear to have been more heavily utilised. Most of the micro-wear is related to the processing of vegetative material, and whilst it is not possible to ascertain its precise nature, it is probably a firm but non-woody substance of similar consistency to rhubarb or apple. Scrapers have been used on meat but the presence of micro-wear is surprisingly light, suggesting that the implements were used on the final defleshing of hides or else on soft meat of a very fatty nature. Much of the micro-wear is unidirectional and its presence on some of the flakes and blades appears to suggest their use in a cutting motion on vegetative matter. One notable feature of both macro- and micro-wear is an apparent preference for it to be on the right-hand side of many of the flakes and blades. It is tempting to suggest a high degree of left-handedness amongst those visiting the Thornborough landscape.

D3.4 Reduction technology

Overall the debitage attests to a reasonable standard of knapping competence, with few pieces exhibiting traces of undetached bulbs and miss-hits or possessing hackle scars. Traces of soft-hammer knapping, probably via the application of wood or stone batons, are present on a very small part of the assemblage. It was certainly being conducted in fields 5 and 11. Nearly all these soft-hammer-struck pieces could be considered to be
trimmings from the final stages of core and tool reduction or trimming flakes from implement maintenance. Soft-hammer flaking is also reflected by fairly frequent diffuse bulbs of percussion in fields 1, 5, 10, 16, 21, and 38, along with a high incidence of feather terminations, punctiform and linear butts, and platform edge abrasion, all reflecting controlled knapping in the Mesolithic and early Neolithic (Tables D3.12, D3.14–3.15 and D3.17), a pattern replicated by the excavated collections from the triple-ditched round barrow and Three Hills (Tables D3.13 and D3.16).

The majority of the assemblage, however, was the result of hard-hammer knapping, probably carried out via the application of small quartzite or flint pebbles, of which there were single examples in fields 1, 4, and 29: all are heavily battered spherical pebbles of olive-grey till flint, the many un-detached bulbs in the example from field 4 being consistent with its use as an anvil on which indirect or bipolar knapping had been carried out. Faceted butts correspond to the working of Levallois, discoidal, and less-regular keeled cores, with which they notably occur on Chapel Hill, although both are widespread at low frequencies. This technology is predominantly associated with Peterborough Ware and Grooved Ware elsewhere (eg Manby 1974, 11–70; 1975, 33–45) for transverse arrowheads. The mass of indistinctive flake production from unspecialised cores corresponds to the widely documented lack of precision and care often shown by knappers in the later Neolithic and early Bronze Age. It should be noted that butts and terminations were not recorded for the collections from fields 31, 31A, 32, 33, 34, 35, 36, 37, and Nost 1.

The overall size of the artefacts is small, reflecting their till and gravel sources; and flint cores, but not those of chert, were worked almost to extinction. The generally small size of the raw material means that if the entire reduction sequence had taken place across the study area there would be a high frequency of cortical or partly cortical flakes. However, the reverse is the case, the overwhelming majority of complete flakes and flake tools having either none or no more than 25% dorsal cortex irrespective of location, indicating that the early stages of core reduction were generally conducted elsewhere, presumably closer to the flint sources. This is very similar to the Nosterfield
assemblage (Dickson 2011, 280). The breakdown of lithic reduction stages, based primarily on remnant cortex and including retouched implements, can be found in Tables D3.18–3.24. There is an almost total absence of completely cortical material from across the study area, and its rarity in both ploughzone collections and excavated collections suggests that this is a real pattern and not the result of differential discovery. Of those fields which produced more than a few lithics, there is a relatively high number of flakes and tools with at least some cortex in fields 8, 9, 10, and 11, on and around Chapel Hill, and in fields 16, 22, 24, 27, 28, 38 and 50 (Tables D3.18–3.19). Chapel Hill was clearly used as a finishing site during the later Neolithic (5.3.3 and 5.5), and with a single exception, the other locations may be scatters like those earlier ones detected by excavations, total collection, and test-pitting at Three Hills and the triple-ditched round barrow (Table D3.20–3.24). Fields 22 and 50 are of interest given that they are adjacent to the pit clusters excavated to the south-east of the Ladybridge Quarry, perhaps reflecting the knapping activities in areas adjacent to known occupation foci (5.5).

