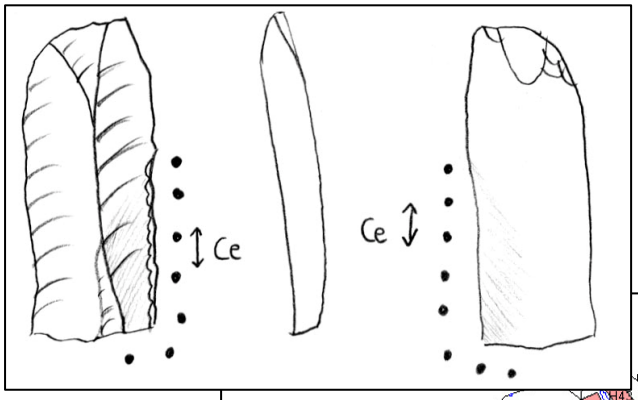
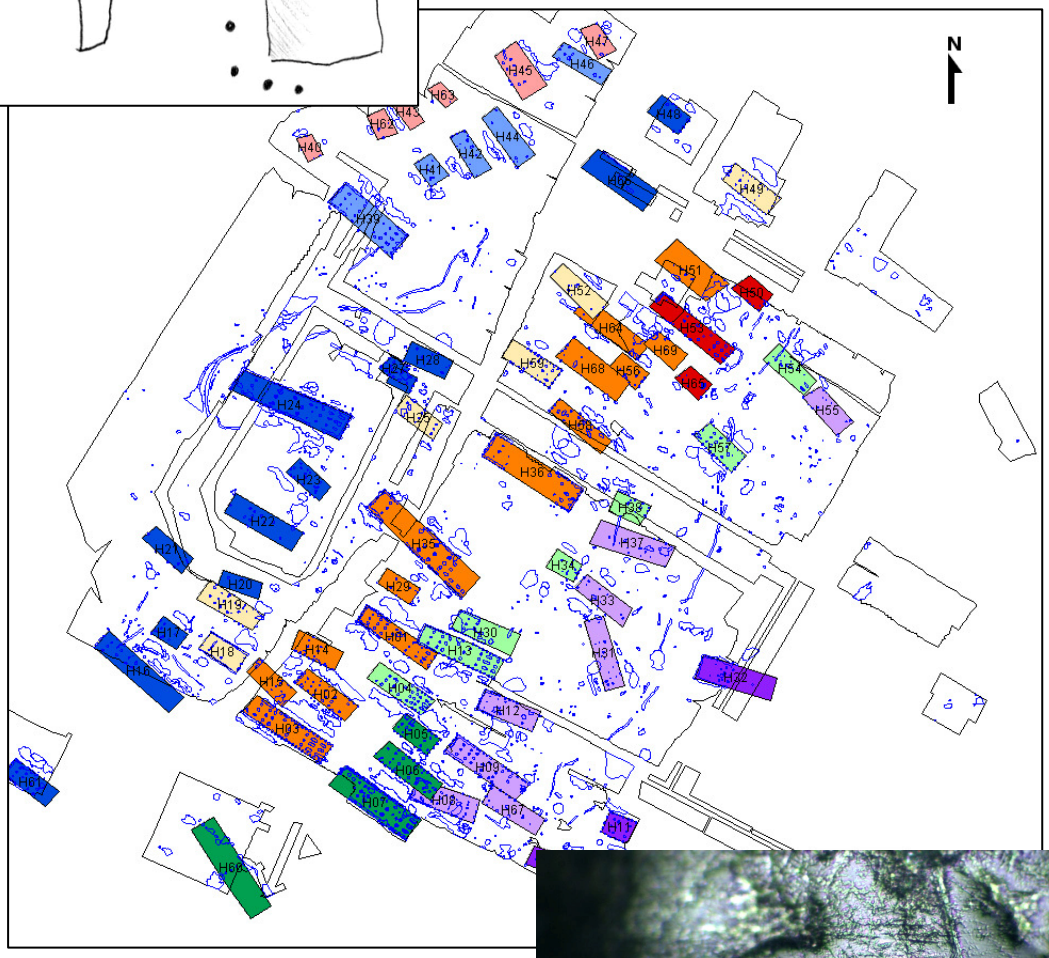
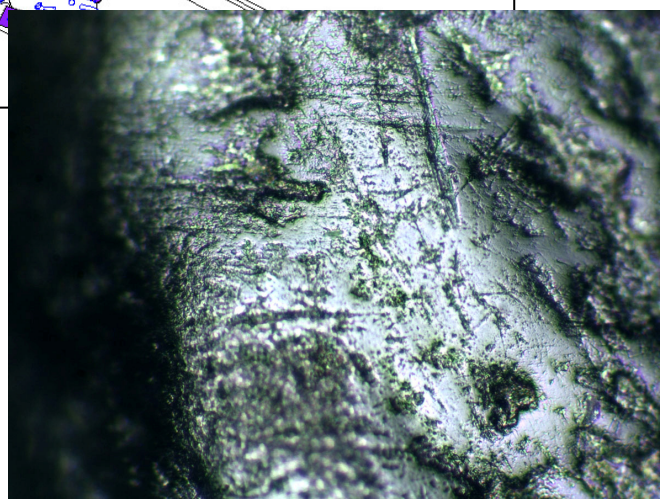
The Settlement Structure of ‘The First Dutch Village’

A use-wear study and a spatial analysis of the Bandkeramik settlement Geleen-Janskamperveld







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Contents

1. Introduction

The Bandkeramik culture has been investigated long since by archaeologists. The ideas about house plans and settlement structures have been established in the ’80 under the influence of Modderman. He proposed a model where the houses within Bandkeramik settlements were arranged within small neighbourhoods or wards which were the result of long-term occupation on the same location (Modderman 1988, 101). Since then some discussion has occurred about the subject, but the old model is still the most used one. Recently however, Rück started a new discussion about the Bandkeramik settlement and proposed a different model for this settlement structure and its houses. First off he assumes that the settlements were structured quite different; houses were built along lines, in contrast with the old model where the houses were clustered. Secondly, he also proposed new models for the duration and reconstruction of Bandkeramik houses. Thirdly, he proposed that Bandkeramik houses were built on poles instead of on the ground. Finally, he also proposed the idea that houses in Bandkeramik times were enlarged during their use life, and this influences the duration of the use of these houses in his opinion. Houses were probably used significantly longer than always assumed (Rück 2007, 159).
In this thesis I will investigate which of these models will be best applicable for the Dutch Neolithic site Geleen-Janskamperveld, the ‘Dutch first village’. I will do this by means of a literature study on the subject and by doing a use-wear study of flint artefacts from this site.

The settlement Geleen-Janskamperveld is part of the Graetheide-cluster which is located in the south of the Netherlands (figure 1). It was already discovered in 1979 but was excavated much later, in 1990 and 1991 when the municipality of Geleen decided to build villas on the exact location. This rescue excavation was carried out by the Institute of Prehistory of Leiden University, which used this excavation for the first-years field course. Three and a half of the five hectare of the site was still available for excavation and thus was excavated (Kamermans and van de Velde 2007, 1-2). Before the excavation was published several years had passed. In 2003 a collective essay written by Louwe Kooijmans, Kamermans and van de Velde was published on the subject. This essay clearly showed the different views of the different authors. In 2007 the complete excavation was finally published (Kamermans and Van de Velde 2007, 4-5).
For the 2007 publication, quite a few stones from Geleen-Janskamperveld were already examined for use-wear (Verbaas and Van Gijn 2007); however, no spatial analysis has been executed here because the sample was quite random and unevenly spread through

the excavation. One of the reasons for this uneven distribution of the sample was the fact that many finds had disappeared, only to resurface again right before publication (Verbaas and Van Gijn 2007, 173).

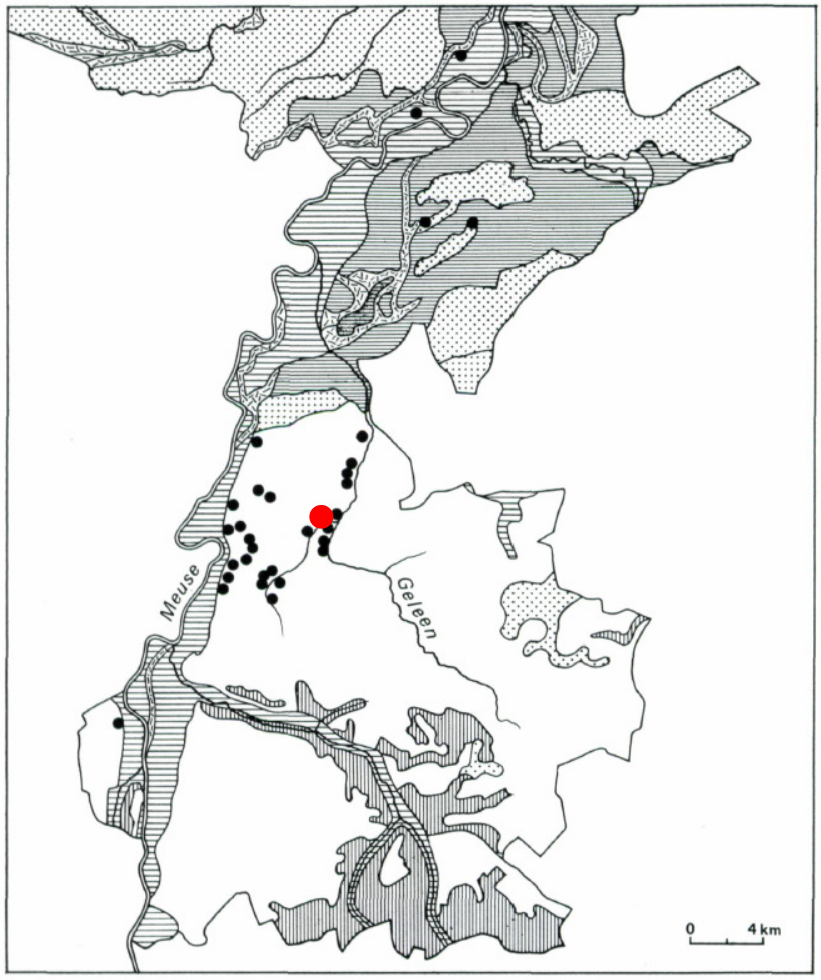


Figure 1. The location of Geleen-Janskamperveld at the Graetheide plateau (Bakels 1982, 35).

With this research I will try to fill the gaps which prohibited this kind of research before and use this new information within the discussion about the settlement structure. The main questions which will be asked in this research are:

- What are the activities carried out within the different houses at Geleen-Janskamperveld? Are there any differences between these different houses?
- Two settlement structures have been proposed for Geleen-Janskamperveld, can the results of use-wear studies help in deciding which of the two is most likely?

In the next chapter I will first investigate the archaeological context. The Bandkeramik culture will be discussed shortly and in more detail the different models which are currently up for discussion. The site Geleen-Janskamperveld will also be discussed

shortly in this chapter. In chapter 3 the research methods will be presented. The question how to connect the flint finds to individual houses will also be discussed in this chapter. Onwards the results of the use-wear studies are presented and compared with the results of the earlier use-wear studies of Bandkeramik settlements and especially with the earlier research of Geleen-Janskamperveld. In chapter 5 all information gathered from the literature and the use-wear study will be used in applying the different models onto the settlement of Geleen-Janskamperveld.

2. The Bandkeramik culture.

The oldest agricultural complex of the Netherlands is found in Limburg, the southern-most part of the Netherlands. This culture, the Bandkeramik, or in short LBK, is the North-Western end of a large complex which outstretched most of Europe and represents the oldest Neolithic culture of Europe (De Grooth and Van de Velde 2005, 219). This culture is defined by its typical pottery with linear bands. Almost all scientists agree that the Bandkeramik culture in the Netherlands is not a local product but came here as a complete package together with immigrants (De Grooth and Van de Velde 2005, 220). This package consists of a number of aspects which will be discussed shortly.

Settlements from the Bandkeramik period have been found on numerous occasions. These settlements often consist of several large constructions, probably houses, accompanied by different kinds of pits and some shallow ditches. There are different theories about how these settlements are organised. The main theory is called the *Hofplatz* model, but alternative models are also published. Because these different models are central to this research they will be discussed extensively in separate paragraphs: the old model will be discussed in paragraph 3.1 and one of the alternative models will be discussed within paragraph 3.2.

Burials are difficult to find in our region because organic material is badly preserved. At the Graetheide plateau, where Geleen-Janskamperveld was found, only one separate graveyard was recognized at a different site near Elsloo. On this graveyard both cremations and inhumations were recognised (De Grooth and Van de Velde 2005, 223). Looking at the size of the graveyard compared to the Bandkeramik settlement of Elsloo probably not all people were buried at this graveyard. What happened to the other people of the Bandkeramik period after they died we do not know (De Grooth and Van de Velde 2005, 233).

Because of the bad preservation of organic material we also do not know a lot about the way houses were built. We mainly have indirect clues about the kind of houses found in Bandkeramik context. Oak was probably used as a building material because it was the most durable type of wood in the region. Post holes show us that not only entire trees were used but also split ones. Pieces of burnt loam with imprints of wattle teach us that the walls were probably made of wattle and daub. The sizes of these houses varied between 8 and 35 metres in length and 5 to 8 metres in width. Most of them were oriented in the same way, northwest to southeast with the entrance at the south-eastern side (De Grooth and Van de Velde 2005, 226).

As noted before, the Bandkeramik owes its name to the distinctive ceramic ware with linear bands (figure 2). Ceramics are the best represented find category of the Bandkeramik. The pottery was made using the local loess or loam with often an additive of clay pellets. It was baked under reducing circumstances which gave the pottery a dark grey appearance (De Grooth and Van de Velde 2005, 228).

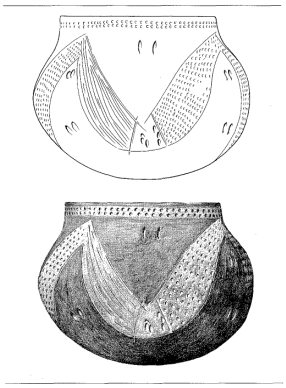


Figure 2. Decorated pot found on the cemetery of Elsloo (Modderman 1988, 113).

Next to pottery, stone is the most frequently encountered find category in Bandkeramik excavations. Flint was collected 10-15 km south of the Graetheide plateau, in an area where a limestone surfaced and flint could be collected easily. This flint was mainly worked within the boundaries of the settlement. The main technology used for the working of this flint was the blade technology. Flint debitage is found in most pits which accompanied houses so probably all households produced their own tools. However at the site of Elsloo some indications of part-time specialists occur; some pits had too much flint waste and not enough flint tools in comparison (De Grooth and Van de Velde 2005, 227).

Grinding stones could often be collected by the Neolithic people on the banks of the river Meuse. These could be used as querns for producing flour, or as grindstones to produce e.g. wooden arrows or bone tools. Next to the local stones some exotic stones were imported to the Graetheide plateau. These were formed into woodworking tools like adzes (De Grooth and Van de Velde 2005, 227-228).

As noted before, organic material was not preserved well in the Dutch loess grounds so not a lot can be said about objects made of for instance wood or bone. Use-wear on flint might give some indirect clues about organic materials. Within the LBK hide working was probably an important activity. There is for example a lot of variability found within hide polish. This might indicate a range of specific stages of production in which the hide working tools were involved (Van Gijn 2010, 83).

2.1 The *Hofplatz* model

When describing the *Hofplatz* or wards model (*les aires d'habitat)* some problems occur. Different authors use different definitions and terminology. Also within translations between the different languages in which Bandkeramik research is published (for example English, German, French and Dutch) some discrepancies occur. I will try to give a clear overview of the variation within this model and its discussion.

