# The domestic sphere of the Corded Ware Culture: a functional analysis of the domestic implements of three Dutch settlements

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## Chapter 4. Keinsmerbrug[6]

### 4.1 The site

Keinsmerbrug was discovered in 1985 and excavated in 1986 (Van Heeringen and Theunissen 2001). Three occupation layers were documented, dating to the Medieval, Roman and Neolithic periods. The Neolithic layer was 20cm thick, and in the profile drawings several layers indicates several occupations of the site (Nobles 2012a). In addition, five charcoal concentrations were interpreted as hearths. Several features, such as 25 pits and more than 600 stake and postholes, were recorded in the Neolithic layer, but at the time of excavation no structure was identified. Subsequently, however, at least five dwelling structures were revealed during the spatial analysis (Nobles 2012a, 2012b). In the south of the site there were two structures which overlapped, and some posts where occasionally reused (Nobles 2012b: 176). Another structure was identified in the central area of the site, and, finally, two overlapping structures were recorded in the northern part of the site. The five structures had a trapezoidal shape with rounded corners, and a central post line (Nobles 2012). Based on the analysis of the sections (Nobles 2012a, 2012b), two phases were distinguished: during the first phase southern structures and some water pits were constructed and then abandoned; during Phase 2 the central structure and the two northern structures were built (Nobles 2012b; Smit *et al*. 2012).

Keinsmerbrug is located within the large tidal basins of West-Friesland. The area started to silt up between 4500 and 4000 BC as a result of sea level rise, becoming habitable around 2900-2800 BC. At the beginning of the third millennium BC, the beach barriers developed, resulting in a more closed coastline. Peat started to form and by 3200-2900 BC the shoreline was almost completely closed. A lagoon also formed, and was active for at least two centuries. At the end of this period, the landscape was characterized by a combination of diverse ecological zones. Finally, from 2900 to 2250 BC, two branches of the large tidal channel developed, forming a brackish marsh environment, protected on the west border by a complex of beach barriers and connected to the sea by an open water system (Smit 2012). Late Neolithic settlements flourished in this environment, with the inhabitants exploiting several ecological niches. The site of Keinsmerbrug was located on the highest parts of the tidal flats, and the archaeological materials were '*embedded in the lowest level of peat covering tidal flats*' (Smit 2012 following Bosman 1986: 19) (Figure 4.1).

[6] This chapter is an altered and abbreviated version of García-Díaz 2012.

Botanical analysis suggests that Keinsmerbrug was located in a brackish environment, with salt marsh areas and some fresh water areas nearby. Keinsmerbrug was situated in an open landscape, and the local vegetation was dominated by grassland. Trees were not numerous in the immediate vicinity of the site, although pollen spectra show that trees may have been present (Kubiak-Martens 2012: 87). Cereal consumption was identified during the botanical and chemical analysis of the organic residues found on several pots. Five of the six residues contained indicative plant remains suggesting that emmer grains were eaten after being cooked in liquid with a small amount of animal fat (Oudemans and Kubiak-Martens 2012: 129). However, evidence of crop cultivation was not found (Kubiak-Martens 2012). The faunal assemblage shows a strong maritime influence. Both saline and freshwater fish species were identified, some of which migrated between the two water currents. Although fishing activities were focused on catching flounder, the analysis of the other fish species caught indicates a broad diversity of fishing activities (Zeiler and Brinkhuizen 2012). Fowling, however, was the most important subsistence activity at the site. In fact, the analysis of the large quantities of duck bones collected during the excavations has revealed that the inhabitants specialized in hunting several duck species. Mallard, teal, and widgeon were the most numerous, but at least 16 bird species were identified. Most birds will have been consumed, even though some of them, such as the eagle, may have been caught for their feathers (Zeiler and Brinkhuizen 2012: 137). The number of birds calculated – between 5,000 and 10,000 individuals – implies mass kills. Fowling techniques may have included nets, hunting traps, or hunting with arrowheads. In addition, the hunt might have taken place during the moulting period, when ducks cannot fly (Zeiler and Brinkhuizen 2012: 138). Other mammal remains were not numerous. However, the presence of domestic animal bones (mostly cattle, but also pig and dog) and wild animals (wolf, polecat, marten, mice and some amphibians) suggests that a combination of hunting and herding was taking place (Zeiler and Brinkhuizen 2012).

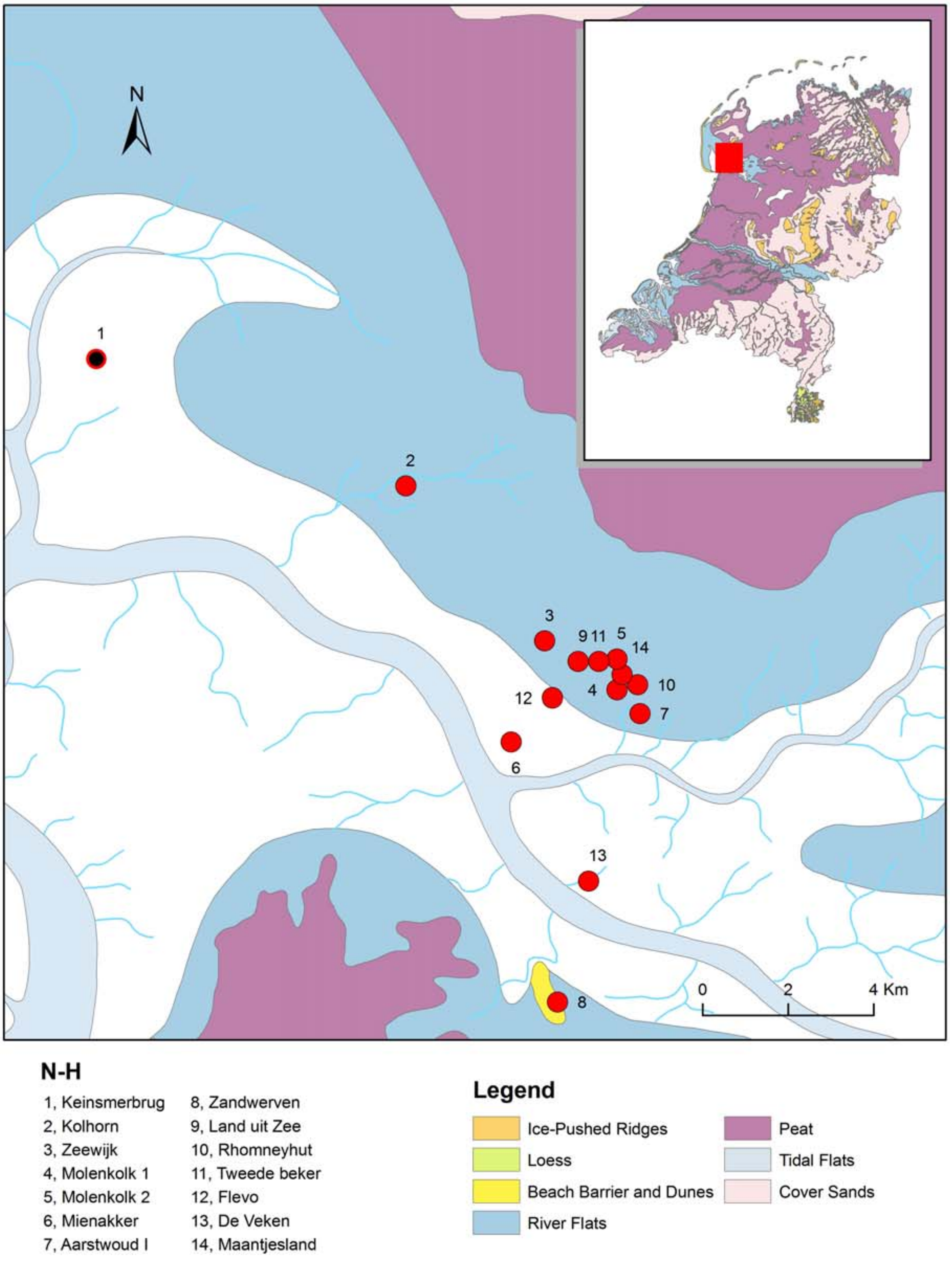


*Figure 4.1. Location of Keinsmerbrug and other known Corded Ware Culture sites (after Vos and de Vries 2011).*

Pottery analysis revealed a great variety of forms. The 219 sherds analysed belonged to at least 19 vessels, with a wide typological variety. Three different types of vessels could be distinguished: thin-walled, medium-walled and coarse-walled pottery, tempered with seven types of materials, and 14 different temper combinations. The vessels have a high rim and neck zone with flat bases. In addition, some of the thin-walled vessels have a fluid S-shaped profile (Beckerman 2012b). A possible functional differentiation of the different types of vessels was dismissed following the analysis of the organic remains (Oudemans and Kubiak-Martens 2012). Instead, pottery variation was interpreted as the result of several potters, potentially with diverse origins, producing the vessels (Beckerman 2012b: 55). During post-excavation, the site was dated by pottery typology to the CWC period. In 2013, six calibrated radiocarbon dates were published, all falling within the period of 2900-2300 cal BC. However, the calibration curve shows a clear plateau which prohibits a final delimitation of calibrated dates (Smit 2012: 20) (Figure 4.2).