D3.5 Retouched implements

The assemblage produced a total of 286 retouched lithics: 207 were from widespread fieldwalking, 48 from total collection and test-pitting, and 31 from excavation (Tables D3.1–4). The overall retouched to unretouched ratio is 1:8, or 1:6 if only the ploughzone collection is considered, compared to the ratio of 1:13 from the adjacent Nosterfield Quarry (Dickson 2011). Their distribution generally mirrors the overall pattern of the higher the lithic density the greater the incidence of retouched pieces (Fig 5.3). In terms of the widespread fieldwalking collection, the highest density by far, in terms of both total lithics and retouched items (7 per hectare), is to the east of Chapel Hill in field 11 (Table D3.5), emphasising the field’s distinctiveness. The high incidence of retouched pieces here was also borne out by the results of total collection and test-pitting (Table D3.7). The density of retouched pieces falls away rapidly in fields 10 and 12, especially in the latter (2.2 and 1.6 per hectare respectively), and is well below that for field 21 (4.1 per hectare) in the south-west corner of Ladybridge, but broadly equivalent to field 22 (2.3 per hectare) on the north-east of the Upsland ridge, field 32 (2.2 per hectare) at Mire
Barf Farm, field 2B (2.2 per hectare) on the lower terrace immediately to the east of West Tanfield, and field 33 (1.7 per hectare) on the east-facing slopes of Tanfield ridge. The collection from widespaced fieldwalking in field 16, adjacent to the triple-ditched round barrow, also possessed a relatively high density of retouch (1.4 per hectare), although these results were not repeated by test-pitting and total collection (Table D3.7), both producing a very small collection of tools.

These major concentrations are all generally associated with a higher density of cores, irregular knapping debris, and scrapers (Tables D3.5–3.7), but interestingly, scrapers both outnumber and are more densely distributed than cores in fields 11 and 32, while the reverse is the case in fields 2B, 10 and Nost 1 (Figs 5.4–5.5), suggesting greater emphasis on knapping in the latter areas. This is understandable if these fields were near to a ready supply of flint, as was perhaps the case for field 2B, close to the river from which eroded material must have been in plentiful supply. Fields 12 and 21 are different again, the density of cores and scrapers being exactly the same, whilst very small amounts of each occur in field 16. As with overall distribution, there is a fall-off in the density of retouched pieces elsewhere on Chapel Hill (fields 5, 8, 9, 30 and 36), to the north and west of Ladybridge, and along the Upsland ridge, although their relatively high incidence in field 22, albeit of just three pieces, suggests a marked increase to the north-east of Chapel Hill, close to a medieval settlement, and perhaps the edge of a largely undiscovered cluster.

**D3.5.1 Microliths and microburins**

Seventeen microliths were recovered, many in a surprisingly fresh state, a large number for an assemblage of this size, including six from the triple-ditched ditched round barrow. Twelve of those from Thornborough were manufactured on till flint in varying shades of grey, 2 on yellowish-brown or reddish-brown till flint, 1 of greyish-brown till/gravel flint, and another 2 on dark grey chert. Classification is sometimes difficult because several are fragmentary. They include 2 scalene triangles from field 11 (Fig 5.18, 7) and field 41, 4 edge-blunted points from fields Nost 1, 6B and 8 (Fig 5.18, 3, 4,
5 respectively) and pit 27 of the double pit alignment, a complete rod microlith, with retouch along its entire left-hand side and two-thirds of its right-hand side, from the triple-ditched round barrow (Fig 4.5, 4), 3 obliquely blunted points from the triple-ditched round barrow, and fragmentary bilaterally retouched points from field 50 and Nost 1 (Fig 5.18, 2). The scalene triangle from field 11 has a dense light grey patina. Two of the edge-blunted points are broken and appear to have been utilised, while there are possible micro-wear traces on the triangle and on the point from field 8. Where classifiable, most are of forms current in the later Mesolithic (Myers 1987, 139; Spratt 1982, 111–12), and those from the Nosterfield Quarry are similarly dated (Dickson 2011, 296). A fragment, from total collection in field 11 and 2 fragmentary obliquely blunted points from the triple-ditched round barrow (Fig 4.5, 3) would, when complete, have been of sufficiently large size to be compatible with earlier Mesolithic industries. One of these was either heavily patinated or manufactured of Wolds flint (Fig 4.5, 4).

Various functions have been suggested for microliths but they are most likely the points and barbs of composite projectile heads (Myers 1987; David 1998). There are also 3 microburins, from fields 2B, 8 (Fig 5.18, 16), and 27. The microburin from field 27 has a moderate light grey patina. The recovery of microburins is of particular importance since they are a by-product of manufacturing microliths and comparatively rare in fieldwalking assemblages.

**D3.5.2 Truncated blades**

There are 2 truncated blades from widespaced fieldwalking in fields 12 and 38 and another 2 from test-pitting in fields 16 and 18. They include a complete piece of dark grey till/gravel flint, a distal/medial fragment of a dark yellowish-orange-coloured gravelly till flint, with steep though marginal transverse distal retouch, a distal fragment of grey till flint, whose end is trimmed to straight oblique edges by abrupt retouch, and a proximal fragment on grey gravel flint. Such pieces are a component of the region’s Mesolithic assemblages (Moore 1950, 107) and are infrequently encountered in its largely unpublished surface assemblages. This class of artefact is generally assumed to
have served as a knife, for whittling or butchery, the retouch serving as a finger support. The specimen from field 12 has received slight use-wear to the ventral right-hand side.