The *Hofplatz* or ward model has been used for a long time as the predominant model for Bandkeramik settlements. It is based on the ideas of Modderman. He discussed three types of houses for the LBK:

- Longhouses, *Großbauten* or type 1 houses.
- Bipartite houses, *Bauten* or type 2 houses.
- Small houses, *Kleinbauten* or type 3 houses (Modderman 1988, 90).

These types are shown in figure 3. It can be noticed that the first type of house, the longhouse, is subdivided in two different types: 1a and 1b.

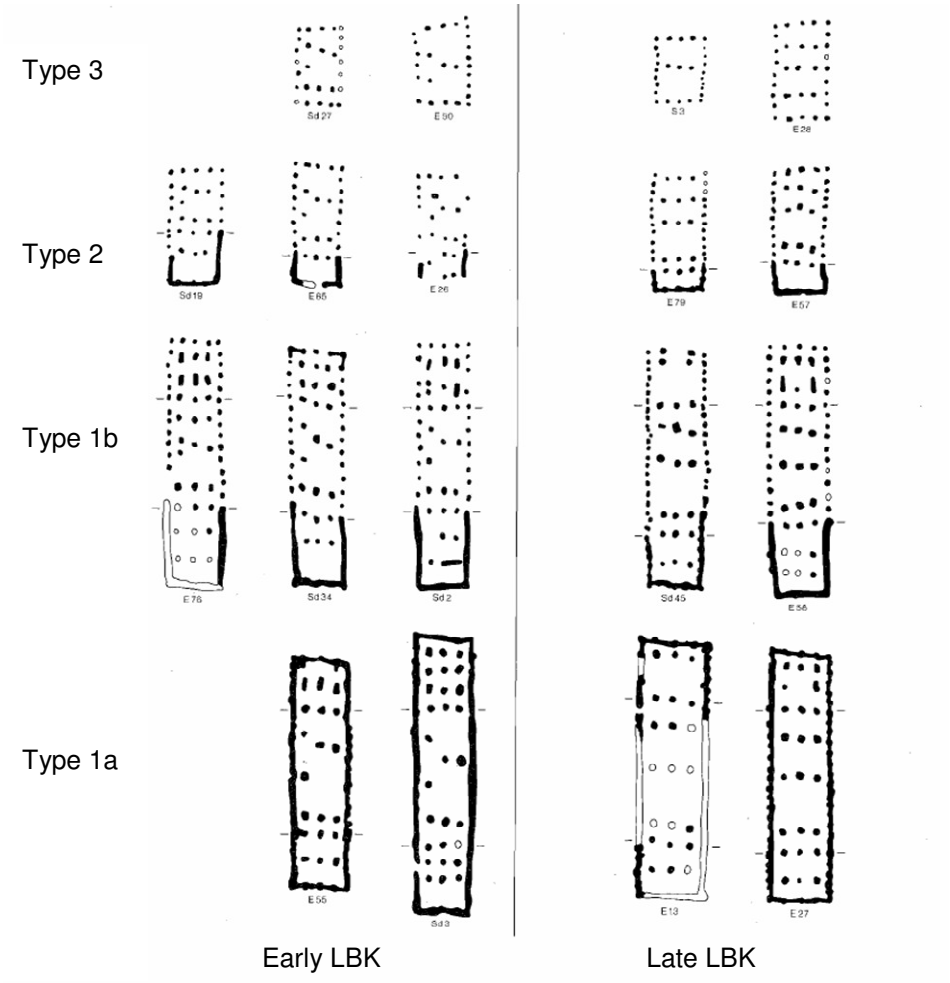


Figure 3. A typochronology of Bandkeramik house-plans in the Netherlands (Modderman 1988, 91).

These houses, especially the larger houses, are in this model the centre of a yard (*Hof* in German). Next to the house, pits are found alongside the house within a distance up to 25 metres (figure 4). The contemporaneity of the pits and houses is based on the refitting of ceramics found and on the locations of the pits compared to the houses. The duration of such a yard is called a house generation. After several years the house needs to be replaced and this is often done close to the old house. So a new yard is created at almost the same place. The continuity of these yards on a location is called a *Hofplatz.* So the principle assumption of the *Hofplatz* model is that Bandkeramik settlements are continuously occupied areas with local sequences of single yards (Claßen 2009, 97). This model then can be used to place houses which are not datable with ceramics, within the settlement sequence (Claßen 2005, 117).

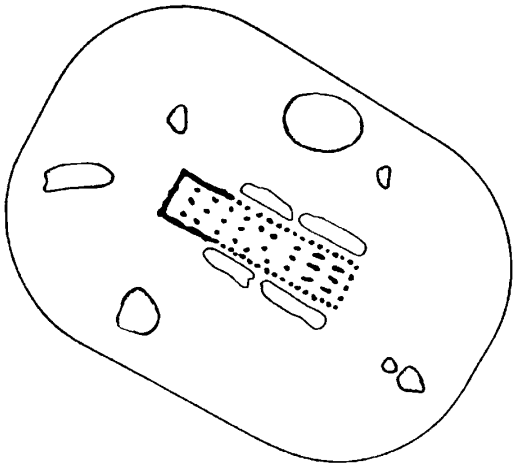


Figure 4. Model of a *Hof* after Boelicke 1982 (Claßen 2005, 114).

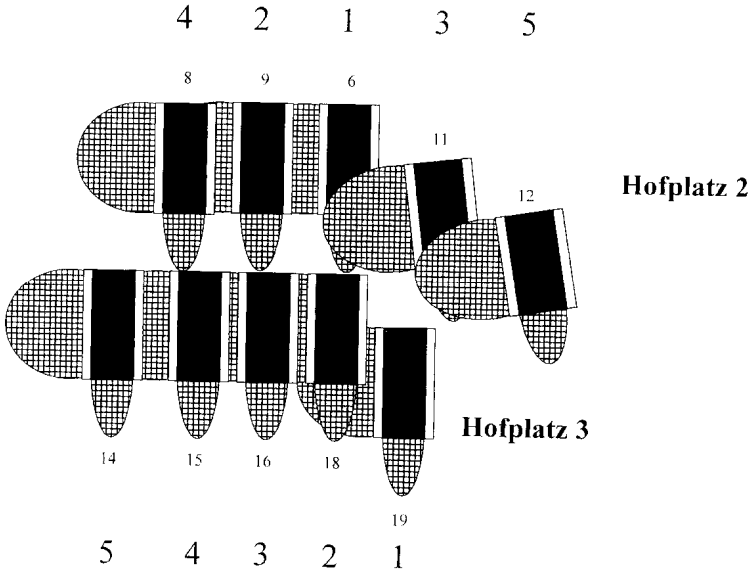


Figure 5. Several *Hofs* within two *Hofplatzen* from the excavation Schwanfeld (after Lüning 2005, 60).

Jens Lüning (2005, 59) however sees a different shape for these yards. In his opinion the Bandkeramik houses have a west- and south-*Hof* were activities took place. These areas are based on the probable locations of entrances and the way the dominant wind blew (figure 5).

Modderman argued that within larger LBK settlements, like the settlements of Bylany, Elsloo and the settlements in the Merzbach Valley, two or more individual centres would develop. These centres consisted of one type 1 building together with type 2 and type 3 structures (Modderman 1988, 101). Some Dutch authors used this idea to interpret yards as an area where not just one house was present (De Grooth and Van de Velde 2005, 229; Louwe Kooijmans *et al.* 2003, 381). This results in a different model even though they are called the same. With this version of the model a yard thus consists of one type 1 building accompanied with some type 2 and/or type 3 structures. These yards also succeed each other resulting in a ward (*Hofplatz*) with several houses. As stated before the type 1 buildings have different variations. This model assumes only one type 1a building is present at a Bandkeramik settlement at a given time. However these type 1a buildings are migrating between the different wards. At the time one ward has a type 1a building all the other wards thus have a type 1b building. Because the 1a houses migrate between the different wards it is proposed that this type of houses was linked with the female line of descent (De Grooth and Van de Velde 2005, 232).

Anne Houzer however recognizes these two different variants of the model and gives them different names in French: the term *aires d'habitat* is used for the model with only one house per generation, she calls this the *Hofplatz* model. The second variant, the one with the clusters of houses, she calls *habitat en grappe (*Hauzer 2006, 161).

To conclude, the *Hofplatz* model tries to find a pattern within a settlement by clustering groups of houses. This could be a succession of individual houses or a succession of a group of houses.

2.2 An alternative model

Rück (2007, 2009) proposes a new model for Bandkeramik settlements. He focuses on two aspects; firstly the construction of the houses, and secondly the layout of the settlements. House constructions of the Bandkeramik have long since been categorized into three different kinds of house types. These types are often seen as static constructions which were built, used and abandoned after several years. Rück however sees indications for building expansions and thus transitions between the different types of houses. As quoted from Rücks text indications for these expansions are:

1. *loam pits dug along the northwest and/or central part which end at the transition to the southeast part.*
2. *loam pits accompanying only the southeast part (and mostly of the same length as the latter).*
3. *a different orientation of the southeast part respective to the northwest/centre.*
4. *'additional' posts or post row at the transition between central and southeast parts.*
5. *'additional' posts in the northwest and/or central parts which suggest repairs or rebuilds. This kind of additional posts seems to be absent from southeast parts. (Rück 2007, 159).*

The schematic model of house enlargement can be shown in figure 6. Rück argues that some of the Bandkeramik buildings probably would have expanded by the addition of extra parts. Not all buildings would have been expanded in the course of their use life. This new model thus questions the house typology as proposed in the *Hofplatz* model.

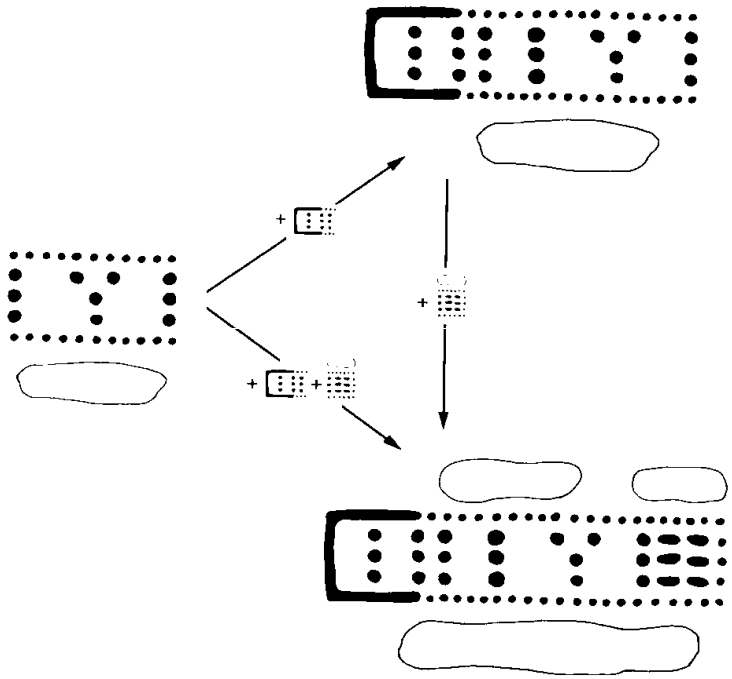


Figure 6. Model for house enlargements (Rück 2007, 113).

In addition to these doubts about the typology of the houses the layout of the settlement is up for discussion. With the predominance of the *Hofplatz* model there has not been any systematic research into alternative interpretations of settlement structures (Rück 2007, 167). One of the things noteworthy when comparing different Bandkeramik settlements is

the way houses are built parallel to each other. Rück argues that not only the orientation towards the south/southeast is similar for all houses, but also the gable ends of houses are aligned (figure 7) (Rück 2007 164). Some excavation reports do recognize these rows, like the excavations at Füzesabony-Gubakút described by Domboróczki. Most excavation reports however do not describe this phenomenon, probably due to influences of the *Hofplatz* model (Rück 2007, 168).

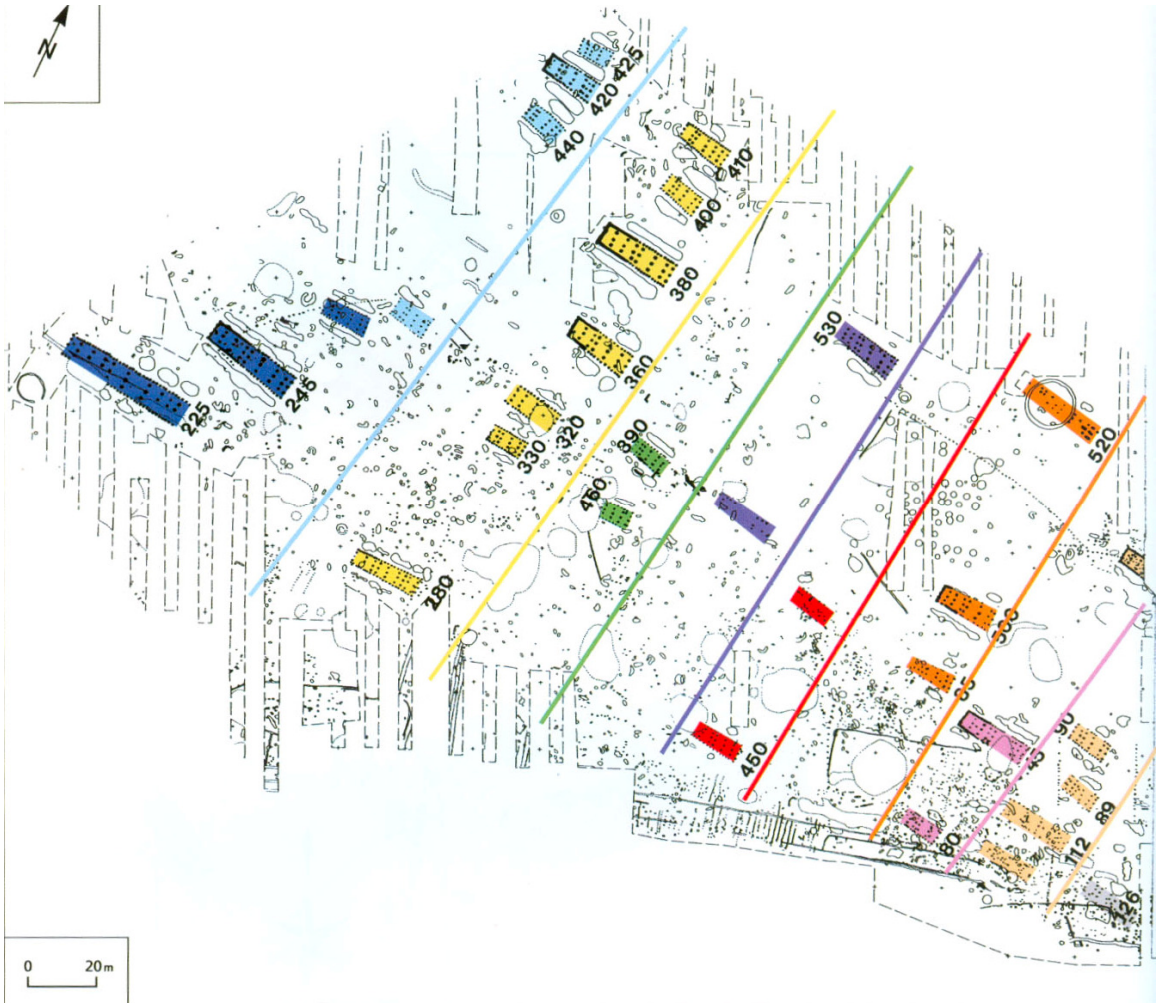


Figure 7. Cuiry-lès-Chaudardes, France. An example of a Bandkeramik settlement to Rücks model (Rück 2007, 124).

Next to these discussions Rück also questions the reconstructions of houses. It has been noted for a long time that LBK settlements were generally located on the upper third of slopes on the edge of loess-covered river terraces. Steep slopes were apparently chosen as settlement sites (Rück 2007, 169). The reason why the Bandkeramik settlers choose these locations has to do with the climate. New dendro-climatological, geological and ecological investigations show an above-average rainfall for the LBK period. For this reason flat surfaces would have been too moist for settlements (Rück, 2007, 171).