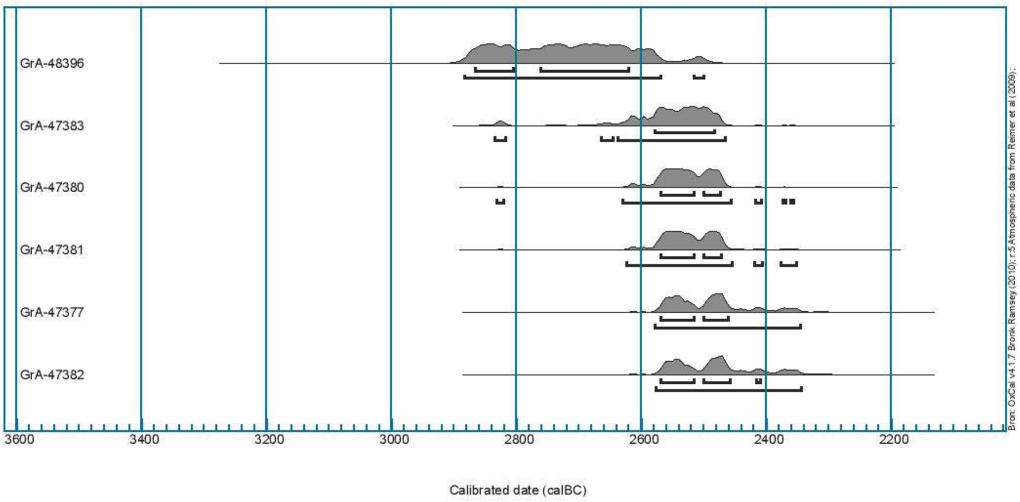


*Figure 4.2. Multiplot of calibrated 14C outcomes (Smit 2012: 21).*

#### 4.2 The material analysed

Keinsmerbrug was excavated in its totality. The site was divided into four trenches, each separated by a metre-wide bank (Nobles 2012a). Trench 1 was excavated down to the peat layer. During the excavation, several pits were documented. The few finds from these pits were ascribed by typo-chronology to the Roman period. Trench 2 was also excavated down to the peat layer in meter squares in artificial spits of five centimetres. The site was excavated by trowel, and the soil from every square meter was sieved. At the start of the excavation, the location of each find was documented individually; however, as the excavation proceeded it became clear that the site was bigger than expected, so artefacts were then collected by square metre. Trench 3 was divided into squares of 4x4m. These squares were again divided into four squares. One of the squares was completely excavated using a spade, after which the soil was sieved. The other three squares were excavated by trowel, and the soil was also sieved using a 2mm mesh. The information concerning the excavation of Trench 4 was not published in the original site report, so the methodology is unknown (Nobles 2012a: 24). During the excavation, a small amount of archaeological material was recovered, which provided an excellent opportunity to understand the nature of the site, the activities that took place, and the spatial patterns of occupation.

The assemblages of flint, stone and amber were small enough to make a complete analysis of the sample possible. A total of 416 flint implements were recovered at Keinsmerbrug, the majority of which were picked up by hand, but an undetermined number of implements came from the sieve. In addition, a total of 94 stone pieces were recovered. Most of the pieces are very small (between 10 and 50 millimetres), with no traces of manufacture or use. Finally, half a bead and two small fragments of amber were recovered. The level of fragmentation in both stone and flint implements from Keinsmerbrug was very high: more than 80% of the flint implements displayed some kind of fracture, and for some tools, such as flakes, the percentage was even higher. Out of a total of 159 flakes, only 45 are complete (28%). The same is true of blades and cores. This may be attributed to the large quantity of waste fragments collected at the site. It also suggests, as will be discussed below, that knapping took place at the site. Another reason for the high level of fragmentation at Keinsmerbrug could be the extent to which the flint was exposed to fire. More than 50% (N=218) of the flint implements show different degrees of heating. In most cases (N=128) the surface of the implements has cracks (*craquelé)*. This complicates not only the use-wear analysis, but also attempts to determine the source of the flint. Consequently, a lot of information about the tools has been lost. Moreover, some of the flint implements had some post-depositional surface modifications (PDSM), such patinas and abrasion, but in most cases the edges and use-wear could still be readily analysed. Most of the stone fragments also displayed a high level of degradation, especially the granite, which degraded as a result of weathering. In some cases, this led to some fragments of granite being almost entirely reduced to gravel. At the same time, a high percentage of granite (42.3%) showed signs of heating which caused clear physical modification of the stones, including colour changes and decomposition. In contrast, thermal alteration or fragmentation of quartzite is not as extensive as for the granite. However, the quartzite surfaces are not very well-preserved either, due to PDSM. As a result, the use-wear traces on the stone artefacts were not very well preserved and interpretation of the worked raw material was not possible. Finally, no residues were observed. Even though the three amber artefacts were in good condition, the level of fragmentation was very high. In the case of the one finished bead, a recent fracture was observed, so only half of the bead was preserved. All three were microscopically studied for traces of production and wear.

### 4.3 Flint, stone and amber procurement network

Although Keinsmerbrug was located in a resource-rich environment, from a lithological perspective the immediate areas surrounding Keinsmerbrug were poor. Flint, stone and amber were not present in the close vicinity of the site, and the materials had to be brought in from further away. Northern flint and stones were probably obtained from the Pleistocene deposits of Wieringen and Texel, located 15km away from the settlement.

The flint was classified into six diverse groups, all considered to have a northern origin (García-Díaz 2012) (Table 4.1). As previously stated, the amount of material with alterations caused by contact with fire is very high, and around 30% of the flint could not be characterized in terms of its raw material origin. The common characteristics of the documented flint are a light-grey colour with a fine-grained matrix.

| | |
|---|---|
| R1 | Grey and fine-grained flint with fossils |
| R2 | Grey and fine-grained flint without fossils or mineral inclusions |
| R3 | Flint with old surface |
| R4 | Rolled pebbles |
| R5 | Grey flint without fossils but with light inclusions |
| R6 | Fine-grained flint with a yellow and grey mottled colour |

*Table 4.1. Classification of flint raw material.*

| | Flakes | Wastes | Corefragment | Core | Cpdf | Blades | Splint | Pebbles | Tested pebbles | Uns | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 40.3 | 30.5 | 83.3 | 44.4 | 40 | 43.5 | 25 | - | - | - | 34.9 |
| R2 | 13.8 | 12.1 | 16.7 | 11.2 | 20 | 13 | 37.5 | - | - | - | 13 |
| R3 | 18.2 | 16.8 | - | 44.4 | 20 | 13 | 12.5 | - | - | 25 | 17.5 |
| R4 | - | - | - | - | - | - | - | 100 | 100 | 16.7 | 1.4 |
| R5 | 5.7 | 1.1 | - | - | 20 | 4.3 | - | - | - | - | 3.1 |
| R6 | 0.6 | - | - | - | - | - | - | - | - | - | 0.2 |
| Rind | 21.4 | 39.5 | - | - | - | 26.1 | 25 | - | - | 58.3 | 29.8 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Table 4.2. Flint primary classification versus flint variety (%)(Cpdf: core piece decortification fragment; Uns: unsure; ind: indetermined)(García-Díaz 2013: 60).*

| | Flakes | Wastes | Corefrag | Core | Cpdf | Blades | Splint | Pebbles | Tested pebbles | Uns | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R1 | 64 | 58 | 5 | 4 | 2 | 10 | 2 | - | - | - | 145 |
| R2 | 22 | 23 | 1 | 1 | 1 | 3 | 3 | - | - | - | 54 |
| R3 | 29 | 32 | - | 4 | 1 | 3 | 1 | - | - | 3 | 73 |
| R4 | - | - | - | - | - | - | - | 2 | 2 | 2 | 6 |
| R5 | 9 | 2 | - | - | 1 | 1 | - | - | - | - | 13 |
| R6 | 1 | - | - | - | - | - | - | - | - | - | 1 |
| Rind | 34 | 75 | - | - | - | 6 | 2 | - | - | 7 | 124 |
| Total | 159 | 190 | 6 | 9 | 5 | 23 | 8 | 2 | 2 | 12 | 416 |

*Table 4.3. Flint primary classification versus flint variety (N) (Cpdf: core piece decortification fragment; Uns: unsure) (García-Díaz 2013: 60).*

The variety of stones found at Keinsmerbrug was very low, with a predominance of igneous rocks (89.2%). Granite was very fragmented, mainly because of natural alterations such as weathering. Metamorphic rocks, mostly quartzite (12.76%), were also represented, with a total weight of 113 grams. The quartzite represented was all fine-grained with a dark-grey colour. A small number of other types of stones were also recorded. One fragment of an unspecified type of sedimentary rock and one fragment of jet completed the inventory of raw materials (Table 4.4) (García-Díaz 2012).

| | | N= | % |
|---|---|---|---|
| Metamorphic | | | |
| | Quartzite | 12 | 12.7 |
| Igneous | | | |
| | Granite | 78 | 83 |
| Sedimentary | | | |
| | Uns | 1 | 1.0 |
| | Jet | 1 | 1.0 |
| Indeter | | | |
| | Uns | 2 | 2.1 |
| Totals | | 94 | 100 |

*Table 4.4 Stone raw material frequencies (Uns: unspecified)(García-Díaz 2013: 61).*

Finally, the two small fragments of amber and the broken bead found at Keinsmerbrug were characterized by a translucent orange colour. Traditionally, three possible provenances for amber have been considered. First, amber nodules may have been washed out from Saalian boulder clay deposits. Secondly, amber nodules may also have been washed out by marine transgressions in the Baltic area. And finally, some of the amber may also derive from lignite deposits dating from the Pliocene in the northern Netherlands and Germany (Huisman 1977). It is therefore entirely possible that the most suitable area for obtaining amber could have been the tidal Pleistocene deposits of Wieringen, or the coastal zone of the Noord-Holland province.