**D3.5.3 The burin**

Burins are rare in Neolithic and Bronze Age industries, and the Thornborough specimen, from field 16, is most probably Mesolithic, despite being of a strikingly similar aspect to Upper Palaeolithic examples (Fig 5.18, 1). It is manufactured on a fine chunky parallel-sided notched blade of moderate brown till flint. Burins are normally assumed to have functioned as graving tools for working on bone or splitting antler. There are heavy traces of use on the Thornborough implement. The notching on the blade was probably to aid in the hafting process.

**D3.5.4 Scrapers**

Scrapers are considered one of only three tool types – the others being awls and burins – which we can expect to be routinely associated with settlements (Schofield 1987, 277, 280), making them diagnostic when it comes to understanding the development and use of any Neolithic settlement. A total of 109 scrapers were found, making them the most common retouched tool type. Their ratio to other lithics is almost 1:23, or 1:15 if we consider only the widened fieldwalking collection, a figure which is higher than many of the region’s excavated assemblages and in excess of the 1:92 encountered by fieldwalking at the Nosterfield Quarry and the 1:25 to 1:40 range normally found by fieldwalking from across Rudston in eastern Yorkshire (Makey no date b). Average ratios in excavated contexts include 1:35 at Nosterfield (Rowe 1998; 1999; 2004), 1:36 with the early Neolithic or Peterborough Ware associated pits of eastern Yorkshire (Manby 1975), an average of 1:29 with the Grooved Ware associated pits of eastern Yorkshire (Manby 1974) and with those associated with monuments, 1:46 at the Kilham long barrow (Manby 1976), 1:35 at Grindale 1 (Manby 1980, 33), and 1:173 at Boynton (ibid, 42). Most of the complete scrapers were small in size at 20–40mm long, 10–30mm wide, and 6–12mm thick, their shape, as expressed by breadth to length ratios,
showing considerable uniformity in the selection of short and broad flakes as the favoured support: only a crude till flint end scraper from field 4, which was 62mm long and 38mm wide, was noticeably larger.

They can be described as thinly and unevenly distributed (Fig 5.4), but broadly occurring in their greatest number at the densest scatters collected by widespaced fieldwalking, as in field 11 (3 per hectare), field 21 (1.2 per hectare) and field 32 (1.2 per hectare). Eleven of the 20 scrapers from total collection and test-pitting were also from field 11. Other areas with relatively high scraper densities include fields 5 and 8 (0.8 and 0.9 per hectare respectively), both near to Chapel Hill, and field 33 (0.8 per hectare). At each of these clusters scrapers generally represent around a third or more of the retouched pieces, at their lowest in field 21 (29%), but at their highest in fields 5 and 8 (67% and 75% respectively). They are rarely found elsewhere in the study area, being most uncommon along the ridges which border its eastern and western sides, and across the central part of the gravel terrace. Their complete absence in field 22, despite the presence of three other tools, could simply reflect the small area actually fieldwalked, yet its location on the eastern edge of the study area, as the distinctive topography of the Upsland ridge flattens, may suggest a meaningful contrast with other locations, especially since the only possible sickle from the study area (see below) was found here. It may have even been an area of horticulture.

Scrapers are poor indicators of date since many of their forms are present in all periods. Despite this, the majority from Thornborough are probably of either later Neolithic or early Bronze Age date (eg Figs 5.23, 5–6 and 5.25, 6–17), of which the small Beaker ‘thumbnail’ or ‘button’ forms, of which there are 20 possible examples – mostly from either Chapel Hill and its immediate vicinity or field 32 – are the most diagnostic. However, these are also known from Mesolithic assemblages (eg Mellars and Dark 1998, fig 7.6, 3–5). The primary retouch angle of the majority of the specimens is around 75 degrees, and the retouch semi-scaled. This is reasonably shallow for scrapers, contrasting with the acute retouch usually encountered on later Mesolithic and early Neolithic material. Another possible feature indicating a later Neolithic date is symmetry along
their long axis (Edmonds 1995, 96), although the kind of end asymmetry portrayed on
three of the Thornborough specimens – from fields 9, 21 and 24 – has occasionally be
found on scrapers with Durrington Walls-style Grooved Ware associations in the East
Riding (Manby 1974, fig 33). Nosed scrapers, like the single examples from fields 11 and
12, are quite rare and when present are usually associated with Grooved Ware industries
(ibid, 35, fig 12.8). A fragmentary end scraper with a serrated left-hand side was
recovered from field 11; such implements are also rare in the region’s stratified
assemblages, but present in many of the unpublished surface assemblages, usually from
areas rich in later Neolithic or early Bronze Age domestic material. The piece received
little use. Of similar date are 4 scrapers from Nost 1, including a double-sided end scraper
and a right-hand side scraper with fine scalar flaking of Beaker affinity. By contrast, 6 of
the scrapers in the assemblage are possibly of later Mesolithic or earlier Neolithic form
(eg Fig 5.18, 12–15), of which the most striking example is a fine double-sided end
scraper from field 12, manufactured on a blade support of dark yellowish-orange
till/gravel flint. At least 6 others, including 3 extended end scrapers from fields 1, 3, and
Nost 1, are likely to belong to the 4th millennium. A complete scraper formed by
exceptionally large and steep removals was recovered from field 53, a type thought to
date to the Bronze Age.