Houses on steep slopes seem somewhat unpractical. With no ethnographic examples of dwellings with sloping floors it is probable that Bandkeramik houses were build partly or entirely above the ground by posts, something which can be supported by many different ethnographical examples (Rück 2009, 176). An ethnographical example from India is shown in figure 8.

Figure 8. Garo longhouse, West Garo hills, India (Rück 2007, 141).

The conclusion which can be made from his argument is that we might have been looking too much in one direction. This tunnel vision might have made us oblivious to other possibilities like other settlement arrangements and other kind of houses.

2.3 The excavation Geleen-Janskamperveld

Geleen-Janskamperveld is part of the Graetheide-cluster, a group of Bandkeramik settlements located at the northern edge of the loess covered hills at the south of Limburg. Due to formation processes the south-eastern and central part of southern Limburg has hardly any flat landscape features, except for the valley floors. The Graetheide plateau however is very level, with slopes of less than 1° except for some wide valley like depressions with slopes up to 2° (Louwe Kooijmans 2007, 13).

The site itself was surrounded by gently sloping terrain at three sides. At the west an almost level surface, very useful for farming crops, was stretching out for over 1 km and covering roughly 50 ha. The site itself was very flat, although slightly more sloping than nowadays. The nearest water source for the site was the river Geleen at ca 800 m. distance. The ground water level was probably 15 meters under the old settlement level (Louwe Kooijmans 2007, 15).

There are some problems with the dating of Bandkeramik settlements. Using C-14 dating results in dates with a large error due to 'wiggles' in the calibration curve. Therefore Bandkeramik settlements are mainly dated using ceramic typology. With this method it is possible to divide the LBK into several phases. These phases however are relative and cannot be linked to exact dates (De Grooth and Van de Velde 2005, 20-21).
69 house plans were identified at the excavation Geleen-Janskamperveld (Van de Velde 2007a, 21). To date these houses, and thus the whole settlement, Van de Velde (2007d) proposed for Geleen-Janskamperveld a duration of four house generations of approximately 25 years each. The first three generations fall within the Dutch phase LBK-1b. The fourth generation falls within the LBK-1c phase. There is also a second LBK habitation period. This second period is dated to the LBK-2c and 2-d. The categorisation of the houses within different phases is based on the ceramics connected to the different houses (Van de Velde 2007d, 224). Next to pottery central posts are also used to date the houses.

Some ^{14}C (AMS-) dating has been carried out for Geleen-Janskamperveld. These dates are not accurate enough to identify different house generations due to some 'wiggles' in the calibration curve, but they are however useful to give a rough absolute dating of the site. The founding of the Bandkeramik settlement could be placed at the 53rd century BCE, right at the beginning of the Bandkeramik presence in the Netherlands. A second date was found for the start of the second occupation period at the first decade of the 5th millennium, close to the end of the Bandkeramik in this region (Van de Velde 2007c, 220)

Use-wear study was already part of the initial publication. Research questions asked, concerned the activities carried out by means of flint tools at Geleen-Janskamperveld, with some extra focus on possible bone and antler traces because bone and antler tools are absent on many Bandkeramik locations and thus for archaeologists a very uncertain subject. Another focus of the analysis was placed on harvesting and processing of cereals. The conclusion of the research showed that a wide range of activities was executed at the site. Hide working tools are the most frequently encountered flint artefacts followed by cereal harvesting tools.
Even though use-wear studies can be used to do a spatial analysis of the settlement and could help finding possible specialisations between different households, it was not done at Geleen-Janskamperveld. Part of the flint finds got lost just after the excavation only to resurface again just before the publication. This resulted in an unevenly distributed

sample from the flint assemblage which could not be used for spatial analysis (Verbaas and Van Gijn 2007, 173).

Next to the use-wear study of flint a typological study was also executed for Geleen-Janskamperveld. The aim of this study, executed by de Grooth, was to investigate the way flint working was organized at the site, thus getting an insight in the obtaining of the raw materials and the technological choices made in this region (De Grooth 2007, 143).

The flint found at Geleen-Janskamperveld originated almost exclusively from the limestone area south of the river Geul at a distance of 20-30 km south of the settlement (De Grooth 2007, 143). Even though there are some problems with appointing flint from this region to specific sources, because most flint from this region looks quite similar, de Grooth could make some divisions between them. This is done using the characteristics from different source types, primary and secondary sources give different attributes to the flint. Some morphological variation was also visible between the different sources. Lastly the luminescence of the flint was compared. Using this method, the majority of the flint from Geleen-Janskamperveld could be traced back to the Banholtergrubbe at Banholter (De Grooth 2007, 150).

The *chaîne opératoire* of Geleen-Janskamperveld greatly resembles other Bandkeramik sites. The reduction was aimed at the production of blades, with more or less parallel edges. However, flakes were also produced rather often (De Grooth 2007, 151). Based on the typology, the toolkit of the inhabitants of Geleen-Janskamperveld is very conventional, both in composition and in morphology. The main standardised tool finds are: arrowheads, borers, truncated blades, blades with lateral retouches, end scrapers and side scrapers. These standardised tools were almost exclusively made on blades, with the exception of end and side scrapers (De Grooth 2007, 152).

The flint assemblage also had undergone some spatial analysis. De Grooth (2007) compared the spatial distribution between the north-east and south west of the settlement because Van de Velde proposed these areas to be considered as different wards. There seemed to be some difference between the two wards. The amount of flint from the south-western ward is significantly higher than the amount from the north-eastern one, 66% against 34 %, even though the amount of houses is the same. Ceramics show the same pattern. The differences could not be explained by excavation strategies or erosion processes, thus this difference is interpreted as a variation in the number of people occupying the areas (De Grooth 2007, 157). There is no evidence of specialist activity in the use of tools according to typology at either the ward or the household level. Also discarding, retooling, recycling and the use of rare materials were similar (De Grooth 2007, 158). Different pits does show differentiation between production and use (De Grooth 2007, 162).

In the 2003 publication, Louwe Kooijmans made an extensive analysis of the settlement using the *Hofplatz* model. He found different clusters within the settlement, some domestic yards with *Großbauten* accompanied with by one or more *Bauten* and *Kleinbauten*. He also found some clusters with a functionally different area. Here only *Kleinbauten* were present (Louwe Kooijmans *et al.* 2003, 381).

Louwe Kooijmans however, based his analysis solely on the distribution of the different house types. A different analysis was made in the same article using pottery finds linked to the houses. These two analyses were not coherent at all, the houses dated by pottery told a different story altogether (Louwe Kooijmans *et al.* 2003, 393).

After renewed examination of the traces found at Geleen-Janskamperveld some major revisions and re-interpretations took place. Not only twelve new houses were recognized, but also 21 houses were promoted to a larger house type and four houses were demoted to a smaller house type. This of course completely undermined the analysis which was done before (Van de Velde 2007d, 224). Rück also based his conclusions about Geleen-Janskamperveld on the 2003 results (Rück 2007, 127).

Within the 2007 publication Van de Velde does try to apply the ward model on the ground plans of Geleen-Janskamperveld. He does recognise a north-eastern ward and a south-western ward. Within the south-western ward he identified two separate clusters of houses. Note that here the model is yet again used differently. Here a ward exists of one or several clusters of houses. These clusters contain several houses at the same time and also succeed each other through time. He does indicate that the groups of houses are not lined up internally but rather strewn haphazardly.

It could be calculated from the data that some 20 to 25 houses per house generation would have been present. These house groups would consist of one type 1a, two of type 1b, six of type 1c, about six of type 2, and also six of type 3. When assuming type 3 houses were used for another purpose than habitation, and the other houses had only one family, consisting of 5 members, living in them, the settlement had on average 75 inhabitants. Although the first generation probably would have been a bit smaller and the other occupation periods would consequently have been bigger (Van de Velde 2007c, 233-234).

Next to the first habitation period a second habitation period was also found at Geleen-Janskamperveld. This second phase can be estimated to have around 10 houses. However Van de Velde feels that the major part of the settlement in that period should be sought more to the southeast where no excavation took place (Van de Velde 2007d, 234).

3. Methods

For this research first a literature study is done and secondly a use-wear study is executed. For the use-wear study some steps need to be taken which are discussed below.

3.1 Selection of the materials

To answer the research questions it is crucial to link flint artefacts to individual houses because not only the overall spread of the used flint is of importance for the discussion, but also the different phases of the settlement are up for discussion. To link the flint finds to individual houses within this research only flint finds found within the side pits of houses will be analysed. These side pits (in German *Längsgruben*) probably started as quarries for loam or daub; for this reason these pits are sometimes called loam-pits. These materials were probably used to build the walls and raise the floors of the houses (Van de Velde 2007a, 33). Most archaeologists agree that the contents of these side pits could be linked to individual houses (Louwe Kooijmans *et al.* 2003, 388; De Grooth and Van de Velde 2005, 223; Modderman 1975, 260; Lüning 1982, 17). There is however still some discussion about this assumption. Some archaeologists state for example that these pits might have been filled up rather quickly and do not represent a house generation but rather a very short time span right before or at the beginning of the use of the house (Claßen 2005, 118). Even if these pits were used as refuse dumps through the life of a house, postdepositional processes still could have had an influence on the content of these pits. However at Geleen-Janskamperveld pits associated with houses tend to have 30 % more decorated sherds compared to other pits, which could be a confirmation of a link between households and these pits (Van de Velde 2007c, 209). The result of the analysis of ceramic sherds even shows an almost model-like chronological evolution as if the pottery was deposited without serious interruption (Van de Velde 2007c, 213). For this reason it seems likely that also the flint assemblage represents the individual households which are connected to these pits.

Of the 170 pieces of flint which were already analysed in previous research 117 flint artefacts could be connected to individual houses based on the assumption that the content of the side pits could be connected to individual households. The original sample of flint studied for use-wear studies however was fairly random, some parts of the excavation were overrepresented while other parts of the excavation were completely absent within previous research. Therefore by making a sample I mainly focused on the locations of the finds. In this way I tried to fill the gaps which occurred within the original research.

Figure 9. The houses which were analyzed within the use-wear study.

To be able to research individual houses it is important to look at enough flint per house. For this research I decided at least 5 pieces of flint needed to be examined. With less flint per house it is more difficult to say something about the activities executed at the location. Within the context of this master thesis this is the maximum amount of flint I was able to study. Figure 9 shows the houses which were analysed for this research. Unfortunately the houses are not spread evenly. This is due to the fact that not all houses had enough suitable flint for the research.

Because of my lack of experience at the beginning of my research my selection of the tools themselves was based on whether I had the idea that the artefacts could be used as a tool. This resulted in a selection of tools which were partly the common Bandkeramik tools but on the other hand also pieces which might not had been picked out by an experienced researcher, for they are not typically LBK tools or slightly more damaged after deposition, but turned out to have traces of use nonetheless. This fresh look on the matter might have worked in my advantage.

3.2 Cleaning

The flint I examined had been handled by many people before me. The flint was also not extensively cleaned before I started my microscopic analysis. When the objects turned out to be very dirty, they were first cleaned with water and soap and dried with a piece of paper afterwards. Extensive rubbing is avoided because this could create new traces. All flint also was cleaned using a piece of cotton-wool and 96% alcohol. With this method some of the dirt is removed just as well the fingerprints of the people handling the objects. No chemical cleaning was necessary with any of the objects.

3.3 Use-wear analysis

Use-wear analysis is the investigation of the use life of archaeological objects. This is done not by typological research but by looking at traces which are left when using the objects. There are different kinds of damage occurring on flint which can indicate use. These use indications are: edge-removals (use-retouch), edge-rounding, polish and striations. Not all of these aspects are always present on the flint tools (Van Gijn 1990, 3). Most of these traces can be seen under a microscope. There are different methods to look at these traces. Keeley (1980, 2) makes a division between high power and low power research which require different kinds of microscopic research. I used a combination of the Low and the High Power approach using both a stereo microscope with a magnification of 10-160 x as well as an incident light microscope with a magnification of 50-500 x. With the latter the use-wear polishes and striations are clearly visible. The former microscope however can be very useful to analyse the relationship between the polish seen and the morphology of the tool (Van Gijn 2010, 28).

These observed traces however are not very useful on their own. Use-wear analysis is an empirical study by which traces found on modern replicas are compared with the traces on the archaeological objects (Van Gijn 2010, 30). For my research I made use of the experimental collection of the Laboratory for Artefact Studies of Leiden University, a collection which has been growing since 1984 and contains over 1800 experiments.

3.4 Documentation

For my research I made use of the standardised forms and databases of the Laboratory for Artefact Studies of Leiden University. The database I used was already in use for the use-wear studies of Geleen-Janskamperveld. I merely added to this my own use-wear study results to get the complete dataset.

3.5 Distribution research

It is important to realize that activities not only took place inside the settlement but also "off-site". Hunting and fishing gear was used outside the village and taken home, especially when there is evidence for hafting and retooling activities (Van Gijn 1990, 145).

Bandkeramik sites like Geleen-Janskamperveld also have another problem with distribution research. These permanent settlements often do not have their rubbish scattered around on the location where it is used but all deposited within rubbish pits. For this reason finding activity areas is hard for these kinds of settlements. At Elsloo some variation in certain aspects was recognised between pits of houses, however no real functional distinction was evident (Van Gijn 1990, 146). Next to this problem the postdepositional processes play an important role for the Dutch Bandkeramik sites. Due to colluvium the old surface of Bandkeramik settlements have often disappeared. The only information about the settlement can be obtained from pits. This is also the case for Geleen-Janskamperveld (Louwe Kooijmans 2007, 19). For this research, however, I am not looking for different activity areas within a house or on specific locations but for different activities between the individual houses. So the fact that all flint is clustered within pits which could easily be linked to houses might even be an advantage.

Finally it is very important to be very careful with the interpretation of spatial distribution and it should be approached with considerable caution (Van Gijn 1990, 146).

I will visualise the distribution of the use-wear of flint as well as the different models applied to Geleen-Janskamperveld using the GIS Map-info.

4. Results of the use-wear study

The main questions I want to answer by using the results of the use-wear study are: What are the activities carried out within the different houses at Geleen-Janskamperveld? And are there any differences between these different houses? In this chapter I will try to answer these questions and compare the results with the previous research of Geleen-Janskamperveld in *Analecta Praehistorica Leidensia* 39 as well with other Bandkeramik excavations.

4.1 Activities inferred

Within the original research a total of 170 artefacts were selected for the functional study. Of the 170 artefacts studied 149 show traces of use. On these pieces of used flint a total of 227 used zones were found. For this research extra use-wear study was executed which brings the total of investigated artefacts to 226 pieces of flint with in total 289 actual used areas (aua). The relationship between the numbers of used zones is shown in table 1. Of these 234 researched pieces 31 objects did not show any use-wear traces. This does not imply, however, that these objects were not used. When objects are used for a short interval or on a soft material, polish does not necessarily appear (Van den Driel and Van Gijn 1997, 449-502).

Table 1. Number of used zones.

Number of Auas	*Number of artefacts*
0	31
1	119
2	62
3	10
4	4
Totals used zones	289

When looking at table 2 it is clear that the predominant contact material is hide. Experimental research shows that hide only showed on 65% of the used objects. In contrast, domestic cereals as well as soil and pottery showed a 100% appearance. Siliceous wild plants, bone and wood show respectively in 96%, 94% and 86 % of the experiments use-wear traces (Van den Driel and Van Gijn 1997, 502). So the difference between the hide working tools and the other implements was probably even larger. Most of the hide working tools were used in a scraping motion, 65 out of 107, indicating that a lot of hide processing took place within the settlement. A typical hide scraper and its use-wear traces are shown in figures 14 and 19d.