## 4.4 Techno-typological analysis of the flint, stone and amber implements

### *4.4.1 Flint*

At Keinsmerbrug, the presence of cores, fragmented cores and core preparation flakes suggests that flint was carried to and knapped at the site. The production process reveals that people from Keinsmerbrug used small flint nodules and rolled flint pebbles to produce the tools they needed. The size of the cores, between 12 and 53mm, suggests that they were exploited until their exhaustion. The necessity of collecting the raw material approximately 20km away from the site explains why the cores were exhaustively exploited. The low quality of the raw material determined to a great extent the final tool types obtained.

A combination of direct hard percussion and bipolar flaking was applied to the cores and pebbles. At Keinsmerbrug, the sample is so small that it is not possible to determine if there was a predetermined technique to produce some tool types. Only five cores display evidence of a bipolar approach, but only one flake and two blades show evidence of bipolar flaking. Bipolar flaking is generally related to low quality flint, and, in the case of the CWC in general, also with obtaining particular tool types.

Flakes were the most frequently occurring typological category, making up almost 38% (N=159) of the assemblage; few blades were present (Table 4.2 and 4.3). Flakes were not well preserved, with more than 70% fragmented. Around 50% of the flakes (N=81) had a cortical surface, supporting the hypothesis of local production of flint at the site. The absence of blade cores suggests that blades were an accidental product of flake production; only 13% of them were complete. Medial-proximal fragments occurred frequently (43.47%; N=10), with fewer medial and distal ends. Most of the blades were small (between 7.5 and 32mm) and made of R1 flint (43.4%; N=10). The platform or impact point was generally missing, and no preparation of the platform was observed. The widths of the platforms varied between one and 30mm and the angles of percussion ranged from 50 to 130 degrees. The impact point was mostly flat but sometimes displayed a slight cone of percussion. This suggests that the implements were knapped using a hard percussion technique.

A small number of retouched tools were found at Keinsmerbrug. The retouched tools included one end scraper (1465), three retouched flakes (1485, 1471 and 1721) and one retouched blade (1856). One borer produced from a blade was recovered (1671). The borer was very burnt so it was not possible to distinguish the retouch. However, the proximal side had been modified to obtain an elongated edge. Two strike-a-lights were also recovered. One of them (1486) had a pointed shape and the other one (1783) had a prismatic shape, but both had a rounded point on one of the edges (Figure 4.5).

| | Flake | Retouched flake | Blade | Retouched blade | Borer | Scraper |
|---|---|---|---|---|---|---|
| R1 | 64 | - | 9 | 1 | - | 1 |
| R2 | 21 | 2 | 3 | - | - | - |
| R3 | 28 | 1 | 4 | - | - | - |
| R4 | - | - | - | - | - | - |
| R5 | 10 | - | 1 | - | - | - |
| R6 | 1 | - | - | - | - | - |
| Rind | 35 | - | 5 | - | 1 | - |
| Total | 159 | 3 | 22 | 1 | 1 | 1 |

*Table 4.5 Flint artefact type versus flint variety (N)(Ind: indeterminate)(García-Díaz 2013: 61).*

### *4.4.2 Stone implements*

Less than 100 fragments of stone were found at Keinsmerbrug. Due to a high degree of fragmentation, heating and various PDSM, traces of production and use were poorly preserved and difficult to distinguish. Besides one hammer stone and one flake, the other stone implements recovered from the site showed no modifications that could be associated with manufacture or use (Table 4.6). The flake (1901) was only 40mm long, 26mm wide and 4mm thick. It had a very well-developed bulb of percussion, suggesting the use of hard percussion. The surface was altered, and the flake displayed two fractures on the proximal side. Finally, the hammer stone was a fragment of granite with no clear technological traits. The stone was probably selected for its natural shape and used without modification. The tool did not have any fractures, making it one of the few complete implements from the site. The surface showed slight weathering but the tool showed no traces of heating, or any other kind of alterations. One of its surfaces showed impact scars suggesting its use as a hammer stone (García-Díaz 2012).

| | | Hammer stone | Flake | Modified | Unmodified | Total (N) | % modified |
|---|---|---|---|---|---|---|---|
| Metamorphic | | | | | | | |
| | Quartzite | - | 1 | 1 | 11 | 12 | 8.3 |
| Igneous | | | | | | | |
| | Granite | 1 | - | 1 | 77 | 78 | 1.2 |
| Sedimentary | | | | | | | |
| | Unspec | - | - | - | 1 | 1 | - |
| Others | | | | | | | |
| | Jet | - | - | - | 1 | 1 | - |
| Indeter | | | | | | | |
| | Uns | - | - | - | 2 | 2 | - |
| Total | | 1 | 1 | 2 | 92 | 94 | 9.5 |

*Table 4.6 Raw material versus artefact type (Unspec: unspecific; Uns: unsure) (García-Díaz 2013: 62).*

### *4.4.3 Amber*

Amber ornaments are very common at Neolithic sites and, of course, in Corded Ware settlements in the Noord-Holland province (Bulten 2001; Piena and Drenth 2001; Van Gijn 2014a). Amber represents a large portion of the material assemblage at several sites, but amber accounted for just a tiny proportion of the assemblage from Keinsmerbrug. Only half a bead and two small fragments were recovered. Taking into account the small number of amber artefacts and the absence of production waste, amber ornaments were probably not produced at Keinsmerbrug. However, the production of amber beads and ornaments has been documented at several Corded Ware settlements, such as Mienakker, Zeewijk and Aartswoud (Bulten 2001; García-Díaz 2013; Piena and Drenth 2001; Van Gijn 2014a). The analysis of the bead found at Keinsmerbrug showed that the amber was modified to create a circular shape. Experimental work has shown that amber can be worked in two different ways: by cutting and by flaking (Bulten 2001; García-Díaz 2013). Flaking negatives were observed on the surface of the bead and it had a biconical perforation. A flint borer was probably used to produce this perforation. Small borers have been found at other Neolithic sites such as Mienakker, and preliminary analysis suggests that they were used to produce beads and amber ornaments. No borers with these characteristics were found at Keinsmerbrug, further supporting the idea that amber bead production did not take place there. The absence of production waste similarly indicates that amber production took place elsewhere. As is the case with other Neolithic sites (Bulten 2001; Van Gijn 2014a;

Verschoof 2008), beads and pendants were curated objects: removed when the site was abandoned. In this case, the broken bead was simply discarded.

### 4.5 The use of the domestic implements at Keinsmerbrug

#### *4.5.1 Flint*

A small percentage of flint implements – 16 artefacts (3.8%) with 18 used zones – display traces of use (Fig. 4.5 and 4.6, Table 4.7). In addition, seven implements have non-interpretable use-wear traces. All of them are so deteriorated because of contact with fire that it is not possible to identify whether traces were present. Most of the artefacts that display use-wear are blades (N=5) and flakes (N=7), with four waste fragments also showing traces of wear.

| | | Longitudinal | Transverse | Boring | Pounding | Hafting | Indeter | Total |
|---|---|---|---|---|---|---|---|---|
| Plant | | | | | | | | |
| | Reeds | 1 | - | - | - | - | - | 1 |
| | Wood | 2 | 2 | - | - | - | - | 4 |
| Animal | | | | | | | | |
| | Bone | 1 | 3 | - | - | - | - | 4 |
| | Hide | 2 | 2 | - | - | - | - | 4 |
| | Soft animal | - | | | | | 1 | 1 |
| | Animal uns | - | - | 1 | - | - | 1 | 2 |
| Mineral | | | | | | | | |
| | Pyrite | - | - | - | 2 | - | - | 2 |
| Hafting | | | | | | | | |
| | Indeter | - | - | - | - | 3 | - | 3 |
| Indeter | | | | | | | | |
| | Indeter | - | - | - | - | - | 7 | 7 |
| | Total | 6 | 7 | 1 | 2 | 3 | 9 | 28 |

*Table 4.7 The relationship between contact material and function (Uns: unsure; Indeter: indeterminate)(García-Díaz 2013: 66).*