It is clear that a limited degree of flint selection has been conducted prior to the
manufacture of the scrapers. There is a slightly higher preference for finer-quality raw
material than the debitage would imply. In addition, scrapers of non-end varieties, such
as side forms, tend to have been made on dark yellowish-orange flint. An extended end
scraper from Nost 1 and an end scraper from field 16 had been manufactured on
reddish-brown till/gravel flint and a piece of chert respectively. Another feature of note
is the relatively low degree of breakage exhibited by the scrapers when compared to the
rest of the lithic assemblage. Almost a third are broken, whereas in many of the other
artefact classes breakage accounts for approaching half of the pieces: this may reflect
the fact that scrapers are often made on the thickest flakes in an assemblage. It is
possible that some of the scrapers may have been hafted and this would account for the
missing proximal end of some of the specimens. A comparatively large proportion of
the scrapers are manufactured on flint that appears to have come from secondary deposits such as stream or river gravels (Table D3.11). This may be a deliberate selection. Although the average knapping quality of this type of material is usually below the standard of that from other sources, the fine pieces that can be obtained from gravel exposures tend to be slightly more durable, being perhaps more suited to the production and subsequent use of scrapers.

D3.5.5 Arrowheads

A total of 18 definite arrowheads were recovered, a small number given their range across the full chronological spectrum. These could be considered as pieces casually lost, and accordingly, unhelpful in dating collections, and although a further 5 were found in excavated contexts at the Nosterfield Quarry (Rowe 1998; 1999; 2004), there is only 1 instance of associated pottery (see below). Five of the Thornborough arrowheads come from the monuments themselves or their near vicinity. The finest example comprised 2 conjoining fragments of a leaf arrowhead (Fig 4.60, 5) from the double pit alignment, representing the tip and medial section of a very fine specimen of Green’s (1980) class 3B(r), manufactured on a fine-grained olive-grey till flint. The outline of the piece has been formed by minimal marginal retouch and is almost of ‘ogival’ form. In Yorkshire such fine pieces are found infrequently and although few come from stratified contexts the known associations tend to be with burials associated with Towthorpe Ware (Manby 1980, 52), suggesting that they have a restricted chronological span. This implies the example from Thornborough is residual, yet the breakage probably occurred after discard, and the finesse and relative intactness of the tip suggests that the piece cannot have moved far from its original position of deposition or loss. Leaf arrowheads of ogival form are thought to have been deliberately manufactured as prestige goods (Green 1980, 85) and it has long been recognised that such pieces relate to monuments (Thurnam 1867). The find is very delicate and strikingly similar to one excavated from a pit within a recut of the eastern ditch of Cursus A at Rudston, East Yorkshire (Makey 1997). The similarities between the two pieces are so striking that one is tempted to suggest that both were manufactured by the same hand. If this was the case then it is probable that the
Thornborough specimen was produced in the vicinity of Rudston before finding its way to Thornborough as a prestige item. If it had been produced locally it indicates a high degree of local knapping competence and suggests that fine broad thin flakes were being manufactured and finished by pressure flaking.

Other arrowheads from the gravel plateau include a small, thin and finely bifacially flaked leaf type of Green’s (1980) class 4B(i) from field 3, manufactured on olive-grey till flint and notable for having a slight, intentionally retouched notch at its tip (Fig 5.23, 1). It is in a relatively fresh state, but is blunt, and it is not possible to discern whether it had been fired. Leaf arrowheads such as this tend to occur regionally in assemblages dominated by Peterborough Ware (Manby 1975, 33–47; 1988a, 59) and are predominantly of middle or later Neolithic date. Three other leaf-shaped arrowheads, including two nearly complete bifacially flaked specimens (eg Fig 4.5, 5), one on grey till flint, the other of greyish-brown till flint, found during excavations at the triple-ditched round barrow, along with another from field 38, on light brown till or gravel flint, are likely to be of earlier Neolithic date. At the Nosterfield Quarry, two round-based leaf arrowheads were found in excavated contexts in association with Grimston Ware (Dickson 2011, 276).