Cereal harvesting traces are also represented well at Geleen-Janskamperveld, although in quite a smaller amount compared to hide, 36 implements with the distinctive sickle gloss are recognised. The harvesting of cereals took place outside the village so the finds of used implements probably indicate the maintenance and retooling of the harvesting tools inside the village. A typical blade used for cereal harvesting and its use-wear traces are shown in figures 11 and 19a.

Table 2. The relationship between contact material and executed motion.

	longitudinal	*transversal*	*diagonal*	*boring*	*shooting*	*hafting*	*unsure*	***total***
plant	1	-	-	-	-	-	5	6
cereals	34	1	1	-	-	-	-	36
wood	4	4	-	1	-	-	4	13
reed	1	-	-	-	-	-	-	1
bark	1	-	-	-	-	-	1	2
hide	25	65	-	7	-	-	10	107
soft animal	2	-	-	-	4	-	1	7
bone antler	-	1	-	-	-	-	-	1
clay pottery	1	1	-	-	-	-	-	2
mineral other	-	1	1	3	1	-	1	7
polish 10	-	1	-	-	-	-	2	3
polish 23	-	3	-	-	-	-	5	8
hard material	-	2	-	-	-	-	-	2
soft material	1	2	-	-	-	-	3	6
unsure	8	10	-	3	1	-	30	52
hafting	-	-	-	-	-	36	-	36
total	78	91	2	14	6	36	60	289

Next to these main activities a variety of other activities is recognised. Wood, for example, was worked by means of flint. Cutting, scraping and boring took place on wood. More heavy tasks like chopping, chiselling or splitting was not found on flint and was probably executed using stone adzes (Verbaas and Van Gijn 2007, 178). Two implements were used on bark. Together with the soft plants these implements can indicate the making of objects like baskets or nets. One implement was used on a siliceous plant, probably reed. This is fairly a-typical for the Bandkeramik period. Soft siliceous plant working is virtually absent at Bandkeramik sites in the Netherlands (Van Gijn 2010,89). The artefact used on reed and on of the implements used on bark are displayed in figures 12 and 19b.

Mineral materials were also worked at the site. Some implements were used for boring and scraping of mineral materials. This could indicate the production of ornaments. There were also two objects used for working clay and pottery. Seeing a large amount of Bandkeramik pottery is decorated these implements were probably used in the production process of the ceramics. One of the borers and a scraper used on clay are shown in figures 15, 16 19e and 19f.

In the previous research the distinctive 'polish 10' and 'polish 23' were also recognised. It is still a mystery on what kind of material the artefacts with this kind of polish were used. Experiments could not find the answer yet although 'polish 23', a polish typical for the LBK, probably occurs due to contact with a plant like material (Verbaas and Van Gijn 2007, 179).

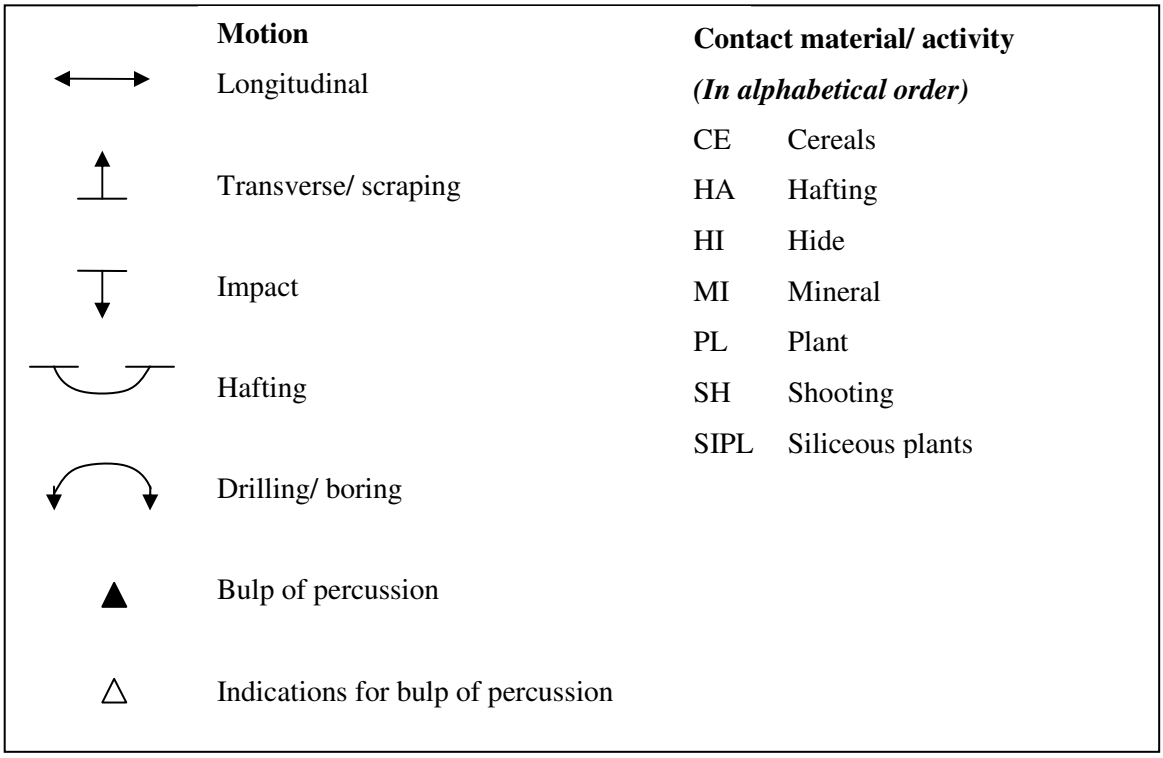


Figure 10. Symbols used in the drawings.

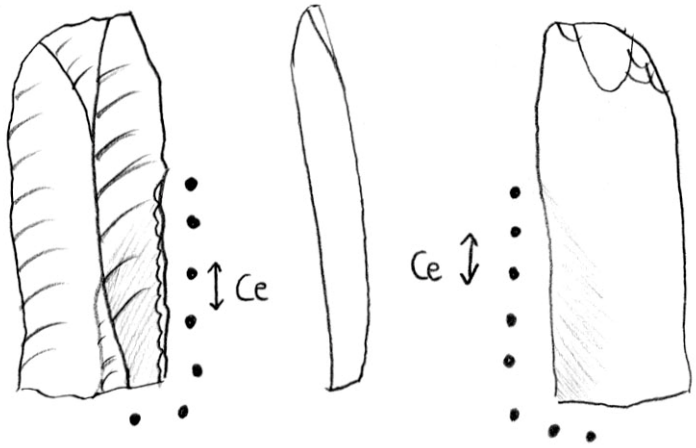


Figure 11. An artifact used for cutting cereals (scale 1:1) (31075 no. 4).

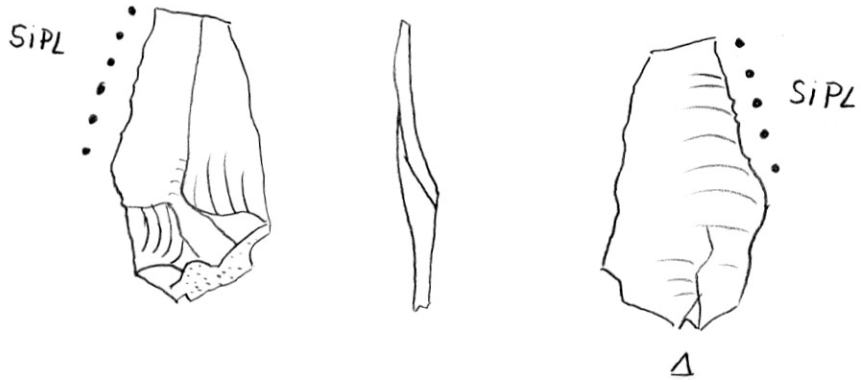


Figure 12. An artifact probably used on reed (scale 1:1) (28061 no. 5).

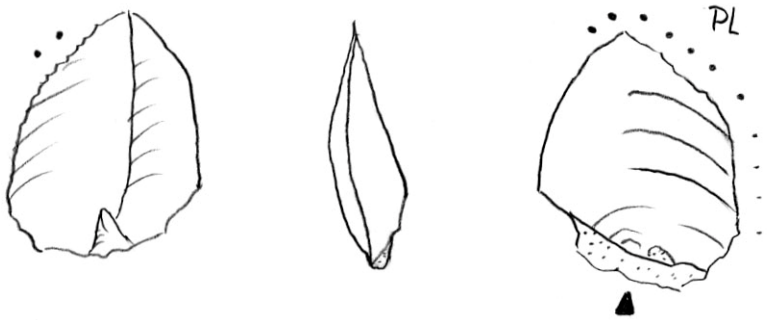


Figure 13. An artifact used on a plantlike material, probably bark (scale 1:1) (45004 no. 6).

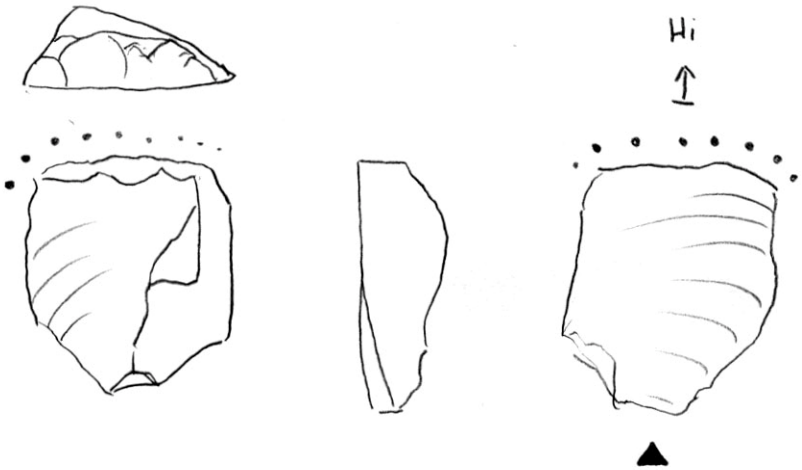


Figure 14. An artifact used for scraping hide (scale 1:1) (31075 no. 3).

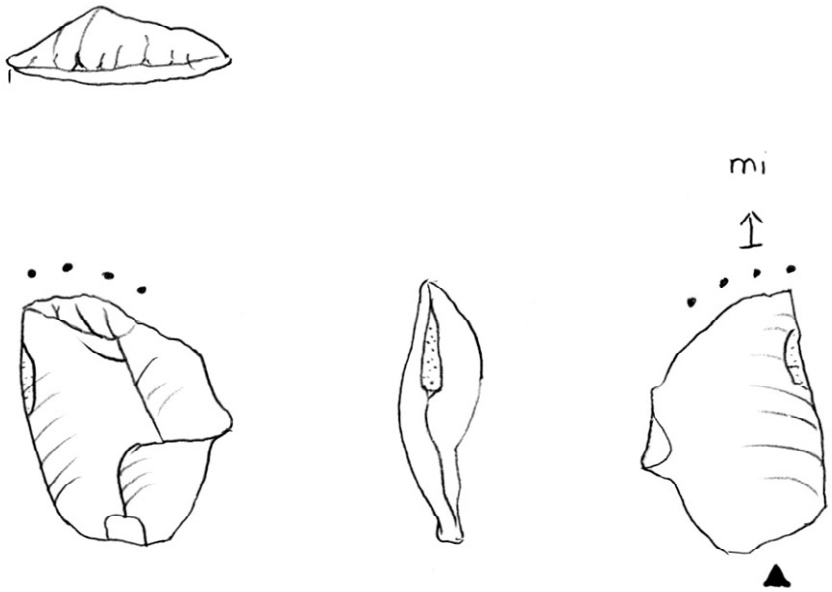


Figure 15. An artifact which was used to scrape leatherhard clay (scale 1:1) (56024 no. 3).

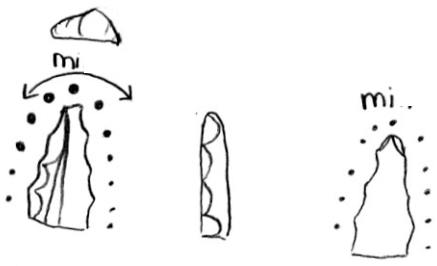


Figure 16. An artifact used for drilling in a mineral material (scale 1:1) (44012 no. 7).

Figure 17. An artifact used for shooting (scale 1:1) (15005 no. 4).

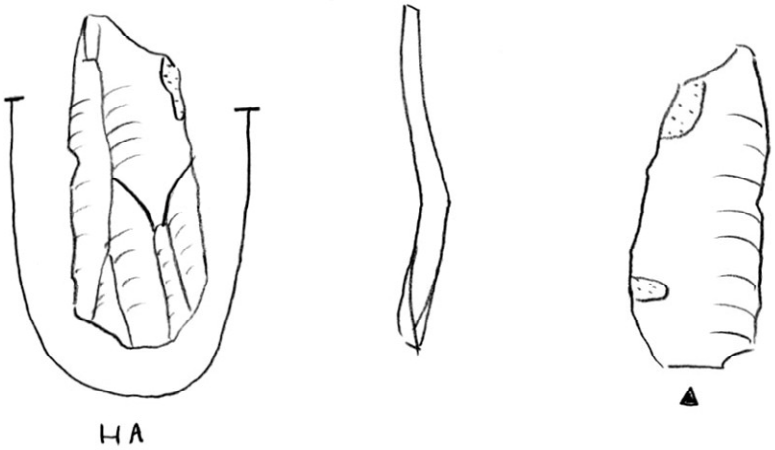
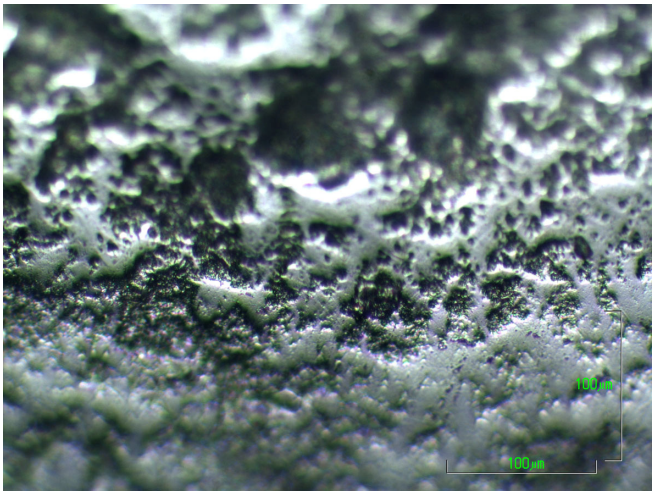
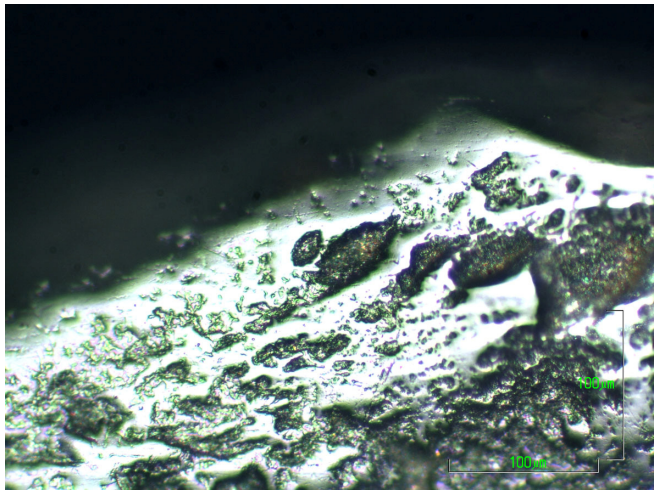


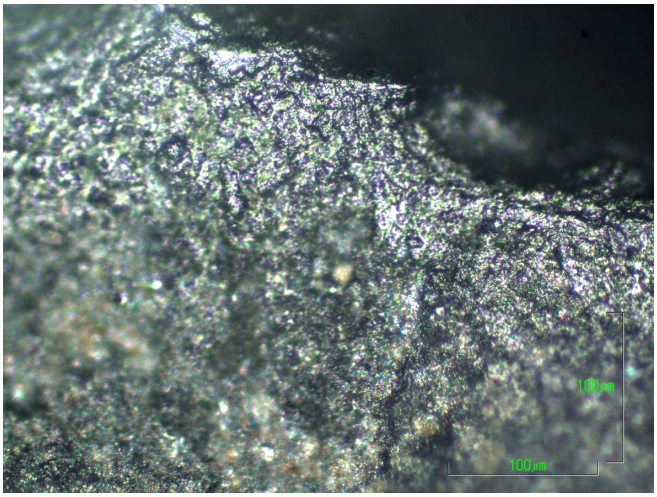
Figure 18. An artifact which was hafted in leather (scale 1:1) (55003 no.2).