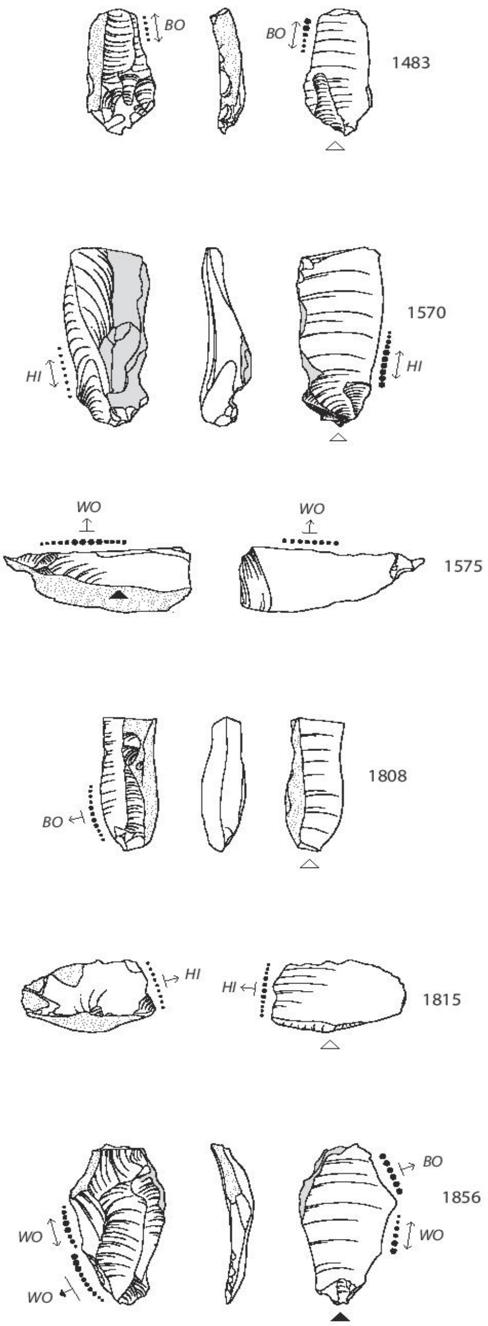


*Figure 4.3. Flint artefacts with traces of different materials (scale 1:1). 1483: unmodified blade; 1570: unmodified blade; 1575: unmodified fragment; 1808: unmodified blade; 1815: unmodified flake; 1856: retouched blade (García-Díaz 2012: 64).*

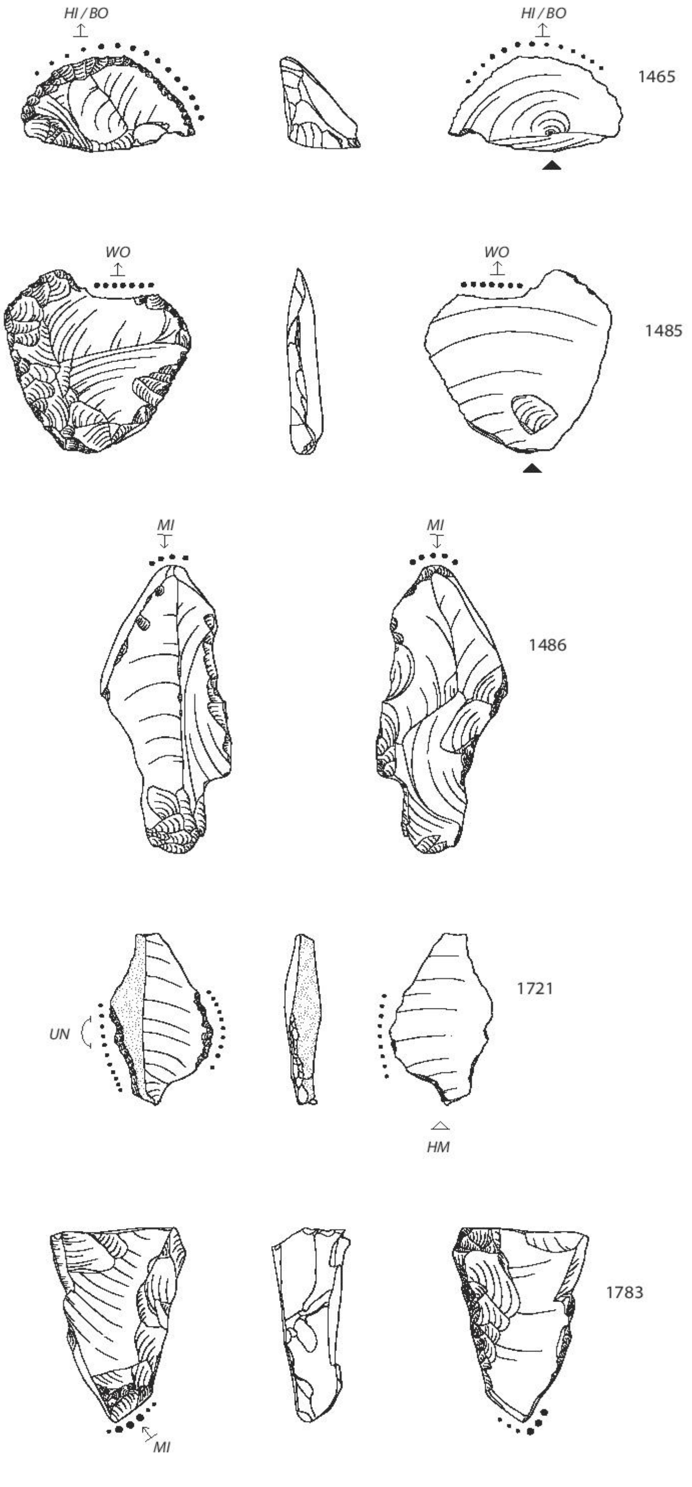


*Figure 4.4. Flint artefacts with traces of different materials (scale 1:1) 1465: retouched flake; 1485: retouched flake; 1486: strike-a-light; 1721: retouched flake; 1783: strike-a-light (García-Díaz 2012: 65).*

#### *4.5.1.1 Plant processing and woodworking*

One distal fragment of a flake (1522) displays a very well-developed polish. On both faces the polish has a fluid appearance, but on the dorsal face it is well-delimited by the edge of the tool. The use-wear is very much like the wear traces obtained from cutting softwood.

One blade, one flake and one piece of waste were used to work hard wood. The blade (1856) displays three used areas, two of which show traces of contact with hard wood; the other one, which will be discussed below, shows traces of contact with bone. On the proximal left edge of the blade, on the dorsal face, a row of small and edge damage can be observed. Around these retouches is a well-developed, bright and smooth polish. However, on the ventral face an isolated polish line parallel to the edge has been recorded. This suggests that the working angle of the tool was mostly high, with the dorsal face receiving most of the contact with the worked resource. The apparent transversal directionality seen on the tool further indicates that this tool was used for scraping wood. In addition, the left medial edge of the blade shows a wood polish with longitudinal motion, and small geometrical edge damage surrounded by wood polish can also be seen on the dorsal face; this use-wear is indicative of sawing hard wood.

One flake (1485) also shows use-wear of the type caused by sawing wood (Fig. 4.5). The polish is mostly developed on the ventral face so it is possible that the working edge was around 45 degrees. The flake also shows edge retouch on its left side. No use-wear has been documented on this edge, and the retouch may be derived from use, possibly from hafting.

Finally, a piece of waste (1575) displays isolated edge damage on the medial section of the distal edge. The use-wear is not very developed, but shows a clear longitudinal directionality. This probably means that the tool was used for only a short time to cut wood.

#### *4.5.1.2 Animal resources*

Traces of contact with animal resources are observed more frequently. A total of 64.7% (N=11) of the artefacts were used for working various animal materials. Eight tools show clear traces of bone and skin work and three flint tools show possible traces that resemble work on indeterminate animal resources.

*Hide working*

Two unmodified flakes, one retouched flake and one blade were used to work hide. Two of the flakes (1815 and 1471) show a transversal motion and another (1583) has a clear longitudinal motion. On the retouched flake a greasy polish is documented inside and around the edge retouch. In none of these cases is the use-wear very developed, which makes it impossible to infer whether they were used on fresh or dry skin. On the other hand, the blade (1569) displays a well-developed polish with a longitudinal directionality. The surface of the tool shows extensive damage from contact with fire. However, remarkably enough, on the dorsal side of the blade the damage produced by fire affects only the right side, and the damage is clearly marked by a straight line. One explanation for this observation is that this straight line represents the limit of a handle.

*Bone working*

Three blades and one scraper were used to work bone. Points of a well-delimited, highly reflective polish have been recorded on two of the blades (1483 and 1808). One blade shows a longitudinal motion while the other has evidence of a transversal motion. The third blade (1856) displays bone and wood polish. The bone polish is located on the left distal edge of the tool and is only preserved on the ventral face. The directionality in the polish suggests that the blade was used to scrape bone. Unfortunately, the dorsal face of the edge consists of a cortex on which it is impossible to distinguish any kind of use-wear. Lastly, the scraper (1465) shows a very well-developed polish from bone working on the ventral and dorsal sides (Fig. 4.6).