There are 13 arrowheads further from the monuments, and with three exceptions these are generally later in date, no doubt reflecting the general distribution of later Neolithic and early Bronze Age lithics. The earlier examples include 2 leaf forms from field 11, 1 a bifacially retouched flaked piriform of yellowish-red till/gravel flint only missing its tip, and probably of Green’s (1980) class 4A, and another leaf form from field 32. There is also a crudely manufactured petit tranchet class C1 (Clark 1934) chisel type in field 2B, with its lateral right side margin formed by a natural step termination, and three further chisel types from fields 11 (Fig 5.31, 3), 22 (Fig 5.23, 10), and 45. These variants usually have middle or later Neolithic associations and have been found, both nationally and regionally, with Peterborough Ware and Grooved Ware of the Woodlands sub-style (Green 1980, 108; Healy 1984, 13; Manby 1974, 29, 84; 1975, 37, 44–5; 1988a, 73). By contrast, the oblique petit tranchet arrowheads from field 41 and field 11 (Fig 5.23, 2) are
typically associated with Durrington Walls and Clacton sub-style Grooved Ware (Green 1980, 108; Healy 1984, 13; Manby 1974, fig 33). The other arrowheads from across the study area were 3 barbed-and-tanged from fields 12 and Nost 1 (Fig 5.25, 1–3), typically associated elsewhere with Beakers (Green 1980, 120; Manby 1974, 86), and the distal fragment of a finely flaked triangular arrowhead of likely early Bronze Age date. Though 2 of the barbed-and-tanged arrowheads, as well as an oblique arrowhead, had been subjected to breakage, this cannot be attributed to utilisation. The finest-quality till flint has been used to manufacture the oblique and chisel examples – respectively, light brown and dark olive-grey-coloured flint – and two of the barbed-and-tanged arrowheads, along with the triangular form of similar date, were made of a high-quality orange till flint of probable gravel pebble origin.

There are also 8 possible arrowhead fragments. Five of these may be from leaf types, three of which were from field 21, including a miscellaneous retouched flake fragment which may be the broken tip of an admittedly crude leaf arrowhead. The fourth fragment is an edge-retouched flake from field 12 which resembles a piece that may have failed during arrowhead manufacture. Possible fragments of chisel arrowheads are represented by two specimens from field 9, although it is equally likely that their similarity is just a chance occurrence, and another from field 45.

**D3.5.6 The sickle**

A notable single find is the distal fragment of a single-edged sickle from field 22 (Fig 5.20, 3). It is manufactured on very high-grade dark olive-grey till flint, possesses a smooth orangey-buff-coloured cortex, is very slightly crescent-shaped, and has a convex section. Two possible sickle pieces from the region have been found with Peterborough Ware (Manby 1975, 45, fig 11.16; see also Manby 1988a, 52). Their presence is usually seen as indicative of agriculture. Heavy use-wear is evident on the left edge of the Thornborough specimen, but the characteristic sickle gloss is not present.

**D3.5.7 Knives**
There are a total of 9 knives, of which 6 were from investigations at the Three Hills Barrow Group. Of the total, 3 were possibly Mesolithic or earlier Neolithic in date. A poor fragment of a double-edged flake knife with invasive retouch was found in field 21 (Fig 5.20, 7). It is calcined and possesses a dense white patina, the burning removing all traces of edge use. What is possibly a backed knife, maybe of either Mesolithic or earlier Neolithic date, came from total collection at Three Hills. This distal fragment of pinkish-grey till flint had semi-abrupt retouch down its right-hand side with damage or wear to its left-hand side. A further fragment of what may be a backed knife also came from field 36. Later in date are 2 complete flake knives (Fig 5.29, 1–2) and the fragments of another two from Three Hills, along with a complete specimen from field 11 (Fig 5.31, 5). One of these examples is a regularly formed fragment with all-over bifacial retouch. The remaining 4, including a complete bifacially retouched piece and the proximal fragment of another, are all different, but elide into a wide class of straight-edged retouched flakes, some pointed and some scale-flaked, which, at their most elaborate, resemble plano-convex knives and, like them, occur in early Bronze Age contexts, as in barrows at Rudston, Hutton Buscel, Gnipe Howe, and Sawdon Moor in Yorkshire, or Ovingham in Northumberland (Brewster and Finney 1995, 3, 8, 20, fig 60; Kinnes and Longworth 1985, cat nos 67, 153, 214; see also Pierpoint 1980, chapter 5). Their manufacture of differing coloured till flint – dark yellowish, brown, red, and grey – perhaps suggests an important relationship between possessing knives of contrasting hue and their role as prestige goods. A single true plano-convex knife (Fig 5.29, 3) also came from Three Hills.

**D3.5.8 Flakes from ground implements**

A total of 4 flakes and fragments were originally from ground implements, most likely axes or adzes. One was of brown till flint and three were of olive-grey till flint. A fragment from total collection in field 11 could possibly have come from a discoidal knife (Fig 5.31, 7). Field 27 produced a partially polished broad cortical flake (Fig 5.23, 4), field 10 an angular flake (Fig 5.23, 3), and field 32 a finely polished fragmentary flake (Fig 5.20, 4). The latter resembles a re-sharpening flake but is probably not one.
Two of these appear to have received a light degree of edge use unconnected to their original function. On a fifth piece, from field 38, it was difficult to judge if the apparent ‘polish’ was deliberate or natural, since it lacked the fine striations normally visible on ground implements. Previously only one polished flint axehead is known from the study area (Thomas 1963, 14), possibly from the central henge. The axe might accord with the polished flakes on stylistic grounds but is manufactured on a different ‘honey-coloured’, white-patinated flint.