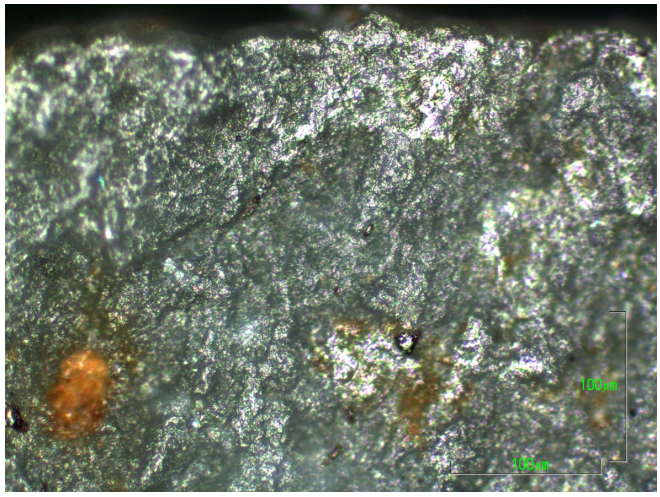
a (31075 no. 4)



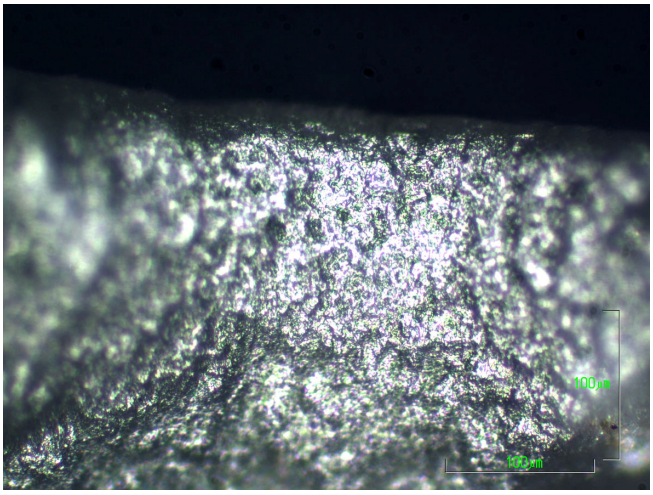
b (28061 no. 5)



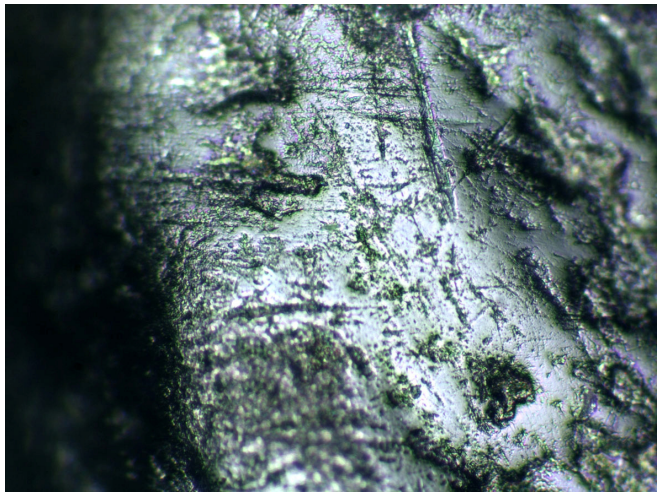
c (45004 no. 6)



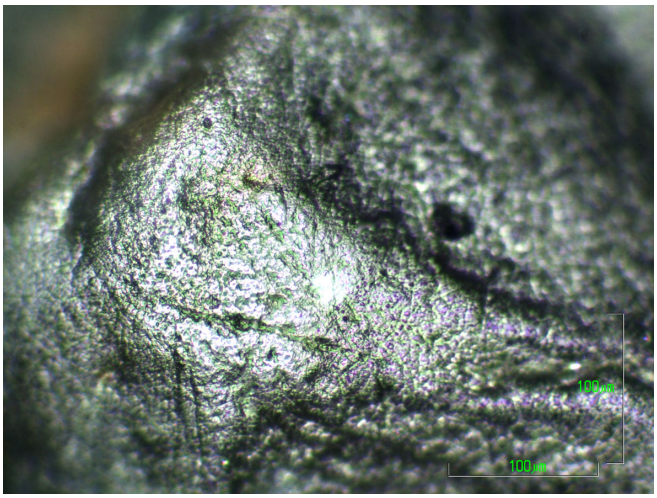
d (31075 no. 3)



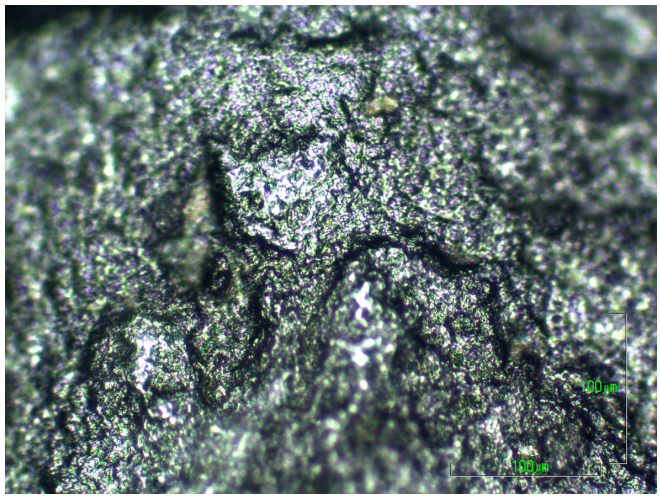
e (56024 no. 3)



f (44012 no. 7)



g (15005 no. 4)



h (55003 no.2)

Figure 19. Pictures of use-wear traces on the artifacts from figures 10-18. a: harvesting cereals, b: processing reed, c: working bark, d: scraping hide, e: scraping leatherhard clay, f: drilling a mineral material, g: abrasive traces from shooting, h: hafting traces on all ridges from leather.

4.2 The relationship between tool type and function

With use-wear studies it is always interesting to see whether form and function are correlated because flint often is only analyzed by typology. By analyzing the relationship between tool type and contact material and between tool type and motion it is possible to see whether tools were used for the tasks they were probably designed for (table 3 and 4). This analysis was already done in the 2007 publication. This research showed that although the majority of the tools were used for the activities they seemed to be designed for, the activities carried out with the tools are not restricted to the tool design. Borers and points are also used for different activities other than the obvious such as cutting and scraping (Verbaas and Van Gijn 2007, 183).

One thing which differs from the initial research is the contact material on borers. In the 2007 research it was noted that borers were used on hide and in one case on wood. With the new research however some borers were found which were used on mineral materials.

Table 3. The relationship between tool type and executed motion.

	longitudinal	*transversal*	*diagonal*	*boring*	*shooting*	*hafting*	*uns*	***Total***
unretouched flake	25	14	-	1	-	5	16	61
unretouched blade	30	19	2	-	-	18	21	90
retouched flake	2	7	-	-	-	-	2	11
retouched blade	12	2	-	1	-	2	1	18
borer	3	2	-	9	-	-	-	14
point	-	-	-	1	6	3	-	10
quartier d'orange	-	-	-	-	-	-	1	1
long end scraper	1	6	-	-	-	4	3	14
round scraper	-	4	-	-	-	-	2	6
short end scraper	1	30	-	-	-	4	10	45
scraper indetermined	-	3	-	2	-	-	3	8
core preperation blade	-	1	-	-	-	-	-	1
core preperation flake	-	-	-	-	-	-	1	1
block	-	2	-	-	-	-	-	2
knife unidentified	4	1	-	-	-	-	2	7
total	78	91	2	14	6	36	62	289

Table 4. The relationship between tool type and contact material.

	unretouched blade	*unretouched flake*	*retouched blade*	*retouched flake*	*borer*	*point*	*quartier d'orange*	*long end scraper*	*round scraper*	*short end scraper*	*scraper indetermined*	*core preperation blade*	*core preperation flake*	*block*	*knife unidentified*	***total***
plant	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	6
cereals	14	7	8	-	2	-	-	-	-	1	-	-	-	-	4	36
wood	8	3	-	-	1	-	-	-	-	1	-	-	-	-	-	13
reed	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
bark	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2
hide	22	18	5	6	8	-	-	10	5	27	5	-	-	1	-	107
soft animal	1	1	-	-	-	4	-	-	-	1	-	-	-	-	-	7
bone antler	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
clay pottery	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	2
mineral other	1	1	-	-	3	1	-	-	-	-	-	-	-	1	-	7
polish 10	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	3
polish 23	4	2	-	-	-	-	1	-	-	-	-	-	1	-	-	8
hard material	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	2
soft material	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	6
unsure	14	17	2	4	-	2	-	-	1	6	2	1	-	-	3	52
hafting	18	5	2	-	-	3	-	4	-	4	-	-	-	-	-	36
total	90	61	18	11	14	10	1	14	6	45	8	1	1	2	7	289

4.3. Comparisons with the previous analysis of Geleen-Janskamperveld.

The new research is quite similar to the earlier (table 5). Some new contact materials are recognized. For example bark was not recognized before, this could be because bark looks quite similar to dry hide and could be recognized as such in the past. The find of reed is also quite unique for the Bandkeramik. Overall the percentages are quite similar and no significant changes can be made for the old and the new analysis.

Table 5. Inferred contact materials, a comparison between the 2007 and this research (after Verbaas and Van Gijn 2007, 174).

	2007		*2011*	
	N	*%*	*N*	*%*
plant	4	1,8%	6	2,1%
cereals	30	13,2%	36	12,5%
wood	12	5,3%	13	4,5%
reed	-	-	1	0,3%
bark	-	-	2	0,7%
hide	80	35,2%	107	37,0%
soft animal	6	2,6%	7	2,4%
bone antler	1	0,4%	1	0,3%
clay pottery	1	0,4%	2	0,7%
mineral other	3	1,3%	7	2,4%
polish 10	3	1,3%	3	1,0%
polish 23	8	3,5%	8	2,8%
hard material	2	0,9%	2	0,7%
soft material	6	2,6%	6	2,1%
unsure	47	20,7%	52	18,0%
hafting	24	10,6%	36	12,5%
total	227	100,0%	289	100,0%

4.4. Comparisons of Geleen-Janskamperveld with other Bandkeramik studies.

Compared to some of the other Bandkeramik excavations at the Graetheide plateau Geleen-Janskamperveld is quite typical, although some difference between the different sites do occur. The variation of contact materials is somewhat higher on Geleen-Janskamperveld compared to the other excavations. This might be explained by the fact that Geleen-Janskamperveld is researched more recently and thus more knowledge is available about different contact materials (Van Gijn and Mazzuco in prep). Elsloo and Beek-Molensteeg were analyzed quite some time before Geleen-Janskamperveld. Elsloo Rivius however is also recently analyzed. The lack of variation can be recognized within table 6. Instead of 'hard material', different mineral materials are recognized. The high amount of hafting traces could also be explained this way. Hafting traces are difficult to recognize, especially when they are hafted using wood or skin. In the past these hafting traces were probably categorized as a working tool instead of a hafted implement. Keeping this in mind the different sites at the Graetheide plateau have quite similar domestic tasks for flint. Something which was to be expected seeming all other aspects of the Bandkeramik culture are also quite similar.

Table 6. Contact materials of different Bandkeramik excavations (after Van Gijn 1990, 91; Van Gijn and Mazzuco in prep).

	Geleen-JKV		*Elsloo old LBK*		*Elsloo new LBK*		*Elsloo Rivius*		*Beek-Molensteeg*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
plant	6	2,1%	1	0,4%	3	2,7%	-	-	13	8,7%
cereals	36	12,5%	15	6,0%	6	5,5%	17	18,1%	9	6,0%
wood	13	4,5%	29	11,6%	6	5,5%	11	11,7%	23	15,4%
reed	1	0,3%	-	-	-	-	-	-	-	-
bark	2	0,7%	-	-	-	-	-	-	-	-
hide	107	37,0%	124	49,6%	65	59,1%	39	41,5%	54	36,2%
soft animal	7	2,4%	7	2,8%	-	-	-	-	2	1,3%
bone antler	1	0,3%	15	6,0%	3	2,7%	-	-	-	-
clay pottery	2	0,7%	-	-	-	-	-	-	-	-
mineral other	7	2,4%	-	-	-	-	-	-	-	-
polish 10	3	1,0%	12	4,8%	-	-	1	1,1%	-	-
polish 23	8	2,8%	6	2,4%	4	3,6%	1	1,1%	6	4,0%
hard material	2	0,7%	12	4,8%	6	5,5%	1	1,1%	2	1,3%
soft material	6	2,1%	7	2,8%	3	2,7%	4	4,3%	4	2,7%
wood/bone antler	-	-	-	-	-	-	2	2,1%	4	2,7%
unsure	52	18,0%	18	7,2%	14	12,7%	8	8,5%	32	21,5%
hafting	36	12,5%	4	1,6%	-	-	10	10,6%	-	-
total	289	100,0%	250	100,0%	110	100,0%	94	100,0%	149	100,0%

Comparing the information of Geleen-Janskamperveld with Darion and Saint-Lambert, two Belgium Bandkeramik settlements outside of the Graetheide plateau, gives some more problems (table 7). Just like Elsloo and Beek-Molensteeg these use-wear studies were executed a long time ago. Also, these were executed not at the Laboratory of Artefact Studies. This results in different ways to categorize objects. For example, when objects are used on different zones they are still recorded as one aua. There are also some different activities recognized. The category depilation for example is used when hide with an abrasive material is recognized. Cereals however are categorized within the plant tools even though they are quite different from other plant activities. Despite these problems the same trend is still visible: a large amount of hide is worked at Bandkeramik sites.

In contrast, the use-wear traces of a Mesolithic site parallel to the Dutch Bandkeramik are shown in table 8. Plant working is a lot more important than hide working. So even though the Belgium use-wear study is executed by another laboratory the results are still more similar compared to other culture groups.

Table 7. The contact materials of Darion and Saint-Lambert (Cahen *et al.* 1986, 55-56).

	Darion		*Saint-Lambert*	
	N	*%*	*N*	*%*
total researched objects	869		181	
fresh meat	18	6,9%	15	16,5%
carcasses	6	2,3%	-	-
fresh skin	9	3,5%	-	-
dry skin	114	43,8%	26	28,6%
depilation	15	5,8%	-	-
bone	3	1,2%	-	-
wood	28	10,8%	29	31,9%
plant	18	6,9%	7	7,7%
reed	6	2,3%	2	2,2%
hard material	4	1,5%	-	-
undetermined	9	3,5%	-	-
mixed materials	19	7,3%	-	-
hafting	11	4,2%	12	13,2%
total with use-wear	260	100,0%	91	100,0%

Table 8. The inferred use-wear traces of Hardinxveld-Giessendam Polderweg phase 1. A Mesolithic site parallel to the Bandkeramik period (after Van Gijn et al. 2001, 146)

	Polderweg phase 1	
	N	*%*
siliceous plant	30	26,1%
wood	9	7,8%
bone/antler	11	9,6%
hide	13	11,3%
fish	1	0,9%
mineral material	4	3,5%
polish 10	1	0,9%
unsure	36	31,3%
hafting	10	8,7%
total	115	100,0%

4.4. The distribution of the use-wear traces on flint

In this paragraph a spatial analysis of the use-wear study will be applied to Geleen-Janskamperveld. This might give some clues for deciding which model proposed before is more plausible for this site.