*Unspecified animal resources*

Three tools display use-wear that can be related to contact with unspecified animal materials. One borer (1671) is made of a proximal blade fragment. The surface of this blade is so altered by fire that it is impossible to distinguish even the kind of flint it is made from. The proximal part of the blade was prepared in such a way as to form an elongated, pointed end. The fire also caused the right side of the proximal part of the blade to break. However, the left side of the tool and the point are very rounded, indicating that it was used as a borer. Also, a polish very similar to that caused by working hide has been recorded. One flake fragment (1704) displays a polish that is very similar to the wear traces obtained from contact with a hard animal material like bone, but again, because of the fire and PDSM, it was not possible to interpret the animal material or motion. Finally, one retouched flake (1721) also displays use-wear, but its poor development makes a more detailed interpretation impossible. The proximal and medial left edges of the tool show small and continuous retouch. On the unmodified ventral face, isolated spots of polish without directionality are visible. This type of polish has been interpreted as the result of the contact between the tool and its haft, although the medial part of the right lateral edge also shows small and continuous retouch. Polish from contact with an unspecified hard animal material has been recorded on both sides of the edge, as well as polish from a medium soft material that could not be specified. Although the poorly developed polish and PDSM make it difficult to determine use-wear, all the evidence points to this implement being hafted and involved in butchering activities.

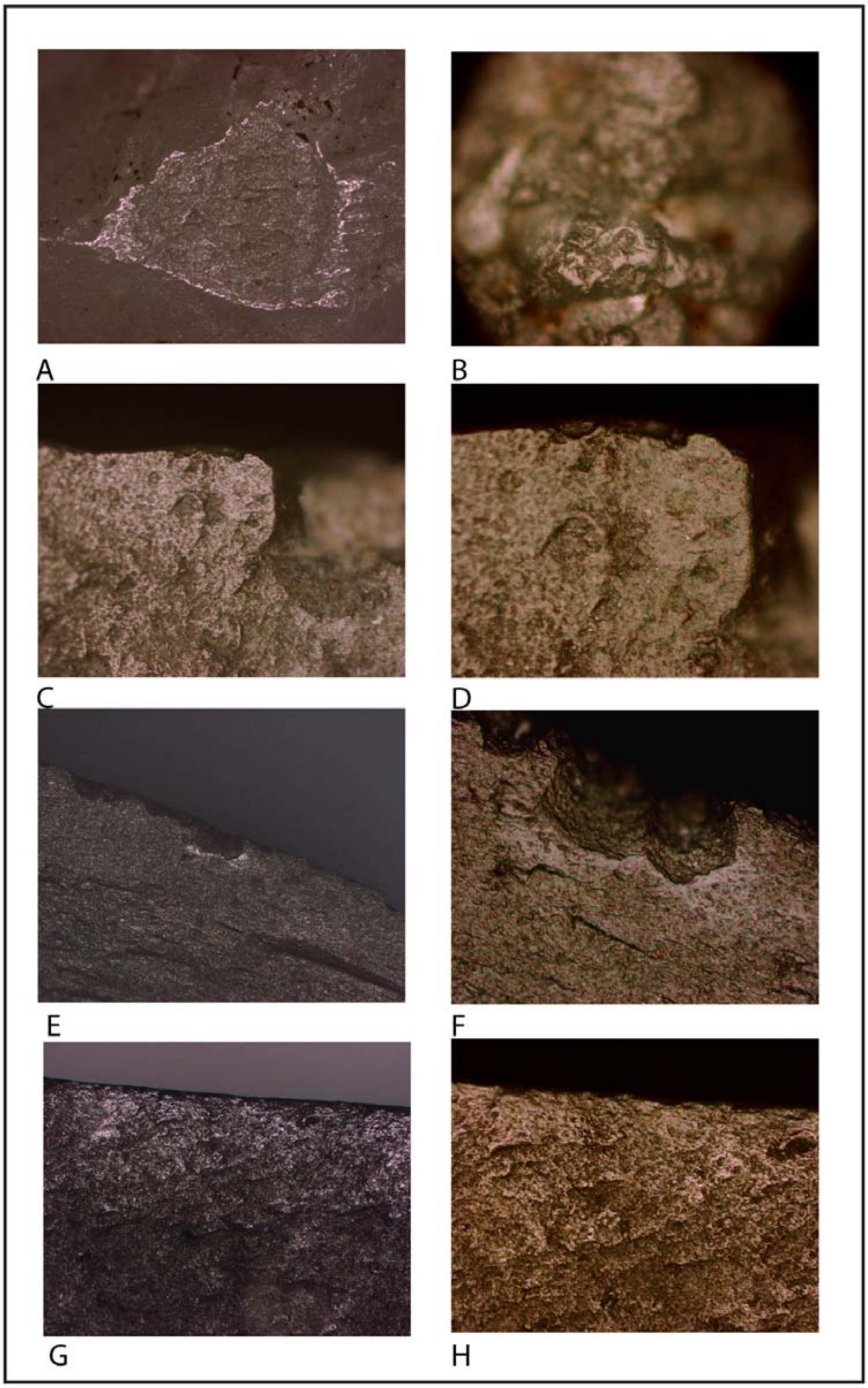


*Figure 4.5. A: bright surface produced by contact of the flint implement surface with mineral (50x) (1485); B: rounded edge with linear and small bands of mineral polish (50x)(1485); C and D: use-wear displayed on a hide scraper (100x and 200x)(1471); E and F: edge damage and polish produced by bone work (50x and 200x) (1483); G and H: very well developed longitudinal polish produced by the contact with soft wood (50x and 200x)( 3-1-71 n1)(García-Díaz 2012: 67).*

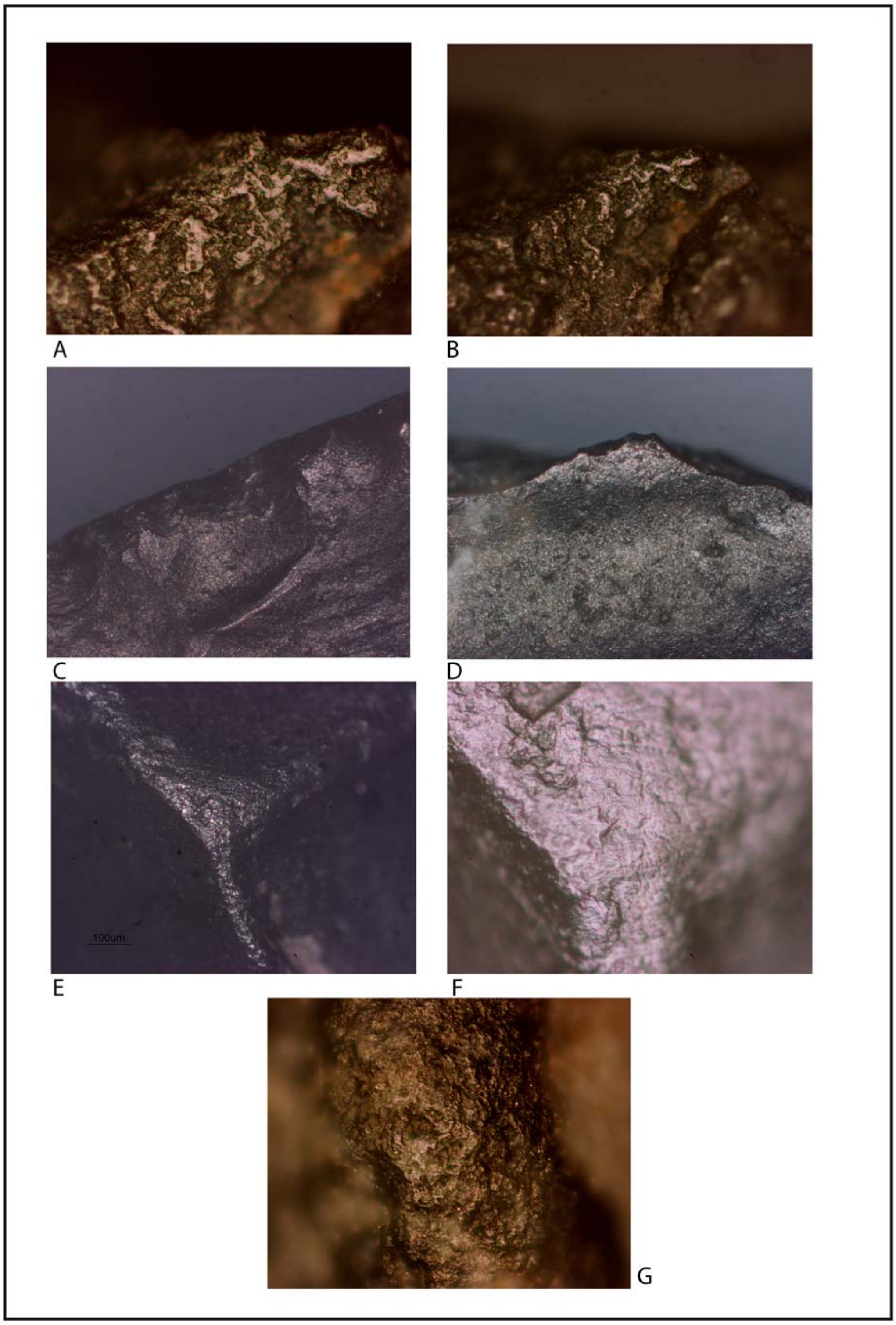


*Figure 4.6. A and B: use-wear displayed on a hide scraper (20x and 5x) (1586); C and D: use-wear displayed on a bone scraper (5x and 10x)( 1465); E and F: bright surface produced by a contact of the flint implement surface with mineral (10x and 20x)(1783); G: polish very similar to the one that develops after boring skin (20x)(1671) (García-Díaz 2012: 69).*

#### 4.5.1.3 Mineral resources

Two waste flints were found at Keinsmerbrug (1486 and 1783). Both implements had an elongated side on which use-wear was observed. The use-wear is very well-developed and is characterized by small impact fractures and a rounded edge with small linear bands of mineral polish. This observation suggests that these tools were used as strike-a-lights. Both tools have a very bright surface, a fact which has been explained by other authors as the result of contact between flint and pyrite, with the powder acting as an abrasive on the tool's surface (Van Gijn *et al.* 2006: 155). Strike-a-lights were a common tool type during the Mesolithic, and they have been interpreted as personal items (Van Gijn *et al* 2006: 155; Van Gijn 2010a: 132, 175). In this sense, strike-a-lights could be compared with the amber beads, which are also related to the personal identity of individuals in the past.