**D3.5.9 Fabricators**

Fabricators are known from a limited number of regional contexts, the most notable being Beacon Hill, Flamborough Head, where an example was recovered in association with Peterborough Ware (Manby 1975, 47). Grooved Ware and Beaker associations are also known (Manby 1974, 82). More widely, they occur in early Bronze Age burials (Clarke 1970, 448, where they are called ‘strike-a-lights’; Longworth 1984, 68) and were among the few finished flint artefact types to recur in flint industries of the full Bronze Age (Ford et al 1984). Three of the 4 definite examples from Thornborough come from total collection at the Three Hills Barrow Group, each being complete and manufactured from grey till/gravel flint (Fig 5.29, 5). Two of these were roughly made, whilst the third was neat and regular. Another example came from field 9 and is crude and chunky with a flattened D-section. It is manufactured of olive-grey till flint. The piece has heavy plough damage and iron staining and has received a moderate degree of battering around all its margins. The function of fabricators is uncertain. The tool is most frequently assumed to have been used as a kind of knapping implement or strike-a-light, but could also have been used for working leather and perhaps stone (Edmonds 1995, 41).

**D3.5.10 Serrated edge blades**

The assemblage included 10 serrated edge blades, 4 from fields 24, 38, 44 and 45, 3 from total collection in field 11 (Fig 5.31, 4), and another 3 from the excavation of the
triple-ditched round barrow (Fig 4.5, 6). The finest example, from field 24, has 20 serrations on its left edge and has clearly been used as a saw, probably on a light woody substance like a sapling. It was made of olive-grey till flint. Implements such as this example occur frequently with Peterborough Ware (Manby 1975), and far more rarely, with Grooved Ware (Manby 1974, 90, fig 33), including an example from a pit fill at the Nosterfield Quarry which unusually was made of Borrowdale volcanic rock (Rowe 1998, 4, fig 9). By contrast, all the other specimens, which included 2 pieces whose left-hand side serrations had ventral edge gloss, are most likely to be of Mesolithic or earlier Neolithic date. Serrated tools have often been associated with harvesting (Edmonds 1995).

D3.5.11 Piercers and awl

The assemblage includes a complete piercer from excavations at the tripled-ditched round barrow and the fragment of another from field 16. Both are made of light olive-grey till flint. There is also a possible example of a complete piercer from field 33, a fragment of another from field 28, and another incomplete piece from field 44, with very regular bifacial retouch extending beyond its point. There is just the one example of an awl from field 10. Piercers and awls are typically associated with the processing of hides and the production of clothing. Their occurrence in fieldwalking assemblages is not unusual, but awls are known to be more frequent in Bronze Age collections such as that from the barrow site of Micheldever Wood, Hampshire (Fasham and Ross 1978, 58). The Thornborough specimens are all of later Neolithic or Bronze Age date, although the awl is a typically late form and is notable for having been manufactured on a core rejuvenation flake. The piece retains traces of both macro- and micro-wear, indicating that it had been used in a drilling motion.

D3.5.12 Spurred, notched, and shouldered pieces

A complete double-crested notched blade and the medial fragment of a fine shouldered single-crested bladelet, both manufactured on light olive-grey till flint, were recovered
from Nost 1 and field 2B respectively. Six notched flakes were recovered from fields 2, 10, 11, 46 and Nost 1, the example from field 10 manufactured on a dark yellowish-orange-coloured chert, along with 1 notched blade from field 2B and another 2 from field 11, including 1 complete piece made of dusky red till flint. The notched flakes from fields 2 and 10, along with the blades from field 2B, have not been used. The remaining notches retain traces of use but have no micro-wear; all are shallow and difficult to distinguish from plough damage. Notches probably functioned as spoke shaves and may have been associated with archery. With this in mind, it is notable that field 11 has produced 3 of the notched implements and 3 of the arrowheads. Notched pieces are present in the region’s fieldwalked assemblages, usually with Beaker type material, but absent or scarce in the excavated assemblages (see Manby 1974; 1975). The Thornborough notches are of the retouched variety, a feature of later Neolithic and early Bronze Age industries, rather than the single-blow forms favoured in the later Mesolithic. The double-crested blade and shouldered bladelet are most likely earlier: the latter is certainly characteristic of a later Mesolithic tool kit.

**D3.5.13 Edge-utilised and edge-retouched flakes or blades**

There are a total of 12 flakes, 4 blades, and 1 core fragment with macroscopic use-wear so heavy as to resemble deliberate retouch. This classification has been retained to provide some degree of consistency with previously published reports on post-glacial assemblages from northern England. Such pieces occur in Peterborough Ware associated assemblages, but more commonly with Grooved Ware (Manby 1974; 1975). The Thornborough material produced comparatively little evidence of micro-wear and displays no patterning in the distribution of the pieces. One item from field 8 is of note for being a utilised core rejuvenation flake.