The use-wear traces which are linked to individual houses are plotted within figure 20. In table 9 all use-wear traces and their percentages per house are shown in detail. At most houses indications of hide working on tools appeared to be represented in rather large quantities. This is consistent with the overall results of the use-wear study of this site. However some houses have a quite different toolkit. Within the pits alongside houses 51 and 56 no hide working tools seem to be present along the researched flint. House 21 and house 49 also have quite a low percentage of use-wear traces from contact with hide, namely 12.5% and 15%. However, the latter house mainly has such a low percentage because of the large number of wear traces from unknown contact materials (12 of the 20 working edges). The two houses without any apparent tools with hide working traces are both dated to the first ceramic phase: 1a. House 51 is categorised as a type 1c house, the other house, no 56, is categorised as a type 2 house. The other house with a low percentage of hide working tools, house 21, is dated within the ceramic phase 1d and is categorised as a type 1c house.

These results are not significant enough in my opinion to make hard conclusions about specialisation. Most houses show the same kind of activities. The exceptions could just as easily be the result of the research methods and the small sample. So for now no specialisation between different houses is recognised by means of use-wear studies. This is in line with the conclusions based on the technological study executed by de Grooth (2007, 158). She also did not find differences between the different houses as well as between the different wards; in this case the north-east ward and south-west ward proposed by Van de Velde.

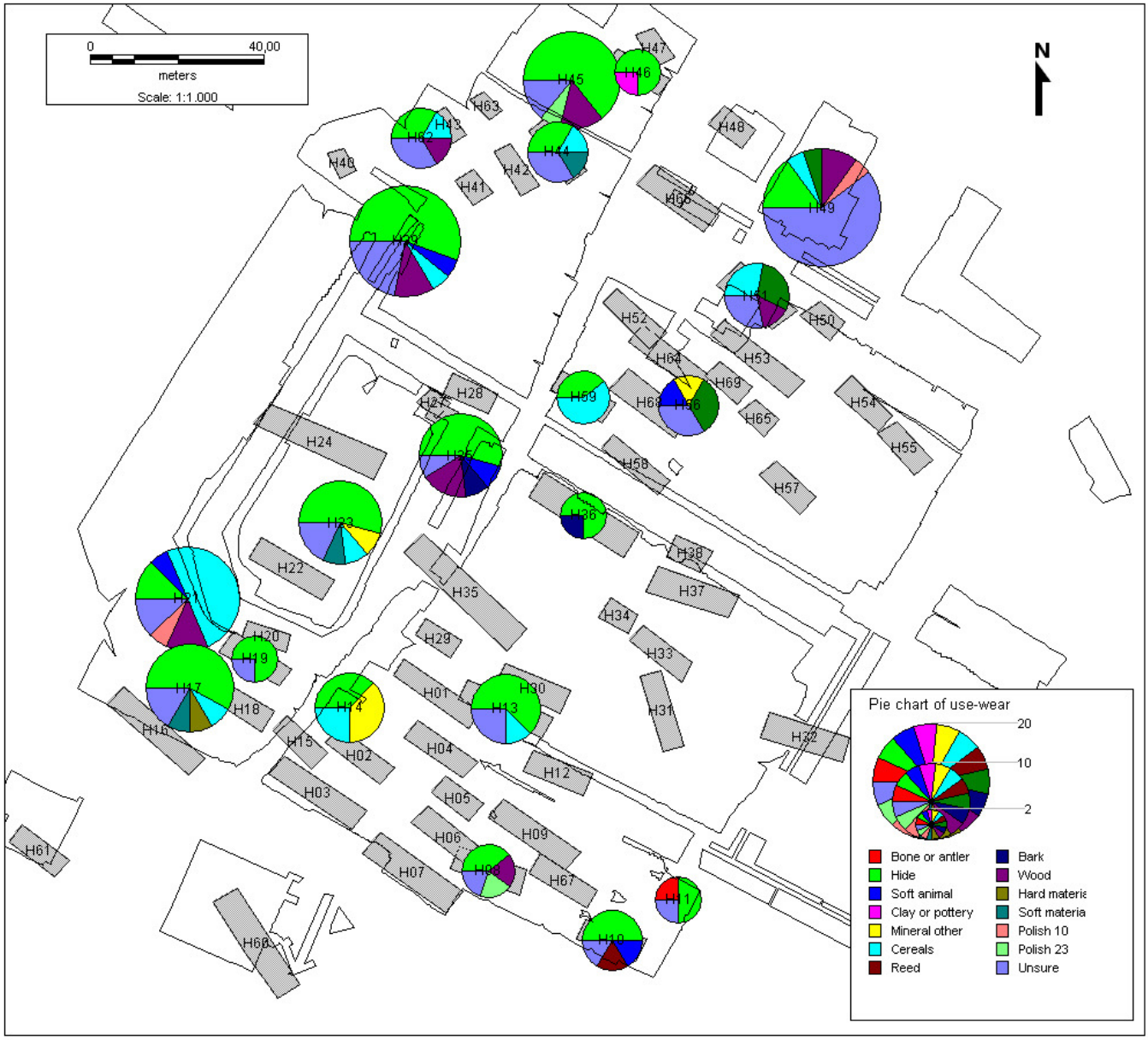


Figure 20. A map of Geleen-Janskamperveld showing the different percentages of use-wear traces per house. The exact numbers can be found in table 3.

Table 9. (next page). The different use-wear traces according to houses. The hafting traces are not included within the count and the percentages. Houses with only one recognized working edge are not taken into the analysis as well but are shown within this table.

	bone antler	*hide*	*soft animal*	*clay pottery*	*mineral other*	*cereals*	*reed*	*plant*	*bark*	*wood*	*hard material*	*soft material*	*polish 10*	*polish 23*	*unsure*	***total***
no house	-	33	2	1	2	13	-	3	-	-	1	3	1	3	13	75
H8	-	2	-	-	-	-	-	-	-	1	-	-	-	1	1	5
	-	40,0%	-	-	-	-	-	-	-	20,0%	-	-	-	20,0%	20,0%	
H10	-	3	-	-	-	-	1	-	-	-	-	-	-	-	1	5
	-	50,0%	-	-	-	-	16,7%	-	-	-	-	-	-	-	16,7%	
H11	1	2	-	-	-	-	-	-	-	-	-	-	-	-	1	4
	25,0%	50,0%	-	-	-	-	-	-	-	-	-	-	-	-	25,0%	
H12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
H13	-	5	-	-	-	1	-	-	-	-	-	-	-	-	2	8
	-	62,5%	-	-	-	12,5%	-	-	-	-	-	-	-	-	25,0%	
H14	-	3	-	-	3	2	-	-	-	-	-	-	-	-	-	8
	-	37,5%	-	-	37,5%	25,0%	-	-	-	-	-	-	-	-	-	
H17	-	7	-		-	1	-	-	-	-	1	1	-	-	2	12
	-	58,3%	-	0,0%	-	8,3%	-	-	-	-	8,3%	8,3%	-	-	16,7%	
H19	-	3	-	-	-	-	-	-	-	-	-	-	-	-	1	4
	-	75,0%	-	-	-	-	-	-	-	-	-	-	-	-	25,0%	
H21	-	2	1	-	-	8	-	-	-	2	-	-	1	-	2	16
	-	12,5%	6,3%	-	-	50,0%	-	-	-	12,5%	-	-	6,3%	-	12,5%	
H23	-	6	-	-	1	1	-	-	-	-	-	1	-	-	2	11
	-	54,5%	-	-	9,1%	9,1%	-	-	-	-	-	9,1%	-	-	18,2%	
H25	-	6	1	-	-	-	-	-	1	2	-	-	-	-	1	11
	-	54,5%	9,1%	-	-	-	-	-	9,1%	18,2%	-	-	-	-	9,1%	
H29	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
H31	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
H36	-	3	-	-	-	-	-	-	1	-	-	-	-	-	-	4
	-	75,0%	-	-	-	-	-	-	25,0%	-	-	-	-	-	-	
H39	-	10	1	-	-	1	-	-	-	2	-	-	-	-	4	18
	-	55,6%	5,6%	-	-	5,6%	-	-	-	11,1%	-	-	-	-	22,2%	
H42/H44	-	2	-	-	-	1	-	-	-	-	-	1	-	-	1	5
	-	40,0%	-	-	-	20,0%	-	-	-	-	-	20,0%	-	-	20,0%	
H43/H62	-	2	-	-	-	1	-	-	-	1	-	-	-	-	2	6
	-	33,3%	-	-	-	16,7%	-	-	-	16,7%	-	-	-	-	33,3%	
H45	-	9	-	-	-	-	-	-	-	2	-	-	-	1	2	14
	-	64,3%	-	-	-	-	-	-	-	14,3%	-	-	-	7,1%	14,3%	
H46	-	3	-	1	-	-	-	-	-	-	-	-	-	1	-	5
	-	60,0%	-	20,0%	-	-	-	-	-	-	-	-	-	20,0%	0,0%	
H49	-	3	-	-	-	1	-	1	-	2	-	-	1	-	12	20
	-	15,0%	-	-	-	5,0%	-	5,0%	-	10,0%	-	-	5,0%	-	60,0%	
H51	-	-	-	-	-	2	-	2	-	1	-	-	-	-	2	7
	-	-	-	-	-	28,6%	-	28,6%	-	14,3%	-	-	-	-	28,6%	
H56	-	-	1	-	1	-	-	2	-	-	-	-	-	-	2	6
	-	-	16,7%	-	16,7%	-	-	33,3%	-	-	-	-	-	-	33,3%	
H57	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
H59	-	2	-	-	-	3	-	-	-	-	-	-	-	-	-	5
	-	40,0%	-	-	-	60,0%	-	-	-	-	-	-	-	-	-	
H64	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1

5. Two alternative models of settlement structure

As mentioned in the introduction, one of the goals of this thesis is trying to see whether use-wear studies are useful for choosing the better model. In this chapter the information of the literature studies will be compared to the use-wear study to find answers to the question: Two settlement structures have been proposed for Geleen-Janskamperveld, can the results of use-wear studies help in deciding which of the two is most likely?
Some of the other aspects of Rücks model will also be discussed; the reconstruction of houses on poles and the duration of Bandkeramik house are questioned in the next paragraphs.

5.1 Houses on poles

Rück proposes in his model not only new structures for the settlement but he also proposes a different kind of reconstruction for Bandkeramik houses: houses on poles. The main argument for houses on poles is the assumption that all settlements were built on steep slopes, all with an inclination in the same direction. Even though Rück discusses settlements at the Graetheide Plateau like Elsloo he neglects to take these settlements into his comparison about the steep slopes.
The settlement Geleen-Janskamperveld is clearly built on the flattest surface in the area; it has almost no gradient (Louwe Kooijmans 2007, 15). This also goes for the other sites of the Graetheide Plateau. The Bandkeramik site at Sittard for example has an inclination of approximately 3 % in the direction of the stream Geleen, the southeast (Bakels 1978, 133). The Bandkeramik site at Elsloo is also situated on a rather flat surface, although on the border of a slope. This slope however, is going in a north-western direction, the opposite direction of Rücks model (Modderman 1970, 4). The houses in contrast, are still in the same directions as at the other excavations. Lastly, the Bandkeramik excavation at Stein also shows a Bandkeramik settlement which is located on a level piece of land (Modderman 1970, 80).
Because the Bandkeramik culture came as one package to the Graetheide plateau it is likely that also the houses which were constructed would have been similar to the different settlements in this region, something which is evident in the plans of houses. This may imply that none of the houses were built on poles because the main argument, the steep slopes, is invalid at the Graetheide plateau. However it could also imply that all houses were built on poles because the houses were part of a cultural package and the original models came from a place where settlements on steep slopes were relevant. The excavation at Elsloo contradicts this, because the slope is going the wrong direction. However, this is something which is beyond the scope of this thesis.

To conclude, there is no clear evidence of houses built on poles at the Graetheide plateau. However, if the decision to build houses on poles was purely a cultural one it would not have left clear traces because the house plans can not tell us how the houses were reconstructed above ground. Only the large uprights are recognized. The alternative reconstruction of Bandkeramik houses therefore cannot be discarded completely.

5.2 The duration of a house generation

The ward model is based on several assumptions. One of the main assumptions is the idea that one house generation covers approximately 25 years. This time span was first proposed by Modderman and he based this idea on two different assumptions. The first assumption is that wood degrades after 25 years. However oak is one of the most durable woods found in the Dutch loess region. It has a durability in humid soil between 10 till 25 years; exposed to weather and wind oak is durable between 25 to 50 years (Bakels 1978, 82). This is however, measured on wood which was not part of houses. Bakels already had the idea that wood within houses could survive longer under influence of for instance a constant fire inside the house (Bakels 1978, 143). New research also shows a life duration of oak up till a hundred years (Schmidt *et al.* 2005, 152).

The second assumption is based on the idea that houses had no major repairs, something Modderman observed (Bakels 1978, 143). Rück, however, does not only see repairs, he even sees later expansions of houses which certainly resulted in a longer duration of houses, far exceeding the 25 years proposed in the past (Rück 2009, 159). Within the archaeological context of the Bandkeramik culture organic materials are not preserved very often. This makes research of wood in Bandkeramik context difficult. However one of the most spectacular wooden finds, a well at Erkelenz-Kückhoven, shows not only skilled craftsmanship of construction but also of repair, using techniques far exceeding our previous expectations about craftsmanship in the Bandkeramik period (De Grooth and Van de Velde 2005, 226; Schmidt *et al.* 2005, 152).

This has some consequences for other assumptions as well. When houses last longer, more inhabitants would have lived in a given settlement; also there has to be a larger number of wards or a larger amount of houses per ward than traditionally assumed. The assumption that houses last a generation of 25 years, leads to a distance between the houses of 25 to 50 metres. However, with a larger number of contemporary houses this distance should be reduced, and the settlements probably had a higher density (Rück 2009, 163).

An additional argument for a higher density of houses comes from new climatological research. Dendrochronological research shows that the Bandkeramik period had been

wetter than nowadays' climate. The climate may also have been slightly warmer. These two data in combination with the fertile loess grounds could result in higher agricultural yields and thus more inhabitants at the same time. The growth of oak was probably above average as well (Schmidt *et al.* 2005, 151).

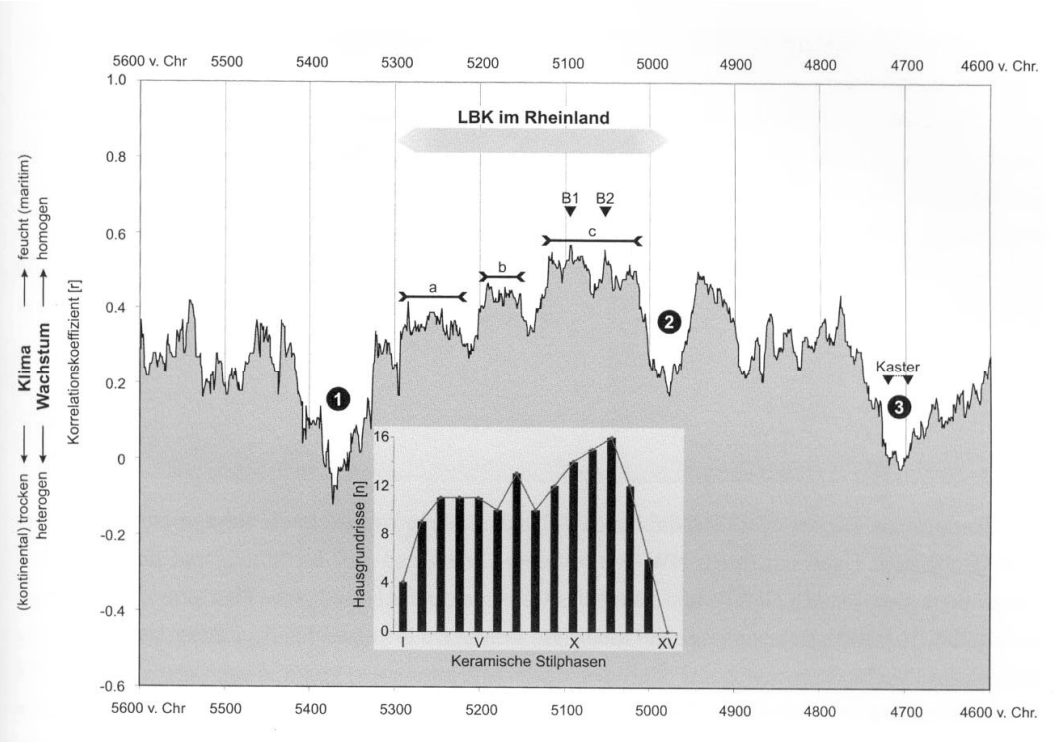


Figure 21. A reconstruction of the climate from 5600 till 4600 BC (Rück 2007, 139).