#### 4.5.1.4 Unknown materials

This category contains seven tools that display ambiguous and poorly developed traces. Unfortunately, the poor preservation of the surface of the tools makes a functional interpretation impossible. All of them have been altered by contact with fire and only some archaeological edge damage can be observed. The vast majority of the tools are complete or fragmented flakes, although use-wear traces were identified on a complete blade (1871) and a distal blade fragment (1769).

#### 4.5.1.5 Hafting traces

Hafting traces tend to be overlooked in use-wear analysis. Increasingly, however, experimental work has shown that hafting can leave substantial traces (Rots 2008; Rots and Vermeersch 2004). The authors stress that the absence of experimental references and the resulting lack of experience with hafting traces are responsible for the fact that some hafting traces, such as the bright spots, are often interpreted as PDSM. At Keinsmerbrug, three implements showed features suggestive of hafting. In two cases, the use-wear recorded on the tools can be defined as bright *spots* (Rots and Vermeersch 2004: 1295). On the other tool, the position of the fire-induced alterations, clearly marked by a straight line in its surface, suggests that the tool was hafted when it came into contact with the fire. In any case, the incidence of hafting is not very high. This can in part be explained as the result of a high level of alteration of the flint implements, but also because most of the tools were probably used without hafting.

#### *4.5.2 Stone*

Although the entire assemblage of stone tools was analysed for use-wear analysis, only one hammer stone displays traces of use (Fig. 4.7): the distal edge of the tool displays traces of pounding and percussion. Unfortunately, the worked material could not be inferred and there was no clear evidence of hafting or handling. The hammer stone was sent for phytolith analysis, but unfortunately, even though the surface of the hammer stone shows some phytolith remains, the plant species could not be determined (García-Díaz 2012).


*Figure 4.7. Traces of pounding and percussion (10x)(García-Díaz 2012: 70).*

#### *4.5.3 Amber*

Use-wear analysis can also provide interesting information about the use of the amber beads. Sometimes, the friction of the cord on the surface of the amber provides important information which enables us to understand the use and shape of the ornaments. The half fragment of an amber bead found at Keinsmerbrug shows wear traces along the rim of the perforation, indicating that it was worn on a cord as a decorative ornament. The function of the bead was probably related to the social status of the individual and their position within the group and wider community (Fig. 4.8).

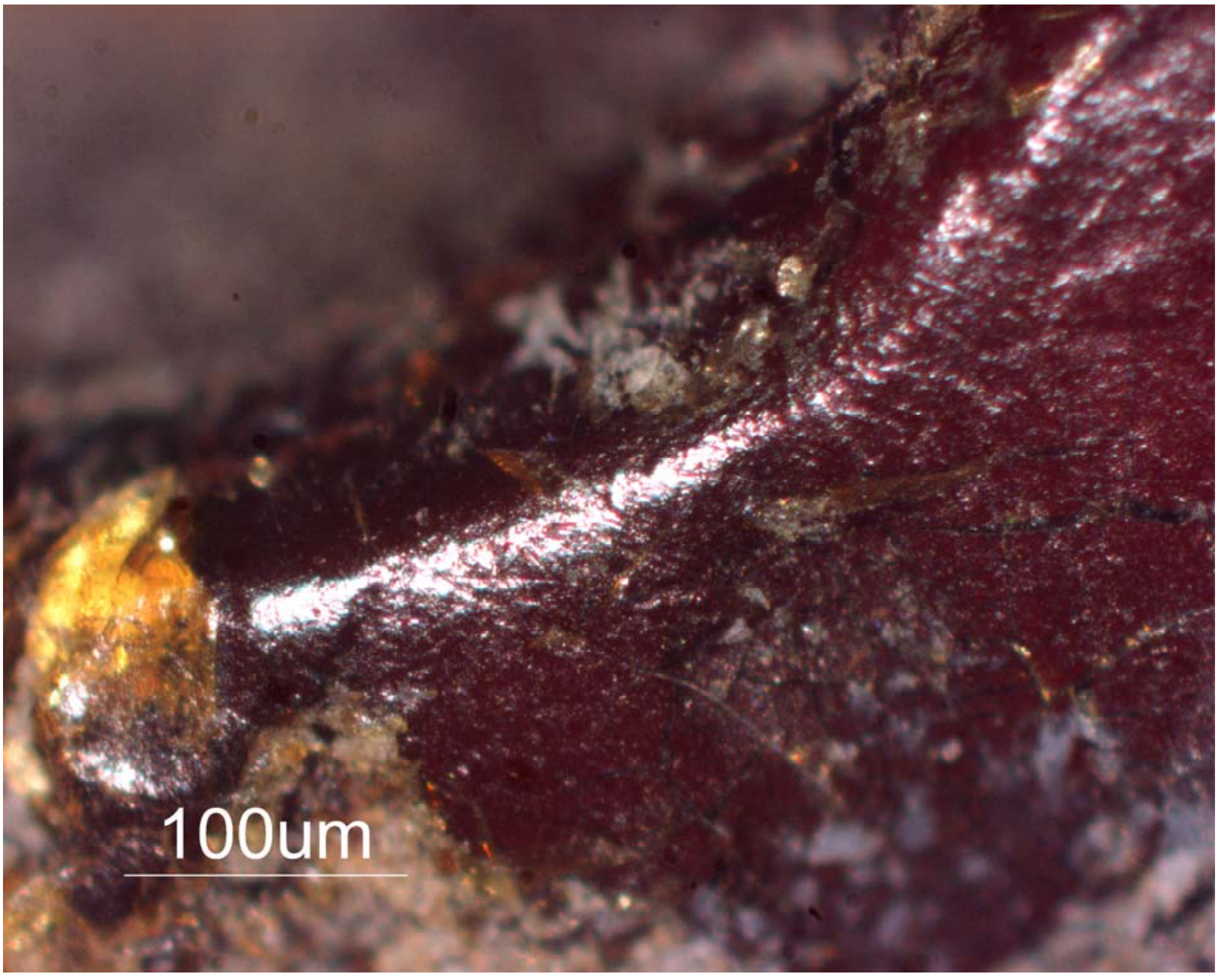


*Figure 4.8. Wear traces along the rim of the perforation of the half amber bead (10x)(García-Díaz 2012: 71).*

### 4.6 The spatial distribution of flint, stone and amber implements at Keinsmerbrug

Nobles' spatial analysis (Nobles 2012b) shows that seven activity areas were present at Keinsmerbrug. During the analysis, the northern structures were considered as a palimpsest. Consequently, it was estimated that the use of the space did not change between the construction phases (Nobles 2012b). Flint distribution analysis was based on 354 of the 416 implements analysed, which come from the cultural layer and from features. Stone distribution analysis was based on 91 stones, and three fragments of amber were used for the amber distribution analysis. The map of the flint spatial patterning shows a general distribution of the flint across the site (Fig. 4.9), although some concentrations of flint are recorded, mostly in the northern part of the site, and to a lesser extent in the south (Fig. 4.9). These concentrations are related to the activity areas which Nobles designated Areas 1, 2, 3 and 4.