A total of 48 flakes, 6 blades, and 1 core rejuvenation flake were retouched, of which 20 flakes and 5 blades possessed edge retouch. They represent the most numerous retouched form other than scrapers, such pieces being common in later Neolithic contexts elsewhere in the region (eg Manby 1974, fig 33, 82; 1975). It is unusual,
however, that so many of the edge-retouched flakes are of diverse form and that comparatively few of the blades have received edge retouch. Most of the examples possess only a small area (less than 10mm) of nondescript straight edge retouch, which varies in angle from 40 degrees to 90 degrees. There is a noticeable but slight tendency for the retouch to be on the right-hand edge. The retouched core rejuvenation flake, from field 7, is a class D (Saville 1973) platform removal secondary flake.

**D3.5.14 Bifacial retouched pieces**

The assemblage contains 3 bifacially retouched pieces, 1 of which, from field 6B, resembles a Neolithic leaf-shaped arrowhead and possesses slight traces of edge use, whilst another, from field 38, is a parallel-sided, plano-convex-sectioned, completely bifacially flaked fragment of a possible chisel, like those found with Grooved Ware on the Yorkshire Wolds (Manby 1974, 90–1, fig 34). The remaining piece, from field 2B, is rather nondescript. Two of the pieces retain cortex and all 3 were manufactured on olive till flint.

**D3.5.15 Miscellaneous and indeterminate retouch**

A total of 24 pieces possess small areas of nondescript retouch whose only common feature is for the retouch to be at right angles to the direction of flaking (ie the transverse distal). There are also 6 fragments from retouched implements of uncertain type. Two of these are probably from arrowheads and 1, from field 21, is possibly from the edge of a scraper.

**D3.6 Cores and debitage**

The classification and distribution of the 134 intact or fragmentary cores, which range between 2.6 and 305g in weight, are given in Tables D3.25–3.26 and Fig 5.5. To a certain extent their occurrence relates directly to collection size, with the highest core densities in fields 2B, 10, and 11, each with 1.6 per hectare from widespread walking. Fields 21, 32,
and 33 also produced a relatively high number of cores, their respective densities at 1.2, 1.1 and 1.3 per hectare, as did Nost 1. The largest ploughzone collection, however, was from field 38, the majority of which came from total collection at Three Hills, reflecting the localised and intensive activity atop this small knoll. Elsewhere in the study area they are either non-existent, or occur in much lower numbers, and if this suggests a strong patterning, then the same can be concluded for each of the clusters, these being noticeably different from one another. Field 32, at Mire Barf Farm, and Nost 1, at the other end of the study area, produced over half of the assemblage’s single platform flake cores, with another 3 coming from Field 33, not far to the south of the latter. By contrast, multiple platform, Levallois, and keeled flake cores predominant at the other two concentrations, but with Levallois cores found only in fields 10 and 11 on Chapel Hill, and multiple platform cores only in fields 2B and 11. Three of the latter also occur in Nost 1, further emphasising the likely complexity of this scatter. One can only speculate as to whether these differences reflect chronological change or are the product of distinctive knapping activities.

It is unsurprising that the most frequently encountered is the multi-platform flake core (eg Fig 5.20, 8). These are a common component of Grooved Ware associated assemblages (Healy 1984, 11–12; Makey 1996, 58). That said, the type is well represented at the triple-ditched round barrow (Fig 4.5, 2), the other characteristics of this collection dating them to the later Mesolithic and earlier Neolithic. Flake cores with one or two platforms – the second most common type from the ploughzone – are typical of earlier assemblage (eg Fig 5.18, 11), but they can also date to the later Neolithic or early Bronze Age (eg Fig 5.23, 8–9). More chronologically specific are cores for blade removals, present in small numbers from across the study area, mostly notably at the triple-ditched round barrow and from the Three Hills Barrow Group. Those with opposed platforms (Fig 4.5, 1) and those with single platforms (eg Fig 5.18, 9–10) are Mesolithic and later Mesolithic or early Neolithic respectively. Their generally higher degree of patination also suggests their earlier date. Possible exceptions include three later Neolithic or early Bronze Age bladelet cores from fields 2B and 32. Later are more distinctive technologies like the relatively uncommon Levallois cores – used in the middle and later Neolithic to produce broad
flakes for manufacturing transverse arrowheads and possibly even discoidal knives (Durden 1994, 158, 304; Makey 1996, 61–2) – and other discoidal cores. Both types are relatively well represented in fields 10 and 11, an area which produced an unstruck Levallois core (Fig 5.31, 1), two other complete discoidals of till, one of which was exhausted (Fig 5.23, 7), and another especially small example, made of till, from field 11. Field 10 produced two very fine and complete examples (Fig 5.25, 4–5), both exploiting a high-quality raw material, one of yellowish-brown till/gravel flint, the other of olive-black till flint. These are thought to possess Beaker affinities. Keeled cores, like the examples from fields 10, 11, and 12 are known to be a feature of many Grooved Ware industries (Healy 1984, 11–12; Manby 1974) and occur with great frequency in the surface assemblages of Yorkshire’s North and East Ridings. An intriguing aspect of the removals from Thornborough’s keeled cores is their relative lengths, which tend to exceed that of the extant debitage. It is probable that broad flakes have been produced and removed for use elsewhere since they are certainly not present in this assemblage. One specimen in Nost 1 was of black chert. Keeled cores would have been suitable for the production of arrowheads (see Healy 1984, 12).