Louwe Kooijmans assumes that the largest houses at Geleen-Janskamperveld, the *Großbau* type 1a lasted 30 to 40 years. He also assumes that the other houses lasted only 20 to 30 years (Louwe Kooijmans *et al.* 2003, 381). In the later publication of Geleen-Janskamperveld Van de Velde struggles with the generations of LBK houses. On the one hand he knows the old assumptions are not valid any more. So to quote him: "*if the concept House Generation has any ground, it is a social not a functional one causing new constructions to be erected every 20 to 25 years*" (Van de Velde 2007d, 227). Van de Velde tries to find a more exact time span for house generations using the ceramic data compared with the ^{14}C dating and the information of other sites. This results in a house generation of 13.3 years (Van de Velde 2007c, 219) or a house generation of 15 years (Van de Velde 2007d, 238). He already noticed himself that some problems might occur with this quite low estimate. The most important problem concerns the placement within the chronology. With such a short time span of house generations and the typical ceramics found, the Flomborn phase, one of the first phases within the Bandkeramik culture, would then have had a shorter duration at the Graetheide plateau than always assumed. The Graetheide plateau would not correlate anymore with the adjacent

Bandkeramik region the Aldenhovener Platte (Van de Velde 2007d, 238). This would also mean that in Bandkeramik times perfectly good houses would have been broken down to be rebuild a couple of metres away, something, which to my opinion, is not very logical. However logic is not always an argument for explaining human behaviour, especially because we do not know their way of thinking and thus their logic.

When a longer duration of a house generation is assumed, the lateral side pits probably do not represent the whole lifespan of a house but only the beginning, or the first 10 years of a house, which also means that the flint regarding this thesis represents only the beginning of the house generation. This is however more likely than a very short house generation.

5.3 Different settlement models applied to Geleen-Janskamperveld

Now it is time to apply the different models to Geleen-Janskamperveld to find out which model is more likely. When trying to adjust Rücks model, which was applied to the 2003 map of Geleen-Janskamperveld, to the 2007 version of the distribution map some

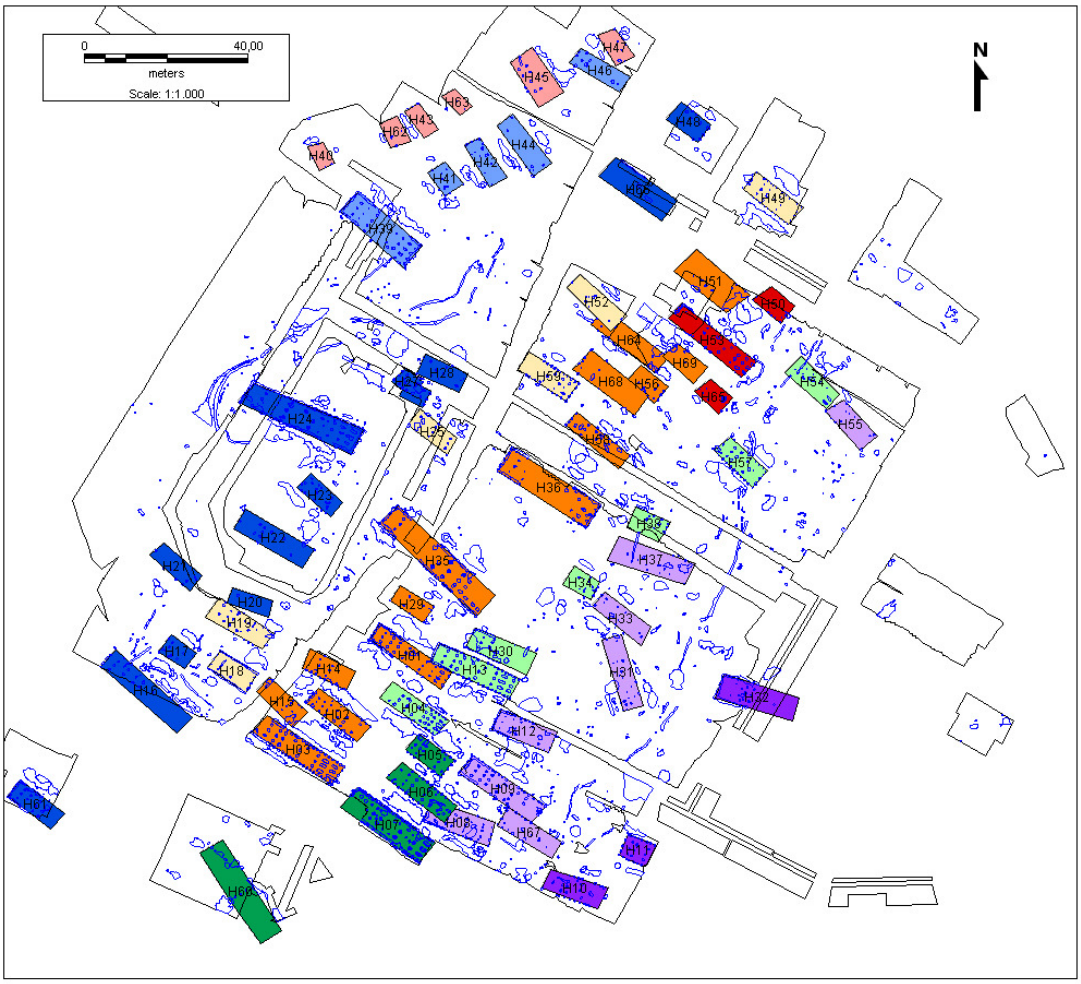


Figure 22. The alternative model applied to the 2007 excavation map (after: Rück 2007, 127).

problems occurred (figure 22). For one thing the houses are not as aligned as Rück assumes. This was already visible within the older version, but after the revision of the houses in the 2007 publication, it is clear that the gable ends of the houses are very often not aligned. Rück also did not take the ceramic dating into account because in the 2003 publication, the one he used, no second habitation period was recognised and he assumed that the ceramic dating of the first habitation phase were not relevant because of the longer duration of the individual houses. However a second habitation period is relevant even when houses would have been used longer. So first, the ceramic dating phases from the publication of Van de Velde will be discussed (Van de Velde 2007d, 228-232), then I will try to combine this information with the use-wear study to find the better model.

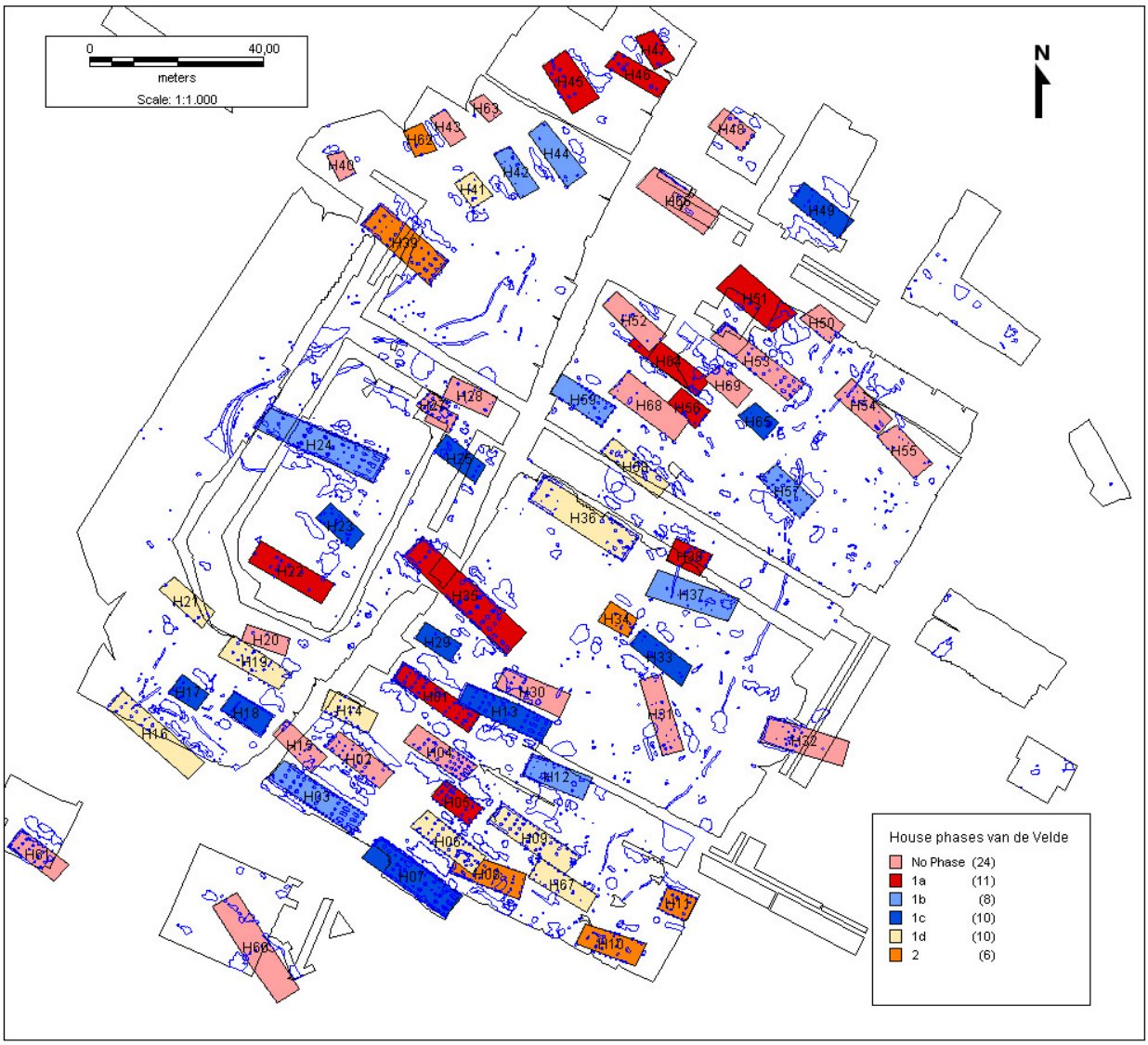


Figure 23. The different ceramic phases of Geleen-Janskamperveld shown all at once, the blue lines represent all traces from the LBK (after Van de Velde 2007d, 228-232).

In figure 23 all ceramic phases Van de Velde recognized are visualized within one map. When looking at the analysis, based on the ceramic dating of the houses, some things are noticeable. For one thing, a lot of the houses are not datable with ceramics; 24 houses of the 69 are undatable. This gives some problems with the arrangement of the different areas. Something else worth noticing is the fact that some of the houses from the same phase are very close to each other. For example house 46 and house 47 are very close together just like house 56 and house 64. In one case two houses of the same period even overlap: house 09 and house 67. This shows us that we have to be careful with the ceramic periodization.

Figure 24. The Ceramic phase 1a and 1b are shown together with the use-wear pie charts from these phases. The bleu lines represent the possible alignments of Rücks model.

Van de Velde already described that within some of the side pits several ceramic periods are represented (Van de Velde 2007d, 236). When assuming that houses would have lasted longer than the approximately 20 years, already discussed in a previous paragraph, houses from different phases also would be contemporary. This does not mean that all houses were used at the same time; some houses overlap, like house 01 and house 13. Houses from the second phase are still from a completely different occupation period.

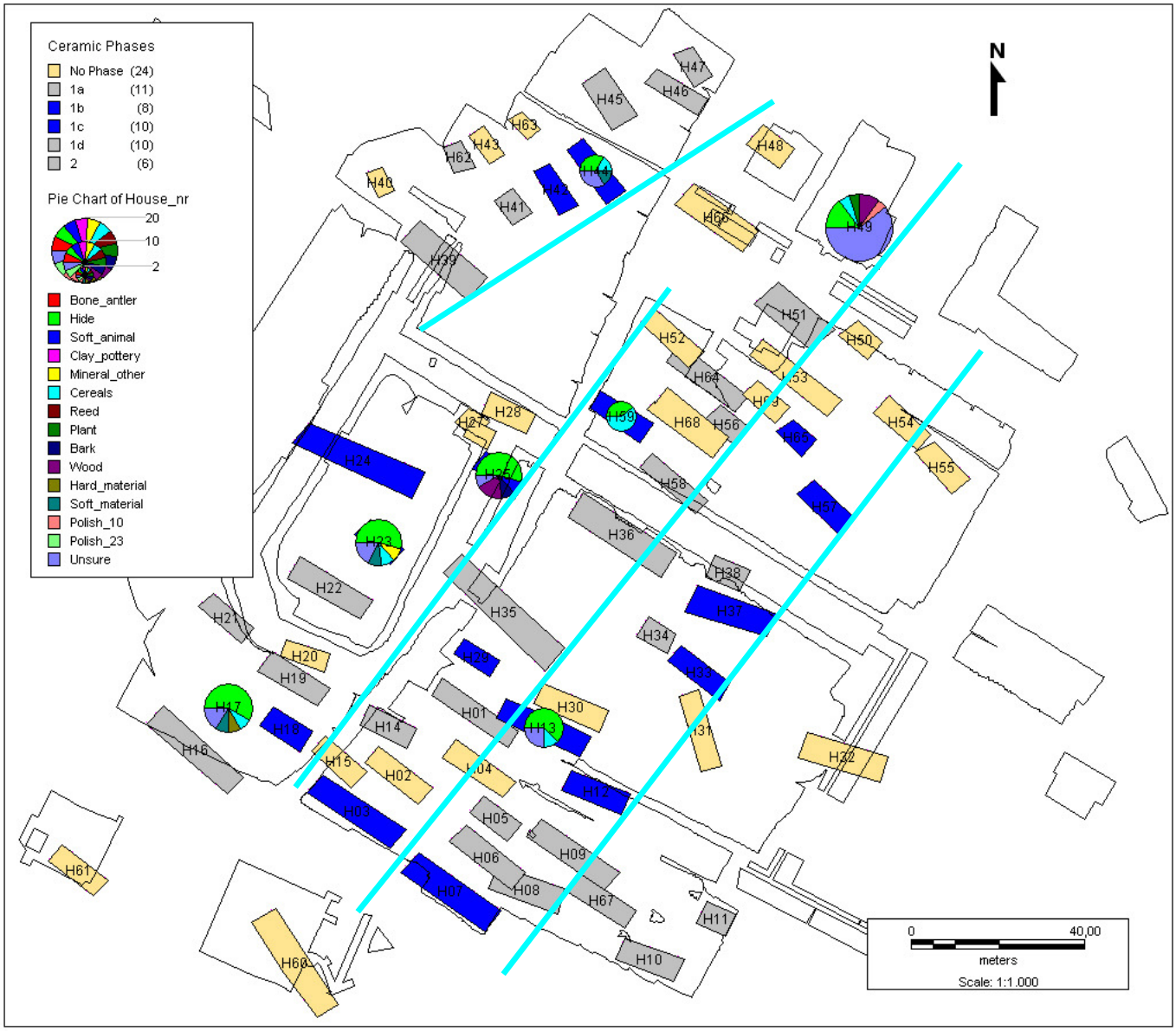


Figure 25. The Ceramic phase 1b and 1c are shown together with the use-wear pie charts from these phases. The bleu lines represent the possible alignments of Rücks model.