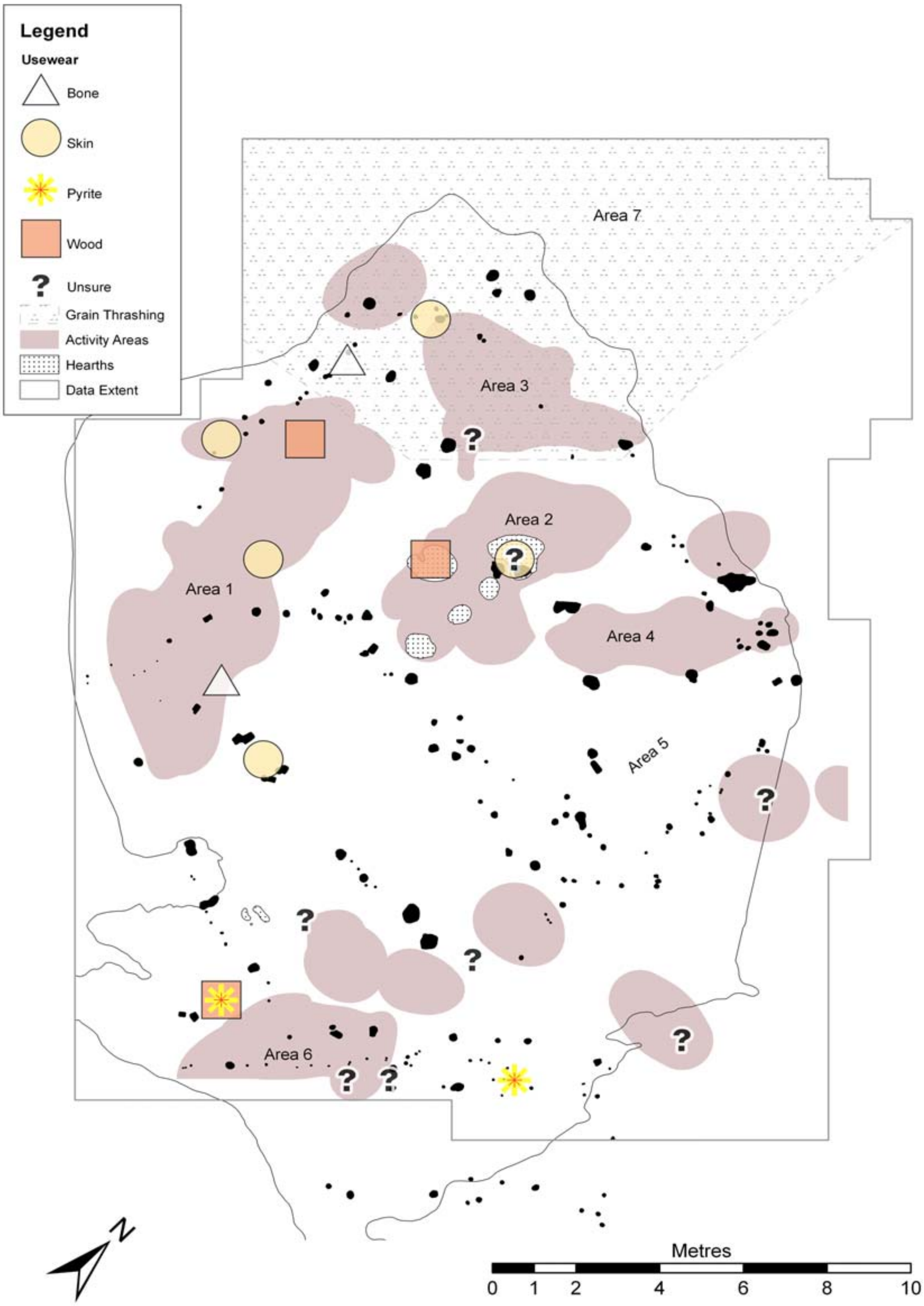


*Figure 4.9. Distribution patterns of use-wear analysis on flint artefacts (García-Díaz 2012: 73).*

Areas 1, 2 and 3 are related to the use of the Northern Structure Number 2. Other remains, including mammal and bird bones, were found in these distribution areas. These areas appear closely associated with domestic structures. Unfortunately, the use-wear distribution does not allow us to identify them as specialized areas (Fig 4.9). At Area 1, located at the entrance side of the central posthole line, implements with use-wear traces related to skin processing are the most common, though work with bone and wood is also represented. Activities related to bone and wood have also been recorded in Area 2, and the hammer stone was also collected from this Area. Area 2 is located around the hearths interpreted as the northern structure, suggesting that the hearth was the centre of domestic activities. The three amber fragments were recovered in the northern part of the site, in association with structure 2; the bead fragment was recovered from inside a posthole, suggesting a more recent chronology of this amber bead. Area 3 is located opposite the entrance, towards the back of the structures, and contains a high number of faunal remains, which suggests that it was possibly a refuse area (Fig. 4.10).

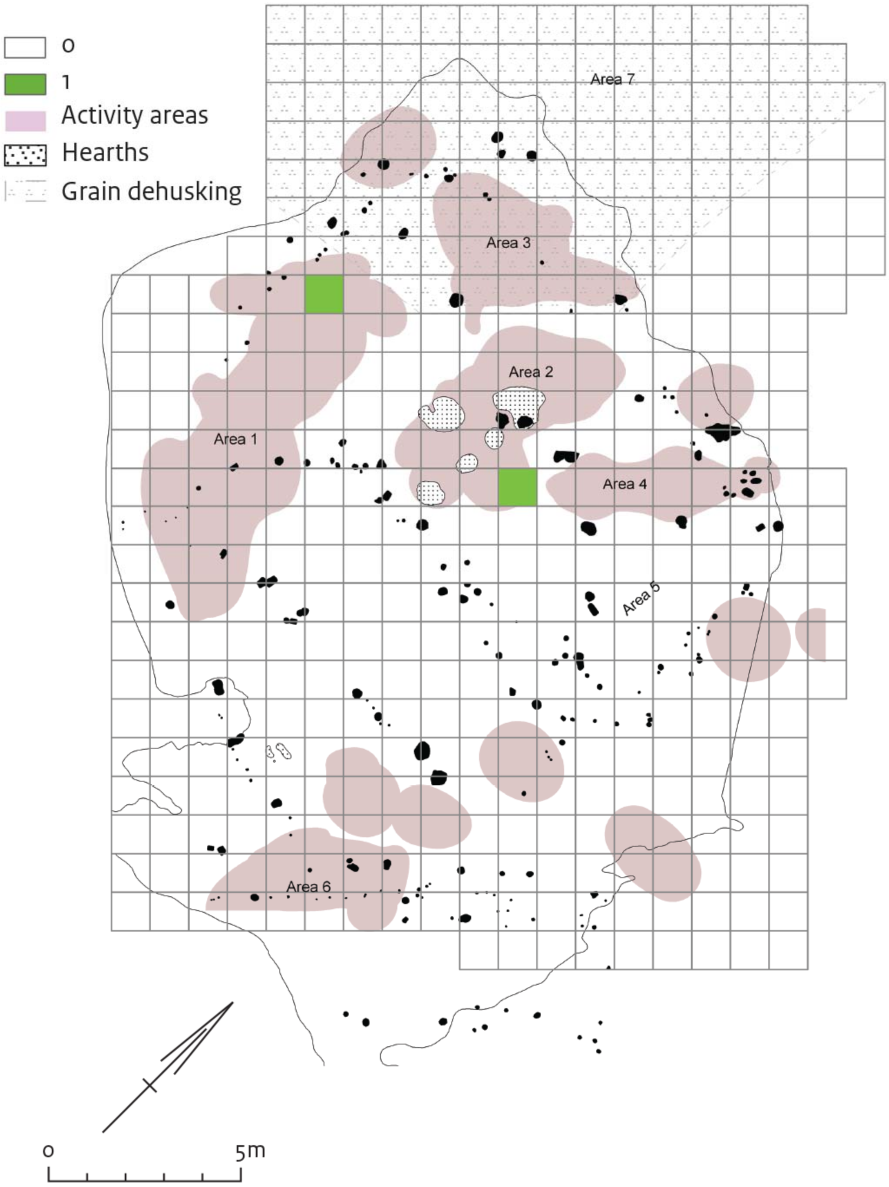


*Figure 4.10. Distribution patterns of amber ornaments (García-Díaz 2012: 77).*

Finally, Activity Area 4 yielded mostly flint flakes and waste, indicating that this may be the location where flint tools were produced. The burnt flint distribution shows a random spread over the entire site. Even though some hearths were found during the fieldwork, the wide distribution of burnt flint does not seem to be related to the intentional preparation or modification of tools.