Core reduction strategies were largely geared to the production of small squat flakes. Many of the cores have clearly been worked out to exhaustion – explaining their generally low mean weight of 21.1g – and the preference for multiple platforms, whereby the core was rotated and production assumed from a new striking platform. However, there were also three large cores which had not been reduced as far as was feasible: a roughly flaked nodule of dark grey till flint weighing 305g and retaining 35% of its cortex, from field 10; a crude single-platform flake core of chert, weighing 190g, from the double pit alignment; and a regular, pyramidal single-platform blade and flake core of yellowish-brown till flint, weighing 169g and retaining only a minimal amount of cortex, from field 12. A total of 53 core rejuvenation flakes were recovered, their low numbers corresponding with assemblages elsewhere dominated by later Neolithic or early Bronze Age pieces. The majority of these are probably of later Neolithic or early Bronze Age date, excepting, of course, the small number of crested flakes, which are likely to be earlier. Full platform removal, a common practice of rejuvenation during the Mesolithic and early Neolithic, was
also evident. The resulting core tablets included two later Neolithic or early Bronze Age examples in field 11, from fine examples of sub-pyramidal and single-platform flake cores. Their presence is another indicator of this field’s distinctive use.

Flakes are best characterised as small and squat, generally being no more than 30mm maximum dimension, with a length to width ratio of between 0.6:1 and 2:1. The majority have diffuse bulbs indicating the use of soft hammers or the controlled use of hard hammers. The assemblage includes: no more than 1 or 2 core trimming or shaping flakes in each of the collections from the triple-ditched round barrow, the Three Hills Barrow Group, the double pit alignment, and from fields 2, 2B, 3, 8, 10, 12, 16, 24, and 32, with another 4 in field 4, and 11 from field 11; 2 pieces, from fields 11 and 32, which were ideal as tool blanks, and another, from field 46, in the shape of an oblique arrowhead, but without retouch; 4 thinning flakes from the double pit alignment and in fields 2, 2B, and 16; the single finishing flake from each of the collections in fields 16, 19, and 24, and a further 12 from fields 11 and 12, divided equally between these two collections. Spalls were also discovered: solitary pieces were found during the excavation of the double pit alignment and in fields 2, 2B, 17, and 27; fields 16, 21, and 22 each produced 2 spalls; and in fields 11 and 12 a total of 7 and 6 were found respectively. They tend not to be a feature of surface collections, given they are usually less than a centimetre in size, suggesting both high rates of discovery and fairly representative lithic scatters at Thornborough. This evidence, when taken together, indicates sporadic tool manufacture in a number of locations across the study area, but particularly on the eastern side of Chapel Hill in fields 11 and 12.

Blades and bladelets are found in much smaller numbers than flakes (Tables D3.1–3.3), no doubt reflecting the higher share of later Neolithic and early Bronze Age pieces in the assemblage. Unsurprisingly, the triple-ditched round barrow and the Three Hills round barrow produced by far the largest single collection of blades and bladelets (Tables D3.6–3.7). Bladelets also occur elsewhere, including 3 or more from fields 2B, 5, 11, 12, and 16. A small number of these are clearly related to the production of microliths. By contrast, other blades, from the triple-ditched round barrow, the Three Hills Barrow
Group, and from fields 5, 12, 16, 21, and most especially fields 2B and 11, are larger than earlier examples and most likely date to the Neolithic.

The non-bulbardebitage, or irregular chunks and chippings, account for 290 pieces or 11% of the total assemblage. Not surprisingly, its overall proportion is lower in the ploughzone collection. It most often occurs in fields with the largest amount of lithics (Tables D3.5–D3.6), again suggesting that these scatters are true representations of what was originally discarded, and even more often in the excavated collections from the triple-ditched round barrow, the gypsum pits, and the Three Hills round barrow (Table D3.6). The concentration in field 21 produced no irregular waste. Their small numbers prevent a more detailed spatial investigation, but there is a minor concentration of chippings in two transects of field 11, which probably relate to an isolated knapping event since all the pieces are made on the same dark yellowish-brown flint.