In figure 24, 25 and 26 two successive ceramic phases from the first occupation period are merged together. So in figure 24 ceramic phase 1a and 1b are shown together, in figure 25 phase 1b and 1c are shown together and in figure 26 phase 1c and 1d are shown together. In only one case two houses overlap. This however are the two houses which

are both dated within the phase 1d, no new overlaps occur which could contradict the merge of the separated phases.

In figure 24-27 I tried to apply the model of Rück again within the different ceramic phases. When looking at figure 24 it seems possible that the houses were built within lines of Rücks model; almost all houses are aligned. However, when moving up with time these lines are becoming less clear. In figure 26 the alignment of the houses is not convincing anymore. Also within the second occupation phase (figure 27), alignments are not clear. Only two houses could be placed within a line: house 08 and house 34. Within this map it may look like house 10 and 11 might also be aligned, but house 11 was found at the border of the excavation and the gable end of the house was not found because it fell outside of the excavation.

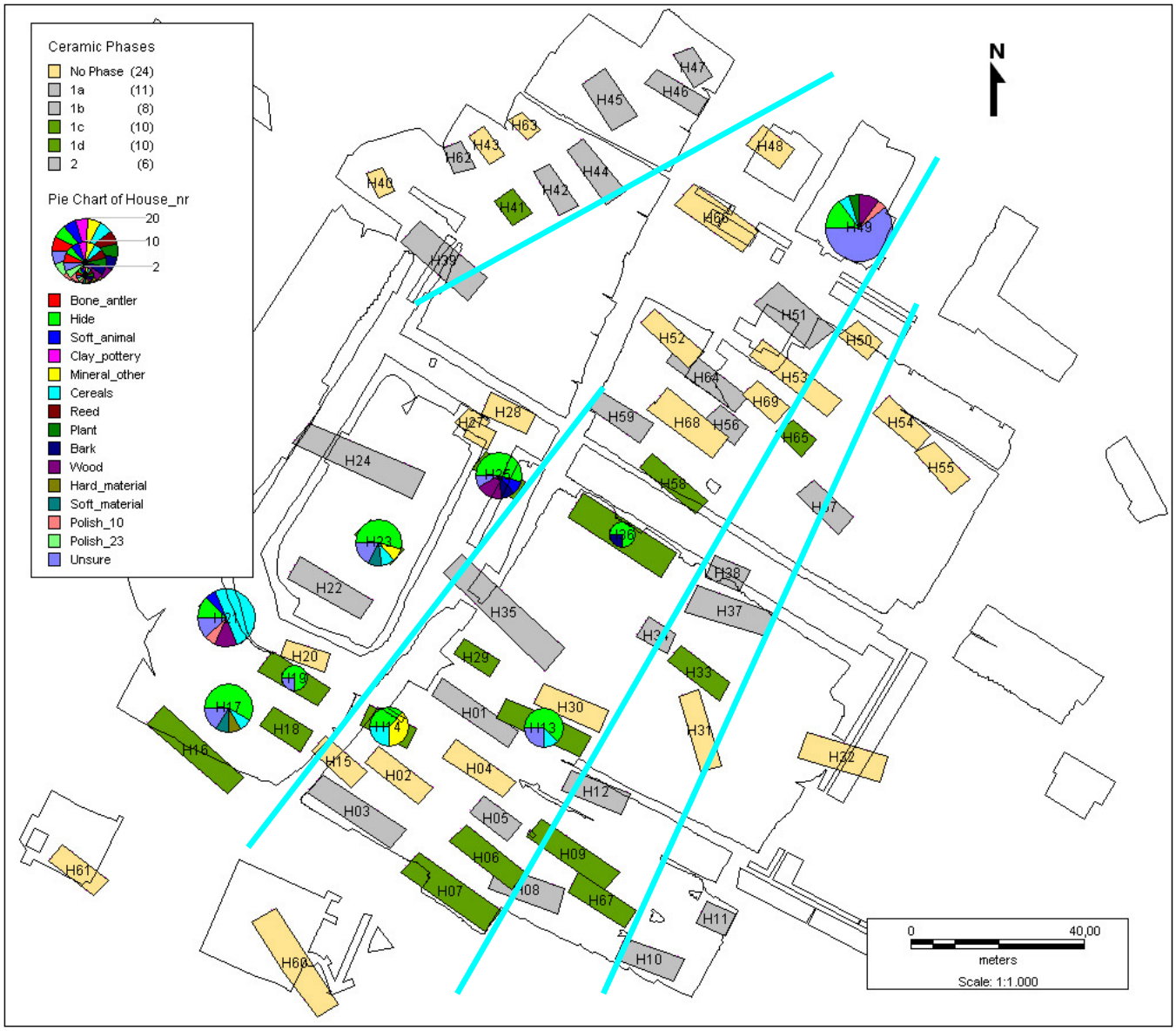


Figure 26. The Ceramic phase 1c and 1d are shown together with the use-wear pie charts from these phases. The bleu lines represent the possible alignments of Rücks model.

In the same figures the use-wear traces of the houses of these phases are also plotted again. Only in the first map, and thus in the oldest phase, some specialisation might be recognisable. Here the use-wear results between different houses really differ. All other maps do not show any specialisation. Unfortunately for this first phase only houses from the hypothetical north-eastern ward are analysed for the first phase so nothing can be said about the wards proposed by Van de Velde.

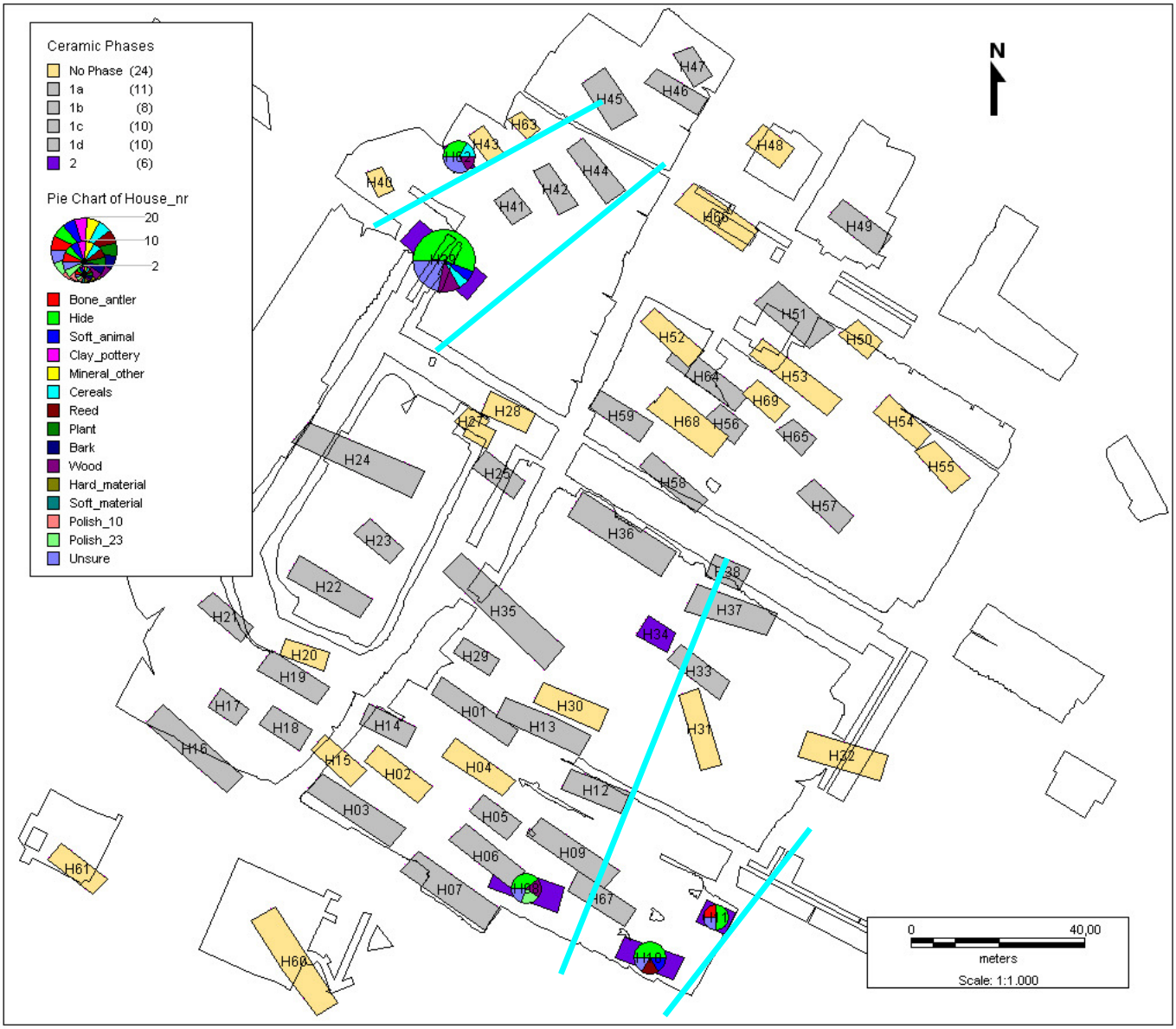


Figure 27. The Ceramic 2 is shown together with the use-wear pie charts from this phase. The bleu lines represent the possible alignments of Rücks model.

5.5 Other features

Apart from the houses, the ceramic dating and finds, other features also might be of use for determining how the settlement was structured. Figure 28 shows the ditches and fences which were recognised at Geleen-Janskamperveld. The ditches or palisades are dated to the first phase of the settlement. They were probably not part of an enclosure; the high amount of entrances combined with the fact that the ditch or palisade was probably not very large and thus not useful to stop a grown man supports this idea. The ditch or palisade was probably built to keep children and pigs in and phantoms and wildlife out (Van de Velde 2007b, 82). The fences might not be contemporary with the settlement because of the way they are arranged (Van de Velde 2007b, 85). The ditches do not show a separation within the settlement within lines or clusters. It rather was the outer border of the settlement in its first phase.

Figure 28. The ditches and fences found at Geleen-Janskamperveld (Van de Velde 2007b, 81).

6. Conclusion

Bandkeramik settlements have complex structures. Different models are proposed to find how these settlements are structured. The main model, the *Hofplatz* model, argues that settlements are clustered into smaller wards with one or several houses at a same location succeeding each other. An alternative model proposed by Rück shows quite a different structure where more houses are contemporary and are aligned instead of clustered. Geleen-Janskamperveld is a typical Bandkeramik settlement found at the Graetheide plateau in the south of the Netherlands. With this in mind two main questions were asked for this research:

- What are the activities carried out within the different houses at Geleen-Janskamperveld? Are there any differences between these different houses?
- Two settlement structures have been proposed for Geleen-Janskamperveld, can the results of use-wear studies help in deciding which of the two is most likely?

By the means of a use-wear study of flint, the executed activities at the different houses could be inferred. Bandkeramik flint is very suitable for this kind of research so the analysed flint showed very clear traces of use. A variation of different activities was recognised including some activities which were not recognised in previous research such as the use of flint on reed and bark. The predominant contact material by far was hide. Because of the large amount of scraping tools hide processing was probably a major activity within the settlement. Almost all houses show hide implements. The maintenance and retooling of cereal harvesting tools is also a common activity executed within the settlement. Over half of the houses had cereal harvesting tools. Other activities carried out with the use of flint are less dominant within this research. Processing materials such as plants, wood, mineral materials and clay as well as the activities carried out with the objects carrying the unexplained distinctive traces ‘polish 10’ and ‘polish 23’ are recognised just at some of the houses. No significant specialisation was visible between the houses. This might be explained by the low sample, although the results of the technological flint study and the ceramic study from the 2007 publication tell the same story. For now the first question can be answered with the notion that no specialisation took place at the settlement of Geleen-Janskamperveld.

Because no significant specialisation was found between the different houses the use-wear study could not help much with ginding the better model for the settlement structure

of Geleen-Janskamperveld. For this reason the models are mainly analysed by the means of a literature study. Different aspects of Rücks model could be discussed this way.
Rück proposed an alternative reconstruction of Bandkeramik houses in which houses are build on poles. The main argument for this alternative reconstruction: the steep slopes on which the Bandkeramik houses were build, is not valid for Geleen-Janskamperveld as well as the other vomparable settlements at the Graetheide plateau. Hence the reconstruction of Bandkeramik houses on poles in not very plausible.
Within the same argument Rück also proposed a longer house generation for Bandkeramik houses. This argument is more plausible and already noted by other authors before, so for the rest of the analysis the extended house generations are used.
A visual analysis is executed to find possible settlement structures at Geleen-Janskamperveld. This resulted in several maps which clearly show that the model of Rück is not plausible for this excavation. No real alignments are apparent. A model in which clusters of several houses succeed each other is more plausible. This is supported by other features such as ditches.

One aspect of Rücks model I did not take into account: the repairs and enlargements of Bandkeramik houses. To see whether these took place at this site a more detailed investigation of the plans of the individual houses is needed.
For subsequent research one might also look at some of the other Bandkeramik settlements at the Graetheide plateau in the same way. If they show a similar pattern it might be possible to conclude that all settlements at the Graetheide plateau were also in this aspect similar.

Although Rücks new model is not always applicable for Geleen-Janskamperveld he reached an important goal; he makes us reconsider the old models, which are used for decades, something which is very important in archaeology because new data presents itself every day.

Abstract

The Bandkeramik culture came to the Netherlands as a complete package. This new culture settled itself at the Graetheide plateau in the south of the Netherlands on the fertile loess grounds. Geleen-Janskamperveld is one of these Bandkeramik settlements. All aspects of the Bandkeramik culture are very similar between the different settlements so models are very suitable to analyzee the Bandkeramik culture.

One of these aspects which has different models, is the settlement structure. The *Hofplatz* model is used for centuries as the main model for the Bandkeramik culture. Within this model clusters of houses represent successive houses and thus continuity on a single location. There is still some disagreement whether one or several houses were in use at one time within such a cluster.

Rück proposed a different model in which the settlement is structured along lines. He also proposed a different reconstruction of the houses and he assumes a longer use-life for the individual houses: up till a 100 years instead of the 25 years which is used most.

Within this research a use-wear study of the flint artefacts found at Geleen-Janskamperveld is executed with the hope of finding some specialization between different houses. This information could help with finding which of these models is best suitable for this excavation. Some use-wear study was already done in the past. The results of the previous study are used for this new research. The predominant contact material found at Geleen-Janskamperveld is hide, followed by cereal harvesting tools. This is in line with other Bandkeramik sites in the Netherlands which were studied in the same way. Other contact materials like wood, reed, bark, meat, bone, clay, mineral materials and the mysterious contact materials which produces ‘polish 10’ and ‘polish 23’ were also recognised. Unfortunately no real specialization was found between the different houses of Geleen-Janskamperveld. The rest of the analysis therefore is based on the literature.

Rück proposed new models for different aspects of the settlement. He argues that houses were built on poles instead of on the ground. His main argument, steep slopes on which the houses were built in Bandkeramik times, is not valid for the Dutch LBK. His argument about the duration of a house generation is more plausible. The old arguments for a house generation are a bit outdated. Houses probably would have last longer. A visual analysis is executed to find possible settlement structures at Geleen-Janskamperveld. This resulted in several maps which clearly show that the model of Rück is not plausible for this excavation. No real alignments are apparent. A model in which clusters of several houses success each other is more plausible. This is supported by other features such as ditches.

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