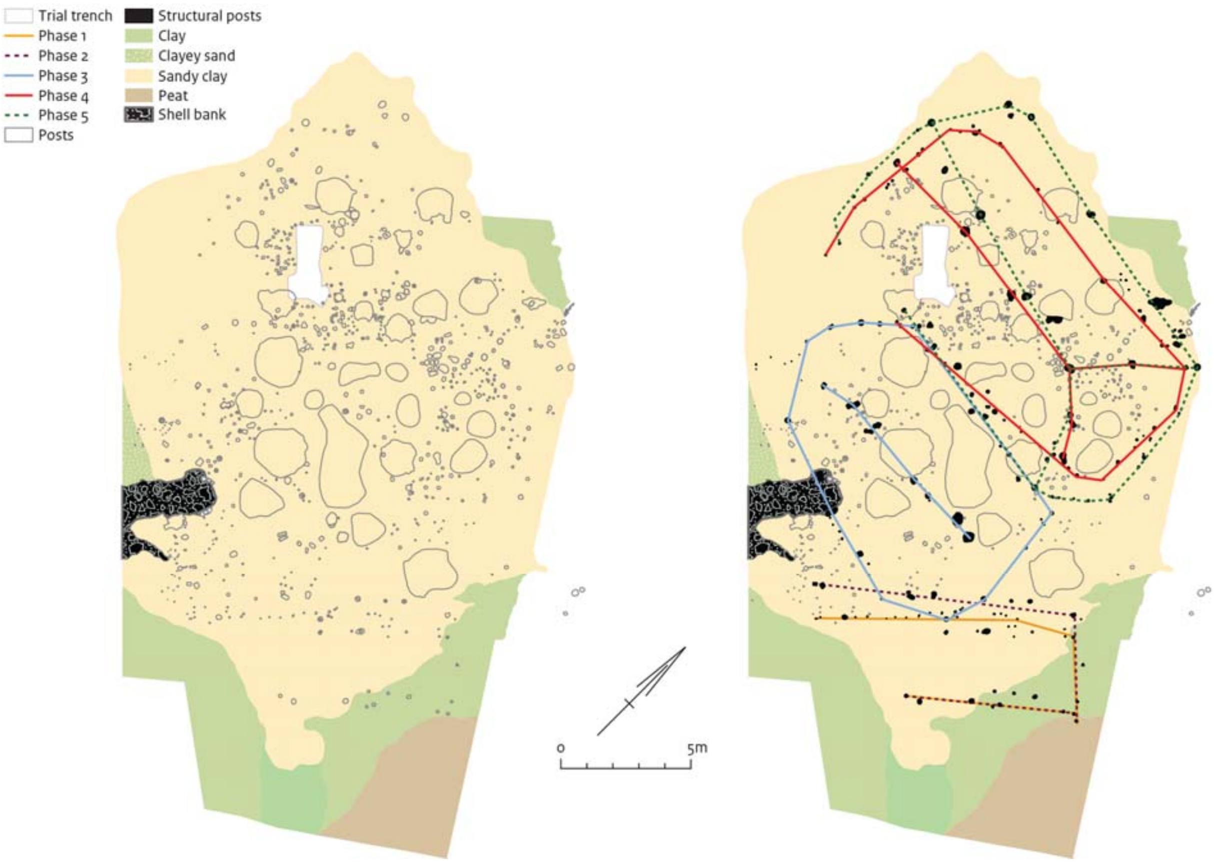


*Figure 4.11. Interpreted structures before and after Nobles analysis (Nobles 2016: 95).*

### 4.7 Conclusion: Group composition and site function

The analysis of flint and stone implements provides some clues as to group size and the function of the site. First, a deep knowledge of the landscape and natural environment is suggested by the use of material resources as far as 20 km away. Along with other resources lacking at Keinsmerbrug – for example quality wood or edible fruits and nuts – flint and stone were probably collected and brought back to the site from the glacial till deposit of Wieringen. Flint tools were conditioned by the quality and size of the raw material. The flint tools were produced on-site using a combination of bipolar and unidirectional hard hammer percussion, and were used for a limited range of activities. The characteristics of the material culture found at the site, and the limited range of activities documented, indicates a short occupation period. Thanks to the analysis of the faunal remains, the seasonality of the site is clearly delimited to the time between spring and the late autumn (Zeiler and Brinkhuizen 2012). Analysis of several dwelling structures has revealed evidence of the site being reoccupied several times, probably as part of seasonal activities related to fowling and fishing. The absence of evidence for these activities from the use-wear analysis of tool assemblage points to the existence of other kinds of technology, such as wooden traps, or other hunting strategies that left no material traces (Zeiler and Brinkhuizen 2012). Fish, bird and duck meat may have been preserved and stored for later consumption either at Keinsmerbrug or at other settlements. The diet was completed with vegetal resources, with naked barley, emmer, nuts, berries and seeds being collected and transported to the site. Although flint and stone tools did not have a predominant role in subsistence activities, they would have been extremely important in maintenance activities such as clothing, basketry and tool repair. Pottery vessels and some flint implements provide the main artefactual evidence of the social composition of the group. On one hand, the great variety of materials used to temper and produce the pottery vessels can be used to argue that there was variety in the knowledge and social practices of the group. On this basis it is likely that members of diverse groups gathered at Keinsmerbrug. On the other hand, flint production shows a great uniformity, which may be explained by the suggestion that flint was exclusively produced for the event, or events, represented at the site, while pottery was curated by individuals from permanent settlements located elsewhere.

Although the proportion of tools that show use-wear traces is low (3.8%), some conclusions can be drawn. First, most of the tools displaying use-wear traces (64.7%) were used to process animal resources; four of them have traces of skin processing. Ethnographic examples suggest that hide was used to produce a range of items such as clothes, rope, containers and canoes. In addition, it was also employed as a construction material for roofing and dividing the inner space of dwellings (Rahme and Hartman 1995: 1, 11). Hide processing has previously been considered as an indicator of seasonality (Van Gijn 1989). Taking into account the use-wear traces documented at Keinsmerbrug, it is most likely that the tasks performed there were mostly related to the repair and maintenance of hides and that the actual preparation of the hide was not taking place at the site.

Four tools have traces related to bone working. Bone was used to produce tools, for example needles, awls or spoons. In Neolithic times it was also used to temper pottery, converted into glue, or modified to create ornaments and pendants. Several bone implements have been documented at the Corded Ware wetlands sites (Van Iterson Scholten and De Vries-Metz 1981; see also Chapters 5 and 6). Surprisingly, not a single bone tool was found at Keinsmerbrug. It is likely that bone tools were personal curated objects which people took with them as they moved on from a site. Their absence could, however, also be due to preservation circumstances.

Furthermore, two blades were used in butchering activities. Traces of softer materials, such as meat, could not be observed because of the high degree of PDSM observed on the surface of the tools. Therefore, butchering and hunting traces cannot be assessed within the lithic assemblage at Keinsmerbrug. As stated, longitudinal activities on soft materials, like meat, create ephemeral traces (González Urquijo and Ibáñez Estévez 1994; Van Gijn 1998; Vaughan 1985), so if butchering traces are not well developed it can be difficult to distinguish them from soil sheen (Vaughan 1985: 43-44). The low tools related to butchery activities fits with the broader faunal evidence: remains from wild mammals were scarcely present, and were mostly represented by small fur animals and sea mammals (Zeiler and Brinkhuizen 2012), suggesting that mammal hunting was clearly not a key feature of the economic activities carried out at this site.

The absence of flint arrowheads further supports the argument that hunting was not practised at the site, but rather at the coastline or at other distant locations such as Wieringen or Texel. If the inhabitants of Keinsmerbrug were travelling to these places for other raw materials, including plant foods, it is not inconceivable that they also took advantage of these forays to hunt. Then again, the scarcity of hunting and butchery tools may be down to the inhabitants of Keinsmerbrug simply using alternative organic technologies such as traps, or bone and wooden arrowheads, which have not been preserved. Wooden projectiles have been documented by ethnographic sources as practice projectiles, or as weapons used to hunt birds or small game (Dale Guthrie 1983). Interestingly, this explanation fits well with the interpretation of the faunal assemblage that has characterized Keinsmerbrug as a place of fowling ducks and other birds. During the moulting period, between July and August, ducks and geese are unable to fly, and the use of small boats and nets to encircle and catch birds is a method proposed by some researchers as a means of fowling *en masse*. It is an approach that could also have been used at Keinsmerbrug in the nearby lagoon (Zeiler and Brinkhuizen 2012).

The absence of use-wear traces related to fish processing is somewhat at odds with the archaeozoological evidence. We know that fishing was one of the main activities practised at the site by the large amount of fish remains identified (Zeiler and Brinkhuizen 2012). Biomolecular analysis of the pottery sherds has identified fish residues, further supporting the argument for fish playing an important dietary role for the site's inhabitants (Oudemans and Kubiak-Martens 2012). In this light, the absence of fish-processing use-wear traces could be due to several reasons: first, it could be related to the poor preservation of the tool surfaces and general poor condition due to PDSM and fire alteration, as discussed. Secondly, bone or wooden tools, missing from the archaeological record, may have been used to process fish, as documented in other contexts (Semenov 1981[1957]). It is also possible that specialized gear, for example hooks, harpoons and nets, was curated: transported from one site to another. It should also be remembered that there are several ways of processing and preserving fish that do not require the use of tools (Van Gijn 1986).

Traces of plant processing and woodworking have been recorded on four tools, one of which displays traces of soft wood processing. These tools were probably used for various tasks such as producing rope, making clothes or possibly even working reeds for roofing material, as proposed by Kubiak-Martens (2012). The other three tools were probably used to work hard wood. Wood was used to build the dwellings, but diverse implements, such as tools and weapons, would also have been produced from wood. None of the tools present showed traces of harvesting cereals. As in the case of the arrowheads, the absence of sickles is a common phenomenon in these wetlands and very few flint sickles have been found in Late Neolithic and Early and Middle Bronze Age settlements or graves (Bakels and Van Gijn 2014; Van Gijn 2010a). At Keinsmerbrug, very small quantities of naked barley and emmer remains were collected during the excavation and local consumption of these crops was also documented on pottery residues (Oudemans and Kubiak-Martens 2012); however, analysis of pollen and plant macro-remains has shown that cereals were probably not locally cultivated (Kubiak-Martens 2012; Van Haaster 2012).

Overall, Keinsmerbrug is interpreted as a temporary settlement supporting the interpretation proposed by Hogestijn (1992, 1997, 1998, 2001, 2005). The settlement was probably visited on several occasions between spring and autumn (Smit *et al.* 2012). Taking into account the information provided by the different specialist reports, it has been proposed by the researchers of the NWO project that this is a place where different groups gathered (Smit *et al.* 2012: 221). At Keinsmerbrug people gathered and performed specific economic activities, such as fowling, fishing and cattle herding. Additionally, the settlement itself worked as a mechanism for social cohesion, whereby people came, feasted on specific foods, and in due process shared information and knowledge about their environment, materials, technology, skills and practices. Through these activities, different groups generated and maintained a form of cultural cohesion, with Keinsmerbrug at the spatial epicentre.